Östersjöregionens ECRR
www.euradcom.org

YTTRANDE
Stockholm 2013-12-31

Till:

Mark- och miljödomstolen vid Nacka tingsrätt
Box 1104
131 26 Nacka Strand
mmd.nacka@dom.se

Mark- och miljödomstolens
mål nr: 1333-11

Kopia för kännedom till:
Strålsäkerhetsmyndigheten
171 16 Stockholm
registrator@ssm.se

ECRR:s synpunkter på SKB:s yttrande den 18 november 2013 om kompletteringskrav och Strålsäkerhetsmyndighetens skrivelse den 26 november 2013.

Comments on the SKB´s opinion stated 18th of November 2013 on the additional information required and the statement by the Swedish Radiation Safety Authority on 26th of November 2013.

Outstanding information still to be answered by SSM and SKB regarding (1) SKBs application to build the Forsmark Spent Nuclear Fuel Waste Final Repository and (2) its Environmental Impact Statement and associated data.

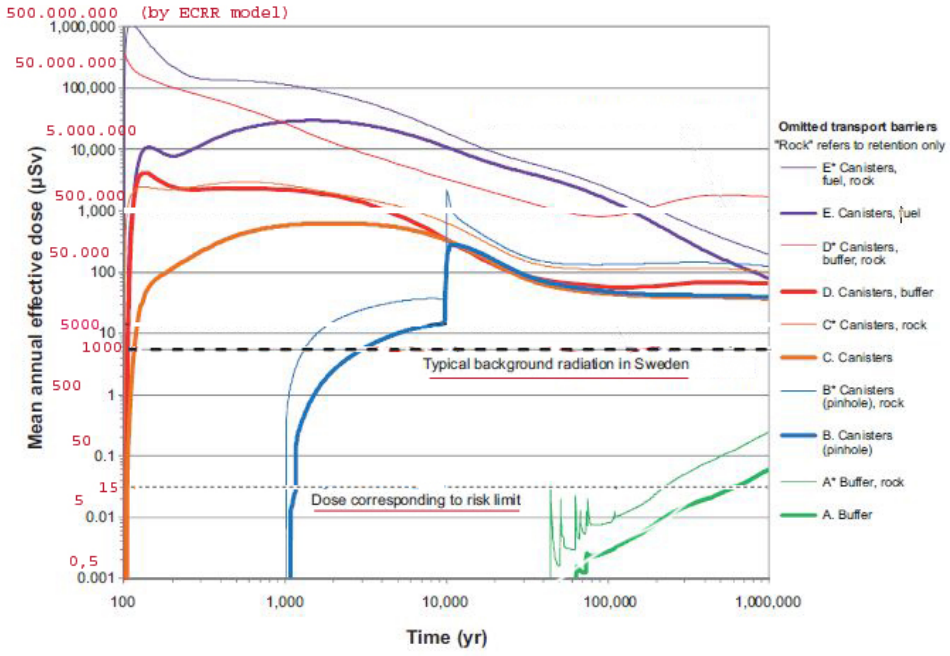

Figure S-12. Results of stylised cases to illustrate loss of barrier functions. Note that an omission of the "rock" barrier in these cases refers to omission of retention of radionuclides in the rock fractures only, whereas the favourable, low flow rate at repository depth and the favourable geochemical conditions are still taken into account. Y-Axis estimated Exposure by ECRR Model (www.euradcom.org)

Comments on the applicant's opinion of 18 November 2013, whether additional information should be produced including comments on the Radiation Safety Authority's report of 26 November 2013.

The Baltic Sea Regional office of the ECRR provides here a brief analysis of SKB's latest opinion 2013-11-18 to assist the Court in determining what the consequences would be to permit the applicant's claim. ECRR would also like to express a few comments on SSM's letter of 2013-11-26 and other relevant points at issue. Summarising the current situation ECRR suggests the Court to rule the request for substantial source of funding for independent scientific scrutiny of the Forsmark Spent Nuclear Fuel Waste Final Repository ***(****SNFWFR****).***

Contents

The 3 appendices are sent to the Court in a separate PDF called "ECRR append final MMD" titled Collected Submissions on the Proposed Forsmark Nuclear Waste Repository.

I. ECRR objects to SKBs general rejection of commenting deeper on groups of questions included in the processes submitting most of radiation related issues to arbitration by SSM through Kärntekniklagen. All of this process should be brought before the Environmental Court as it primarily is an environmental issue

Nacka MMD court has given the applicant SKB the possibility to express its opinion on the question as to whether the applicant admits or denies the necessity to submit answers to outstanding and missing information from the SKB application to build the Forsmark Spent Nuclear Fuel Waste Final Repository. This is done in a main document and partly in an Annex K : 9, where the answers given by SKB to each question are broken down by referral organization.

ECRR objects to the fact that in the main document, section 2, SKB has made a general rejection of commenting deeper on groups of questions under the headings:

1. Radiation safety related issues
2. The level of detail required by organisations wishing to review other issues
3. Review and discussion of other methods of disposal of nuclear waste; ALARA justification considerations
4. Site selection
5. Issues relating to the SKB´s projects Environmental Impact Statement (EIS) :
    5.1 Revision and update of the EIS
    5.2 Highly improbable events.

1. Radiation Safety Issues

There are two applications related to the issue of the Forsmark project. The focus of SKB has been to provide different levels of in-depth information in its application under the Nuclear Safety Regulations law Tekninlagen regarding what it sees a radiation safety issues to the information provided in the Environmental Code applications. This is unacceptable for a number of reasons.

The clear aim of the SKB approach is to leave radiation safety issues to SSM so that discussion of these issues is carried out within the black-box which is the SSM analysis of radiation risk. SSM, which is the Swedish official source of expertise on the issues of radiation risk, in turn carries out its calculations and assesses the risk of the releases from the Forsmark project to health on the basis of the radiation risk model of the International Commission on Radiological Protection (ICRP). However SSM is not independent from ICRP. SSM shares and has shared many personnel with ICRP which until recently was based in Stockholm at the predecessor organisation to SSM. Therefore there is a conflict of interest and no independent appraisal or review of raduiation safety issues.

It is therefore our first and foremost plea to the honourable court to require SKB to make its own radiation safety case independent of SSM on the basis of the ICRP risk model or otherwise, with full discussion and citation of the available supporting

evidence for its case, and for the case to be reviewed by independent expert groups like the European Committee on Radiation Risk as well as SSM. This would put the radiation safety issues on a sound knowledge base as required under European Law (see below). The application of the ECRR radiation risk model to the calculations presented by SKB in its EIS show very large discrepancies with the results given by SKB as can be seen in the human exposure graphs for "improbable events" given by SKB in their EIS.

2. The level of detail required by organisations wishing to review other issues

Much of the SKB case relies on computer partition modelling. The colourful graphs presented in the EIS are outputs from computer models; they are not facts but hypothetical computer predictions. As pointed out in ECRR's 2nd report on this issue [3] computer partition models are critically dependent for the level of uncertainty in their conclusions on the individual levels of uncertainty in the component input parameters. The cumulative error associated with a series of calculation where the output from one calculation is taken as the input for the next can be frighteningly large and can make such an approach valueless. There is no discussion of uncertainties in the SKB report and this makes their conclusions in all sections where graphical outputs are presented as facts, highly questionable. It is not scientifically acceptable to not place ranges of uncertainty on the computer model output graphs. In order to independently asses this issue ECRR has asked SKB to provide such data, but it has not been supplied. SKB has refused to supply such information.

3. Review and discussion of other methods of disposal of nuclear waste; ALARA justification considerations.

European Law (Basic Safety Standards Directives) requires that all such practices (applications) are subject to Justification and that all such activities which result in exposures be compared with other methods in order to ensure that exposures are kept as low as reasonably achievable (ALARA). Other methods of disposal of Sweden's high level waste than KBS-3 method are not discussed seriously in the applications by SKB and justification has not been adequately addressed.

4. Site selection

Alternative sites are not adequately compared reviewed or discussed. This is particularly of concern since the danger of building the repository on the Baltic Sea would potentially result in a much wider dispersion of radionuclide contamination in the event of any accident or failure compared with building the repository in a low population area in the mountainous areas of North West Sweden. There should be a discussion of this point since it is subsumed under the ALARA issue above in (3).

5. Issues relating to the SKB Environmental Impact Statement (EIS) :

5.1 Revision and update of the EIS

5.2 Highly improbable events

Since the assembly of the EIS, there has been a serious incident at Fukushima in Japan involving a highly improbable event. There should be an update of the EIS to

discuss the issue of low probability high risk scenarios using Fukushima as an example. The issue of highly improbable events is not a scientific one, but is a value judgement one. The total quantity of spent fuel in the Fukushima complex is about 700 tons compared with the final Forsmark proposed quantity of 12,000 tons. Fukushima releases are causing concerns due to increased levels of radionuclide contamination in fish caught in the USA. The comparison of a 700ton disaster on the shores of the Pacific with a 12,000 ton disaster on the shores of the much smaller and landlocked Baltic Sea should be discussed. It is already clear that the effects of Fukushima on the health of the inhabitants of Japan are serious, with official reports of thyroid cancer rates already in excess of 80-fold, further evidence of total failure of the ICRP risk model on which the Forsmark SNFWFR´s EIS is based.

II. Commenting on SSM's letter of 2013-11-26 ECRR concludes that SSM still has not asked SKB as an applicant to use a scientifically valid radiation risk model and has not started to engage independent experts.

III. ECRR identifies missing information still to be answered by SSM and SKB regarding SKB´s application to build Forsmark Spent Nuclear Fuel Waste Final Repository as well as its Environmental Impact Statement and associated data.

ECRR has made three submissions on the Forsmark SNFWFR Proposals, executive summaries of which are placed at the end of this document. A number of specific questions were included in these submissions. ECRR summarises questions which have not been answered by SKB from our earlier submissions to SKB. SKB has not answered any of the many questions addressed through the 5 years of communication from ECRR. Two of these questions have been responded to by SSM, but the response has been inadequate.

Summary of areas of concern for SSM and SKB

The missing information is formulated into outstanding 20 questions that are listed within 6 main areas of concern.

Questions concerning both SSM and SKB:

a. The Radiation Risk Model scoping exposure calculations (appendices 1, 3)

The Forsmark Spent Nuclear Fuel Waste Final Repository **(**SNFWFR) proposals involve scientific assessment of the dangers to human health and biota consequent upon the isolation from the wider environment of very large amounts of high level nuclear waste in copper canisters buried under the Baltic Sea over a definite period of 100,000 years or more. Failure of the canisters to isolate the radioactivity from the environment in the short to medium term (1000s to 10,000 years) must be properly addressed, as must the final effect of the certain failure of the canisters on future inhabitants of the regions. Such a plan must therefore be subject to European Union legislation and advice on the precautionary principle in areas of scientific uncertainty.

The major scientific uncertainty, which is not addressed at all in any of the applications or the Environmental Impact Statement of SKB is that arising from the exclusive dependency by SKB and also by SSM, the Swedish Radiological Protection Authority on the radiation risk model of the International Commission on Radiological Protection.

The ICRP risk model, used by SKB and SSM, is inaccurate and dangerous for the assessment of risk from environmental radionuclide contamination. The assumption of the use of the ICRP model is almost invisible to those reading the EIS. There is no mention of the radiation risk model which is at the base of all the calculations and presentations in the EIS except one mention on p36 of the EIS. Evidence for this failure of the ICRP model published in the peer review literature has not been cited or addressed by either SKB or SSM. Attempts by ECRR to bring evidence of these failures to the attention of SKB and SSM have met with refusals to listen or to follow up and address this evidence (see below). A brief account of the Radiation Risk model of the ECRR and its application to the Forsmark SNFWFR Environmental Impact is given below.

It is our assertion, that serious questions persist over the choice of the radiation risk model employed by SKB and SSM in all the documents provided to demonstrate that the risk to health associated with the Forsmark SNFWFR proposals is ethically acceptable.

Question 1. Scoping calculations using the risk model of the ECRR. Details of the extent to which the SKB examined the accuracy and safety of the ICRP risk model by literature searches of available radiation risk research documentation relating to internal exposure situations that might be relevant e.g Chernobyl effects, nuclear site child leukemias, new evidence on the effects of Uranium resulting from both epidemiological and theoretical developments.

Question 2. Details of criticality calculations for various missing FEPs including MOX spent fuel, the meltdown of the spent fuel due to mechanical failure, collapse of the supports and touching of fuel element rods resulting in prompt fission and explosion such as occurred in the spent fuel pool of reactor 4 Fukushima.

Question 3. Tables of solubilities of all modelled radionuclides in the form they are in aqueous media at the expected pH and ionic strength at the range of temperatures expected near the surface of the canister.

b. The assessment of risk from Uranium-238 releases (appendices 1 and 3)

Questions regarding the assessment of risk from U-238 releases

Uranium-238 represents the main component by mass in the spent fuel assemblies. The honourable court may be confused by the description of spent fuel in terms of its activity, or radioactivity. This way of describing the contents as "activity" (Becquerels, Bq) is misleading in terms of physical quantity (tons). Of the 12,000 tons of spent fuel, slightly less than 12,000 tons is pure Uranium, with a half life of 4,5 billions of years. In the 100,000 year time scale almost all will be concentrated Uranium in terms of mass. Since 2001 it has been increasingly clear that Uranium has genotoxic qualities thousands of times greater than its radioactivity would suggest on the basis of simple "dose" considerations. There are tens of publications in the peer review literature demonstrating this. ECRR has been in the forefront of scientific and epidemiological research on this issue of Uranium genotoxicity. The effects are a result of an unfortunate combination of the high chemical affinity of Uranium for DNA coupled with the elements high atomic number which causes it to enhance the effects of natural background radiation. The ECRR has incorporated this fact into its risk model for Uranium by weighting its exposures by a factor of 1000. Sufficient published information on this issue has been available to SKB and to SSM in the last 5 years. ECRR has communicated this information to SSM and made presentations to SSM.
The chemical toxicity of Uranium has not been addressed by SKB nor by SSM even though the Forsmark quantities dumped in one place on the shores of the Baltic sea (12,000 tons of pure Uranium equivalent to 400,000 tons of 3% Uranium ore) far exceed levels which have been shown to cause serious health damage to Uranium miners and those local tribes who live near Uranium mines.

Question 4. What attempts have been made by SKB to assess the health risk associated with chemical exposures to U-238 and radiophotoelectron enhancement health effects?

c. The choice of experts and the avoidance of bias (appendix 2)

Given the EU advises that decision makers ensure that a **secure knowledge base** is a requirement, **the failure of SKB and SSM to seek to question the radiation risk model of the ICRP after having been shown evidence of this failure** in many communications, presentations and reports is unacceptable.

In September 2011 ECRR Baltic Sea Regional office secretary Ditta Rietuma wrote to the SKB manager Saida Laârouchi Engström proposing that ECRR could provide an opportunity where Prof Chris Busby could make an outline presentation of this evidence to the SKB scientists but the proposal was turned down. Therefore it is clear that not only are SKB not examining the considerable evidence for the failure of the ICRP model, upon which all their EIS results are based, but they are not prepared to hear this evidence; they are stopping their ears. This is unacceptable within the framework of European law, cited in the end of this document.

Unfortunately even SSM on their part, colluding with this approach, have made it impossible for independent expertise to be brought in on the issue of the safety of the ICRP risk model, and extraordinarily have not even provided for any expert to address the issue to the radiation risk model and its predictions. This is the content of report No 2 below on expertise. Arising out of this is one further question – the **systemic bias in recruitment of SKB and SSM external experts as the very vetting document of SSM itself is designed to favour the applicants that are from nuclear industry as applicants may be involved either directly or indirectly in work commissioned by the other nuclear waste and nuclear power operators, if earlier than just 2 years**
Examination of the SCS (http://www.stralsakerhetsmyndigheten.se/Global/Slutf%C3%B6rvar/F%C3%B6rfr%C3%A5gningsunderlag/Enclosure%202%20Specification_SR.pdf) shows that to qualify, each expert will have to show that they have been the author or part author of reports or peer review papers which address deep disposal options for high level radioactive waste or a relevant aspect of it. It is clear that any such people will have been working on contracts for nuclear industry or State funded nuclear waste analytical groups. It is easy to see that if the recruitment document had stated that **none of the applicants should have been involved either directly or indirectly in work commissioned by SKB or POSIVA** (the Finnish organisation engaged in a similar exercise) for the last *ten years* rather than ***two years***, it would seriously reduce the number of applicants. And if this were extended from SKB and POSIVA **to all the other nuclear waste and nuclear power operators in Europe and the USA, (e.g. BNFL, NIREX, STUDSVIK, COGEMA**) the number of potential external experts would reduce to zero. In other words, ***all* the possible external experts are from a culture that profits from nuclear industry, and have been exercised only within the frame of the ICRP model**. Therefore they should all be blocked as culturally biased. Let no one think that scientists and technical experts are not biased by their culture and affiliations.

Questions on Expertise

To SKB

Question 5. What attempts have SKB made to conform to the requirements of the European Action Plans on Environment and listen to and act on evidence that the radiation risk model on which their entire edifice stands is insecure and that as a result of this the health and environmental consequences of their proposed operation will be significant and will far exceed the reference levels for exposure which they have calculated and presented in their EIS?

Question 6. Why did SKB turn down the offer of help in employing the ECRR risk model to scope the effects of releases from the Forsmark site under different conditions of failure?

Question 7. Why did SKB refuse the offer by ECRR to provide a lecture to their scientists on the failures of the ICRP model and how the accurate results for releases could be obtained by the use of the ECRR risk model?

To SSM

Question 8. What attempts have SSM made to conform to the requirements of the European Action Plans on Environment and listen to and act on evidence that the radiation risk model on which their entire edifice stands is insecure and that as a result of this the health and environmental consequences of their proposed operation will be significant and will far exceed the reference levels for exposure which they have calculated and presented in SKB:s Forsmark Spent Nuclear Fuel Waste Final Repository **(**SNFWFR) applications and in its EIS?

Question 9.. Why didn't SSM improve the vetting system they use for employment of external experts so that from nuclear industry independent scientist could be recruited as well? ECRR engaged in email conversation, encouraging on this issue, with SSM responsible managers Dverstorp, Paivio Jonsson, Simic, Stromberg, Anderberg and Olofsson in September and Oktober 2011.

Question 10. Why didn't SSM recruit Pr Chris Busby as an external expert ? SSM didn't answer his application for the position. No other independent scientists have been employed as far as we have noticed.

d. The total lack of resources for independent research (appendix 2)

There is total lack of funding for independent research. ECRR have not been provided the financial resources to carry this out though we have applied to several authorities, most recently approaching the scientific director of SKB Peter Wikberg personally in Oskarshamn. The answer was plain NO. Scientists Peter Szakalos finishes his disappointed letter, on SKB:s scientific directors Peter Wikberg unscientific behaviour trying to diminish the results of Uppsala Univesity on copper corrosion, with words of surprise (http://www.mkg.se/uploads/Szakalos_svarsbrev_till_SKB_forskningschef_131022.pdf) . Unfortunately we at ECRR would have been surprised of the opposite, which is a systemic mega error that has to be corrected urgently before it is too late. Which brings us to a request of a solution of the current dangerous situation – the establishment of substantial source of funding for independent scientific scrutiny of the The Forsmark Spent Nuclear Fuel Waste Final Repository **(**SNFWFR) projects, suggested in part IV.

Question 11. Where can independent researchers obtain funding?

e. Computer modelling (appendix 3)

Question 12. ECRR has asked for a full account of the uncertainties in each and every parameter employed in all of the computer models used to generate the outcomes of all scenarios together with the overall uncertainties on the final outcome values resulting from the one-direction operation of the uncertainties in all the parameters.

Question 13. Data and a full analysis of the both potential and design releases and consequent risks associated with the processes up to and including the encapsulation of the canisters including the range of uncertainties in the final outputs.

Question 14. Details of all inputs and codes for all the calculations made using the Pandora and ERICA models.

Question 15. A simple list of all inputs and the uncertainties in each input to the codes.

Question 16. Adsorption isotherms for all relevant radionuclide species on the Bentonite suspensions.

Question 17. Discussion of the effect of high radiation fields on
(a) the metallic integrity of the mechanical support systems and the canister over 100,000 years
(b) the radiolysis of water at the surface of the canister and the production of peroxides and other oxidizing species that would attack copper
(c) the solubility of copper which is highly charged due to photoelectron induction by gamma radiation in aqueous media
(d) the effect of the electrochemical couple Fe/Cu on the integrity of a canister which has been damaged and has allowed moderate ionic strength electrolyte access to the Fe/Cu interface.

Question concerning SKB more than SSM:

f. The Helium generation explosion (appendix 3)

Question 18. The full analysis of Helium gas evolution in the canisters with time and the resistance of the canisters to internal pressure with a further analysis of outcome of the canister gas explosions for radioactivity release to the environment. A back-of envelope-analysis has been provided by SSM. What is wanted is a proper computer program listing and analysing Helium releases from each radionuclide and all the daughters over the entire period of the assessment. In particular we need to know:
(a) the complete design radionuclide inventory at t = 0
(b) the maximum volume of the final corroded and full fuel element assemblies. The volume of the spent fuel assemblies is critical to calculation the final Helium pressure; Section 2.3.2 of the Spent Fuel Report states: *during irradiation in the reactor the*

dimensions of the assemblies may be altered so they may deviate from the specified. However no value for the volume of the final assemblies is given or has been given in response to ECRR questions.

Question 19. Calculation of the temperature time diagram for the spent fuel elements in the intact sealed canisters.

Question 20. Calculation of the gas temperature with time and the canister surface temperature with time.

IV. Summarising the current situation ECRR suggests the Court to rule the request for substantial source of funding for independent scientific scrutiny of the Forsmark Spent Nuclear Fuel Waste Final Repository (SNFWFR).

IV. ECRR requests substantial sources of funding for processes of independent scientific scrutiny

ECRR requests an urgent solution of the currently dangerous situation of absence of an independent scientific process for the eventually apocalyptic project of the Forsmark SNFWFR with existential risk levels for all Baltic Sea Region countries. We demand establishment of substantial source of funding for independent scientific scrutiny of the The Forsmark Spent Nuclear Fuel Waste Final Repository **(**SNFWFR) projects.

ECRR suggests the Court to rule the request for substantial source of funding for independent scientific scrutiny of the Forsmark Spent Nuclear Fuel Waste Final Repository that could be managed by the Court itself, issuing public hearings on the issue of who are the expert scientists to be financed, as no other official parties can be found unbiased.

The Honourable Court is directed to the advice to the European Commission given by the PINCHE Committee of the 40 eminent specialists, scientists and doctors that made up the PINCHE policy network 3.7.3 Obtaining scientific advice (Page 24, PINCHE Workpackage 6, Science and Policy Interface).

Section 3.7.1 report of the final PINCHE report states:
On the collection and use of expertise by the Commission: principles and guidelines – improving the knowledge base for better policies (5), such as transparency and pluralism, the present system clearly fails in many of these areas. The problems that have led to such a situation have been discussed. The question is how to proceed. First, better scientific advice must be obtained, from research that can be believed to be unbiased and interpreted by experts who are themselves unbiased and then distilled into some kind of advice policy-makers can understand. The public, or its representatives, need to be involved at some level, and the whole process has to be transparent at each stage so that if something goes wrong, the decision that was incorrect can be identified. The reliance on expert committees, such as in the United Kingdom, does not take into consideration the built-in bias of the committee selection processes and cultures. Since this system of advice is intrinsically "political" in that sense and since it can be argued that there is no such person as an unbiased scientist (because all scientists have beliefs), a suitable way forward would be to acknowledge this within the structure of the scientific advice process.

A proposal is suggested for an oppositional or discursive committee. This system would be similar to the political system itself, or a better analogy might be with the legal system. Discussion or argument might not be needed; however, if it is, then the committee would include scientists whose job and remit was to oppose the proposal being advanced and to find all the evidence supporting this position. Such scientists

would be funded by government, or the EU. Their activities and reports to the oppositional committee, like those of the proponents of the process, would be accessible to review and placed on the Internet so that, if they had missed anything or if their opposition was incorrect or corrupt, this could be identified. Direct public involvement or representation is needed in the process of oppositional committees or even regular committees.

V. A brief account of the Radiation Risk model of the ECRR and its application to the Forsmark Environmental Impact.

The European Committee on Radiation Risk was formed in Brussels in 1998 to address the perceived failure of the risk model of the International Commission on Radiological Protection, ICRP, to explain clear evidence of harm to health in populations exposed to internal (ingested, inhaled) fission-product and enhanced natural (e.g. Uranium) radionuclides. The radiation risk model of the ECRR was published in 2003 and introduced a system of weighting factors for specific man-made or human altered radionuclides that had increasingly contaminated the biosphere since 1945. Essentially, the problem is that certain radionuclides have evolutionarily novel ways of causing genetic and genomic damage, for example though their chemical; affinity for DNA (Strontium-90, Uranium). Based upon epidemiology, chemical affinity measurements, laboratory experiments with cell cultures and through theoretical calculations the system of weighting factors for specific radionuclides was developed. The model has now been applied to most of the situations where populations are exposed to internal radionuclides (Chernobyl, weapons tests fallout, nuclear sites) and shown to be largely accurate in its predictions of cancer rates and other effects.

As applied to the Forsmark EIS, the ECRR model significantly alters the exposure doses calculated by SKB, and especially for certain radionuclides, by a significantly large amount. In the short term (500y) the most affected radionuclides are Strontium-90 for which the ECRR combined weighting is **w** is 300 and Uranium. The most serious exposure in the long term will be from the element Uranium, which for a number of reasons has been massively underestimated in terms of harm by the ICRP model. For Uranium from the spent fuel represents by far the greatest mass. It has been characterised in terms of harm purely from the (incorrect) viewpoint of the ICRP risk model. The ECRR weighting factor for particulate and soluble Uranium is currently 1000. Therefore by applying the ECRR 2010 model all the releases from the repository will result in human doses many times greater that the limits proposed by SKB of 15microSieverts per annum. A complete calculation of the ECRR doses would be time consuming but possible if required. As an example of the qualitative change in exposure scenarios brought about by applying the epidemiologically justified ECRR model we use a very rough approximated overall ECRR analysis here below. The Figure below shows the real doses (red figures for μSv on Y-axis) based upon the application of a mean weighting factor Wj of 500 over the whole period of 1 million years made up of a value of 300 for mixed fission products in the early period

and an overall final value of 1000 for Uranium in the long term. The dose corresponding to the risk limit of 15 μSv/y and the average background external annual dose of 1000 μSv/y given by SKB in their original version, has been adjusted accordingly and are shown as dotted lines with their titles underlined in red.

Fig 1. Application of an approximate ECRR 2010 risk model is shown with red colour typed numbers close to the SKB predicted ICRP doses presented as Fig S12 in the SKBs application as ***Calculation cases with hypothetical complete loss of barrier functions*** (page 37 in Long-term safety for the final repository for spent nuclear fuel at Forsmark Main report of the SR-Site project, Volume I, Technical Report TR-11-01).

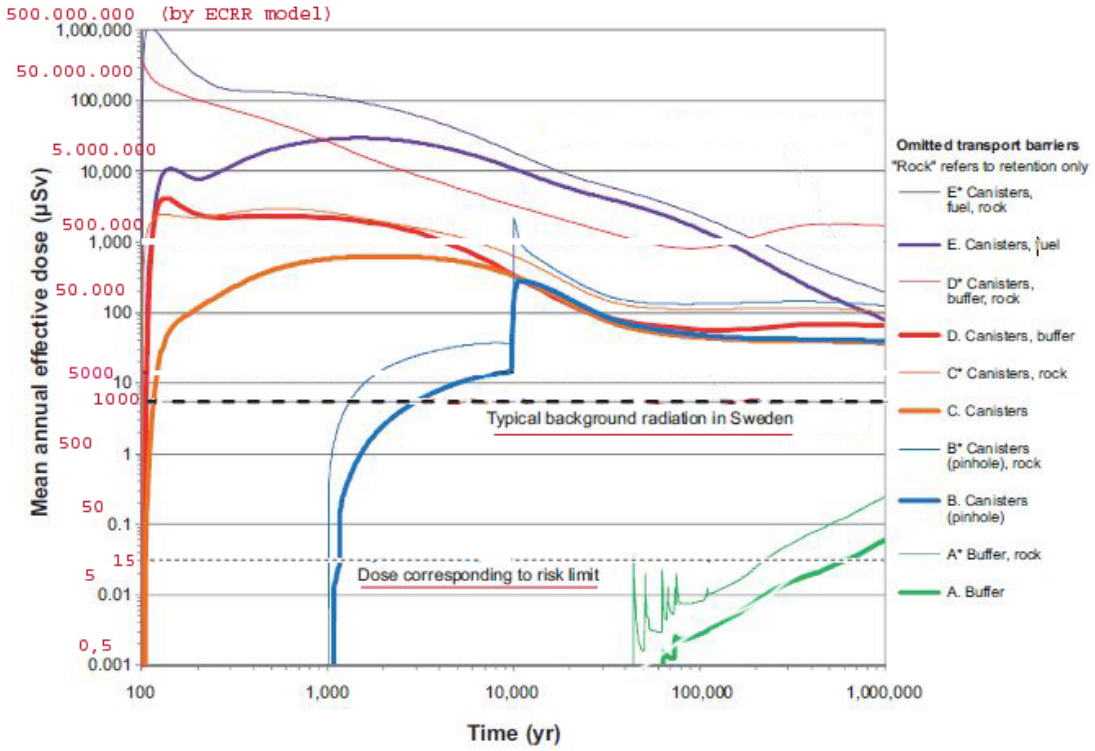

Figure S-12. Results of stylised cases to illustrate loss of barrier functions. Note that an omission of the "rock" barrier in these cases refers to omission of retention of radionuclides in the rock fractures only, whereas the favourable, low flow rate at repository depth and the favourable geochemical conditions are still taken into account. Y-Axis estimated Exposure by ECRR Model (www.euradcom.org)

VI. Contacts

For and on behalf of the Baltic sea regional office of
The European Committé on Radiation Risk

Christopher Busby
Ditta Rietuma

Östersjöregionens ECRR
www.euradcom.org

Kontakt i Sverige:
Pr Christopher Busby
c/o Ditta Rietuma
Södra Jordbrovägen 25
13765 JORDBRO

Tel.: +46 703 999 069
Email: bsr@euradcom.org

VII. Earlier submissions:

The 3 appendices are combined into one PDF in the following order, by the date their were sent.

Appendix 1.

Chris Busby PhD (ECRR)
Feb 5th 2010. ECRR European Committee on Radiation Risk
Baltic Sea Regional Office (2010)
Preliminary formal Response to the SKB Environmental Impact Statement of December 2009 relating to the proposed radioactive waste repository at Forsmark, Sweden.

This first response report addressed the initial Environmental Impact Statement from the position of the European Committee on Radiation Risk, ECRR. It drew attention to the almost complete lack of any discussion of radiation risk and radiation risk modelling in the EIS and pointed out that there had been significant advances in the last 10 years in the scientific understanding of the effects on humans and other living systems and that this new scientific knowledge had not been incorporated into the radiation modelling upon which the Forsmark EIS was based. This was particularly the case for the element Uranium which constituted the main content of the repository in the long (thousand year) time scale. Astonishingly, the EIS barely mentions radiation risk. There was one section (3.4, page 37) where the document referred to the ICRP model: however no modelling of dose or exposure was to be found anywhere in any of the documents examined. Even where the radiation exposures were discussed, the EIS made very erroneous statements and gave misleading information. For example, on p 37 we were told that after 100,000 years all that will remain is “natural” uranium minerals. This is not true: there will be massively enhanced levels of both U-238 and also the more radioactive U-235 and U-234. The bar graph on p 38 appeared to show that the radioactivity will decay to 0.0005% of its initial value after 100,000 years; however, most of the material is uranium. The criticism is that owing to Uranium’s affinity for DNA, the acknowledged target for all radiation health effects, the ECRR weighting factor for Uranium was upwards of 500-fold and therefore on the basis of the only dose calculation presented in the EIS, the effects on health in the long term in Baltic populations would be unacceptably high and much greater than the limit laid down by those regulating the Forsmark exposure protocols.

Appendix 2.

Chris Busby, Ditta Rietuma (2011) Failures of Governance and Human Rights Radiation Risk and the selection-process protocols for External Experts in the matter of the proposed Swedish Radioactive Waste Repository at Forsmark Occasional Paper 2011/15, November 2011, Aberystwyth: Green Audit. Submission to SSM, 6th of November 2011, by email to <josefin.p.jonsson@ssm.se>, <Johan.Anderberg@ssm.se>, <Bo.Stromberg@ssm.se>, <Bjorn.Dverstorp@ssm.se>, <Karin.Olofsson@ssm.se>, <Eva.Simic@ssm.se>

This report took issue with the way in which experts were being chosen for independent assessment of the risk of the proposed development. The report frames both the decisions to build the repository and the process of decision-making from the position of Human Rights Legislation and internationally agreed Human Rights and Environment protocols. Those affected by any decision which affects their environment in a way that can affect their health and well-being, must have input into the decisions. The way in which so-called independent experts are chosen is criticised, and in particular it seems that there are no experts on the radiation risk modelling, a matter of deep concern given that the current radiation risk model, that of the International Commission of Radiological Protection ICRP is assumed (wrongly) to be authoritative and correct. There are no experts to be recruited to address this issue. Although the point was raised at a meeting with SKB 22-09-2011, and in letters to SSM and to the Justice Ministry, nothing has been done to address this problem. The result is that the whole operation will be assessed (if at all) by "independent experts" who are not independent of the culture and scientific belief of the ICRP.

Appendix 3.

Christopher Busby PhD Scientific Secretary
European Committee on Radiation Risk, ECRR (2012)
Pandora's Canister: A Preliminary examination of the Safety Assessment SR-Site for the SKB proposed KBS-3 Nuclear Waste Repository at Forsmark Sweden and associated activities relating to the disposal of spent nuclear fuel
Submission to: The Swedish Land and Environmental Court,
Unit 3, Nacka District Court, Case No Case M 1333-11
Swedish Radiation Protection Agency, Strålsäkerhetsmyndigheten, reference numbers: SSM2011-3522 for repository application SSM2011-3833 for Clink application Green Audit: Report 2012/10; May 2012

This report addresses the final EIS Statement and again points out the main problem, which is that the potential releases in the short term would cause significant heath detriments in exposed human populations and damage Baltic sea life. In the long term, such lethal effects on all Baltic Sea life would be certain. The problem is the failure of the radiation risk model of the ICRP to explain or predict the measured health effects of exposure to radioactive contamination of the environment. There are

now a large number of independent studies published in the peer review literature that show that the ICRP risk model employed by the Forsmark EIS is massively unsafe. None of these have been cited or discussed in any of the EIS or associated reports, and no independent experts have been recruited to addresses these issues. There is evidence now emerging from Japan (thyroid cancer) and Pacific Ocean (sea bed detritus) that confirm the massive failure of the current radiation risk model. In addition this report takes issue with the problem of Helium pressure in the canisters resulting from alpha particle emitters. This is the one issue that has been addressed by SSM, and we (ECRR) are currently examining their assessment. The problem here is that insufficient data is available in the SKB reports on the space packing of the canisters to make accurate calculations of the gas pressures over long time scales. The proper examination of this Helium issue involves computer programming the decay systems of all the component radionuclides.

VII. European Law

The European Commission, in addressing environmental health has consistently pointed out that regulators must make decisions on the basis of a secure knowledge base and one which involves information and expertise provided by independent groups and individual experts. Most recently, in the 7th European Environmental Action Plan (EAP) the commission stated clearly:

Article 1
(22) ***Transparent engagement with non-governmental actors is important in ensuring the success of the 7th EAP and the achievement of its priority objectives.***

(27) Union environment policy should continue to draw on a ***sound knowledge base*** *and* ***should ensure that the evidence underpinning policy-making****, including cases where the precautionary principle has been invoked,* ***can be better understood at all levels****.*

Article 2
1. The 7th Environment Action Programme shall have the following priority objectives:
*(c****) to safeguard the Union's citizens from environment-related pressures and risks to health and well-being;***
(e) to improve the knowledge and evidence base for Union environment policy*;*

*2****. The 7th EAP shall be based on the precautionary principle, the principles of preventive action and of rectification of pollution at source*** *and the polluter-pays principle.*

Article 3
1. The relevant Union institutions and the ***Member States are responsible for taking appropriate action, with a view to the delivery of the priority objectives set out in the 7th EAP****. Action shall be taken with due account of the principles of conferral, subsidiarity and proportionality, in accordance with Article 5 of the Treaty on European Union.*

2. Public authorities at all levels shall work with businesses and ***social partners, civil society and individual citizens in implementing the 7th EAP****.*

Regarding the Precautionary Principle itself, the Commission stated clearly:

6.1. Implementation
When decision-makers become aware of a risk to the environment or human, animal or plant health that in the event of non-action may have serious consequences, the question of appropriate protective measures arise*. Decision makers* ***have to obtain, through a structured approach, a scientific evaluation, as complete as possible, of the risk to the environment, or health, in order to select the most appropriate course of action***

(16)The determination of appropriate action including measures based on the ***precautionary principle should start with a scientific evaluation and, if necessary, the decision to commission scientists to perform an as objective and complete as possible scientific evaluation. It will cast light on the existing objective evidence, the gaps in knowledge and the scientific uncertainties.***

Brussels, 2.2.2000
COM(2000) 1 final ***COMMUNICATION FROM THE COMMISSION on the precautionary principle***

VIII. Current EU best practice on the science-policy interface

http://www.vggm.nl/ufc/file2/hgm_internet_sites/euveyv/7a5207ad757a8ced58ac8e81c308ca48/pu/PINCHE_WP6_final_110106.pdf

The EU is constantly faced with policy questions that are based in some way on assessment embracing the natural or social sciences.
Although the Treaty establishing the European Community recognises the importance of facts and data in relation to health and safety or environment, in reality, expert assessments underpin an enormous range of issues.
The European Commission laid out its thinking in this area in
On the collection and use of expertise by the Commission: principles and guidelines – improving the knowledge base for better policies
(5). Clearly recognising many of th
e concerns reviewed above, the document presented three core principles: quality, openness and effectiveness. These core principles should underpin all activities of the Commission in this domain.
The Commission says the following on quality: “The final determinant of quality is pluralism
.
A diversity of views should be assembled. This diversity may result from differing approaches, expertise, institutional affiliations, contrasting opinions over fundamental assumptions.”

The 2001 European Commission white paper on European governance reinforces the idea that this needs to be changed. It states:
“We must reduce the risk of the policy makers just listening to one side of the argument or of particular groups getting privileged access. The quality of ... EU policy depends on ensuring wide participation throughout the policy chain. The [European] Institutions should work in a more open manner ... in order to improve the confidence in complex institutions.”