



**Research Unit Sustainability and Climate Policy
Könneritzstraße 41
D-04229 Leipzig**

**The Legality of the Export of Radioactive Waste of AVR Jülich to the USA
Legal Opinion on behalf of the Bund für Umwelt und Naturschutz
Germany, State Association North Rhine-Westphalia e.V. (BUND NRW)**

By

**Prof. Dr. Felix Ekardt, LL.M., M.A., Leipzig and
Lawyer Raphael Weyland, Hamburg**

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(translated by Manuela Jäger)

About the authors

Prof. Dr. Felix Ekardt, LL.M., M.A., heads the Research Unit Sustainability and Climate Policy in Leipzig and Berlin (www.sustainability-justice-climate.eu), that is dedicated to the basic research and policy advice to public and non-profit entities in the field of human science sustainability research about policy instruments, legal issues, conditions of social transformation and justice issues. He is also Professor of Public Law and Philosophy of Law at the Baltic Institute of Maritime Law, Environmental Law and Infrastructure Law of the Law Faculty of the University of Rostock as well as Long-Term Fellow at the Research Institute for Philosophy Hannover.

Lawyer Raphael Weyland authored with Prof. Dr. Felix Ekardt, LL.M., MA, his PhD thesis on the updating of environmental legislation and is connected to the Research Unit Sustainability and Climate Policy since his legal environmental focused studies in Bremen. After his legal clerkship at the Federal Environment Ministry and the European Commission he worked for two years as a lawyer in a firm specialized in environmental law in Hamburg and there inter alia represented clients against new power plants and river deepening. When writing this opinion he supports the Hamburg Institute in various consulting projects for energy policy and for public transport.

Preface

The here presented expert report analyses whether the export of the fuel element spheres of the pebble bed reactor “Arbeitsgemeinschaft Versuchsreaktor Jülich - AVR Jülich” (association experimental reactor Jülich), as it is planned by the German government, is compatible with the statutory provisions of the German and European law. Because of the very topicality the given analyses is focused thus on the evident problematic regulations as a short expert report.

The analysis was done in September 2014 on behalf of the Bund für Umwelt und Naturschutz Germany (the German Friends of the Earth member), state association North Rhine-Westphalia (BUND NRW). It displays the opinion of the authors and not necessarily fully that of the BUND NRW.

The present expert opinion depicts the scientific findings of the authors. It relates specifically to the observed case of the planned export of radioactive waste of AVR Jülich for refurbishment to the centre for nuclear weapons Savannah River Site (SRS), USA. Therefore the statements made are not necessarily applicable to other cases of exports of radioactive waste abroad by other plants – even if the juridical assessment of other cases might be similar. Furthermore, it is possible that a court which is concerned with a concrete case assesses the legal questions (substantially convincing or not) differently from the authors.

Leipzig/Hamburg, September 2014

Felix Ekardt and Raphael Weyland

Short summary

The present legal opinion draws on to the recent planning by various authorities on state and national level after which fuel element spheres of the pebble bed reactor Arbeitsgemeinschaft Versuchsreaktor Jülich - AVR Jülich (association experimental reactor Jülich) shall be shipped to the USA. The German public receives this planning critically. The accusation that exporting fuel element spheres abroad was against the law resonates repeatedly. Therefore, the task was to examine to what extent the statutory provisions of the German and European law are excluding the export of fuel element spheres to the USA.

- The AVR Jülich was a pebble bed reactor at which the nuclear fuel is located inside individual graphite coated spheres. The AVR Jülich initially fed electricity into the electricity grid in the year 1967. In the end of 1988 it was deactivated due to earlier incidents. At present, about 300,000 fuel element spheres within 152 castor casks are put into interim storage on the premises of the Forschungszentrum (research centre) Jülich (FZJ). They contain inter alia not fully consumed fuel particles of fissionable uranium (U-235), non-fissionable uranium (U-238) and thorium (Th-232), as well as the consequential emerging plutonium (Pu-239), uranium (U-239) and other fission products. According to the Statement of Intent of 1 April 2014 signed by the American Department of Energy (DOE), the German Federal Ministry for Education and Research (BMBF) and the Ministry for Innovation, Science and Research North Rhine-Westphalia (MIWF NRW), the attempt shall be made to export the fuel element spheres for refurbishment as soon as possible to the American centre for nuclear weapons Savannah River Site (SRS) in South Carolina.
- An ordinary transport permit is not sufficient to authorize the planned export of fuel element spheres of AVR Jülich to the USA according to § 4(1) of the Atomic Energy Act (AtG). This regulation relates solely to the transport process of nuclear fuels. For the question whether the export of fuel element spheres of AVR Jülich to the USA would be legal or not the disposal regime of the Atomic Energy Act is much more relevant. Any approval in accordance with the Nuclear Waste Shipment Ordinance would however likewise be unlawful, because the shipment violates the Atomic Energy Act provisions.
- The export of the fuel element spheres of AVR Jülich for reprocessing in the centre for nuclear weapons SRS in the USA violates § 9a(1) Sentence 1 of the Atomic Energy Act. However, such a disposal of the radioactive waste does principally not constitute a harm-free utilization within the meaning of the Atomic Energy Act, regardless whether or not AVR Jülich was a research reactor. In contrast to the thus far executed refurbishment of radioactive waste of conventional pressurized and boiling water reactors, in the case of an eventual refurbishment of nuclear waste of pebble bed reactors it is especially problematic that the nuclear fuel is merged with graphite and there is no practicable technique so far for the removal of the graphite. Likewise, the Statement of Intent of 1 April 2014 does not assume the feasibility of refurbishment. Moreover, according to the findings of the German Government the refurbishment of the fuel element spheres of AVR Jülich would also lead to additional nuclear radiation and to the additional accumulation of extremely dangerous plutonium. In due consideration of the legislative assessment in consequence of the amendment of the Atomic Energy Act in 2002 it can overall not be assumed that a refurbishment of the fuel element spheres of AVR Jülich constitutes a harm-free utilization.

- Furthermore, the shipment of the fuel element spheres of AVR Jülich for refurbishment is also according to § 9a(1) Sentence 2 of the Atomic Energy Act explicitly inadmissible, because AVR Jülich was a plant for the commercial generation of electricity and not a research reactor within the meaning of the Atomic Energy Act. In accordance with the Atomic Energy Act the term research reactor applies only to those plants that are used for research related to neutron radiation, for example for isotope research for medical purposes, for biological measures as well as for the generation of tracers. AVR Jülich did not serve such a purpose. It was ordered instead as nuclear power reactor by a consortium of 15 municipal power supply companies. During its operating time the AVR Jülich delivered in total 1.51 terra watt-hours electricity. A correspondent energy supply contract is given. According to media reports from the mid-1970s this generated a revenue of about 3 million DM. Also the German Government and the Federal Office for Radiation Protection (BfS) proceed in official documents on the assumption that AVR Jülich was a nuclear power reactor and not a research reactor. Apart from that, concerning the legal differentiation it is irrelevant that the full name of AVR Jülich contains the term “Versuchsreaktor”, meaning experimental reactor.
- In addition, the disposal of the fuel element spheres of AVR Jülich can also not be considered as safe, controlled disposal within the meaning of § 9a(1) Sentence 1 of the Atomic Energy Act. An immediate permanent disposal abroad is however not envisaged, moreover, it is in principle inadmissible according to the disposal regime of the Atomic Energy Act. On top of that, at present neither in Germany nor in the USA exists a repository for the permanent disposal of the nuclear waste in question.
- This prohibition of permanent disposal abroad is also confirmed by § 1(1) Sentence 1 of the Selection of Sites Act (StandAG), which says that for the permanent disposal of all waste produced domestically a repository must be sought (exclusively) on German territory. Complementary, by means of § 1(1) Sentence 2 of the Selection of Sites Act it is further clarified that any future export of radioactive waste for the purpose of permanent disposal abroad is inadmissible due to international treaties.
- The export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA also contradicts the provisions of European law. According to Art. 4(2) of the Directive 2011/70/EURATOM the shipment of the fuel element spheres of AVR Jülich to the USA for refurbishment fails to abdicate Germany’s responsibility for permanent disposal. According to Art. 4(4) Sentence 1 Half-Sentence 1 of the Directive 2011/70/EURATOM a permanent disposal has to take place in principal domestically. This provision applies for the radioactive waste of AVR Jülich. A privileging of AVR Jülich as research reactor does also not come into consideration according to the provisions of the European Atomic Energy Community. Also, the exceptionally envisaged permanent disposal abroad as in Art 4(4) Sentence 1 Half-Sentence 2 of the Directive 2011/70/EURATOM is out of question, because the preconditions of Art 4(4) Sentence 2 of the Directive 2011/70/EURATOM are not met by the envisaged treatment of the radioactive waste in the USA.
- This result is overall supported by the environmental law principles of the European Union law that are basically applicable to the sphere of nuclear energy. Especially the principle of origin and the polluter pays principle of Art 191(2) Subsection 1 Sentence 2 of the Treaty on the Functioning of the European Union argue in particular against a refurbishment of the fuel element spheres abroad and principally in favour of

a domestic permanent disposal of the radioactive waste. There are no evident reasons to exceptionally derogate from those principles for the export of the radioactive waste abroad.

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Expert Report

A. Reason, Subject and Question of the Export Report

In Jülich, Germany, the Arbeitsgemeinschaft Versuchsreaktor (Association experimental reactor) GmbH (AVR GmbH) operated the high-temperature reactor “Arbeitsgemeinschaft Versuchsreaktor Jülich“ (AVR Jülich).¹ The AVR Jülich is a pebble bed reactor at which the nuclear fuel is located in individual graphite coated spheres. The AVR Jülich initially fed electricity into the electricity grid in the year 1967. In the end of 1988 it was deactivated due to earlier incidents.

In the eighties, more than 100 casks of fuel element spheres of AVR Jülich were stored in the shaft mine Asse that in the meantime has been concretely damaged and threatened by water inflow; the temporarily approved storage from 1976 to 1978 of 100,000 fuel elements of AVR Jülich in the shaft mine Asse could however not be implemented.²

At present, about 300,000 fuel element spheres within 152 castor casks are put into interim storage on the premises of the Forschungszentrum (research centre) Jülich (FZJ) near the AVR Jülich. They contain inter alia not fully consumed fuel particles of fissionable uranium (U-235), non-fissionable uranium (U-238) and thorium (Th-232), as well as the consequential emerging plutonium (Pu-239), uranium (U-239) and other fission products.³ The permit of the interim storage at the AVR Jülich, which is insufficiently protected against incidents,⁴ expired at the end of July 2014, with the result that the interim storage takes place currently merely based on a nuclear law directive.⁵

On the 1 April 2014 a Statement of Intent among the American Department of Energy (DOE), the German Federal Ministry for Education and Research (BMBF) and the Ministry for Innovation, Science and Research North Rhine-Westphalia (MIWF NRW) was signed.⁶ In that Statement of Intent the parties testify to collaborate in order to export the fuel element spheres as soon as possible to the American centre for nuclear weapons Savannah River Site (SRS) in South Carolina. According to this Statement of Intent, the transport of the fuel element spheres to the USA shall begin in the summer of 2015.⁷

¹ Cf. on this and the following with further references the detailed depiction in *Schubert*, Kugelhaufenreaktoren, p. 4ff., 7f.; further *Moormann/Streich*, in: *Strahlentelex* 664-665/2014, p. 1ff.

² Cf. with further references the final report of the parliamentary investigation committee for the disposal site for nuclear waste Asse II, 15 October 2012 (Parlamentarischer Untersuchungsausschuss zum Atommülllager Asse II), *Bündnis 90/Die Grünen*, Abschlussbericht, p. 41f., 46f.

³ Cf. on this and the following the self-representation on the website of the FZJ that has in the meantime become responsible for the waste disposal. Available at http://www.fz-juelich.de/portal/EN/AboutUs/self-conception/responsibility/avr/FAQ_Transport/_node.html.

⁴For criterions by court rulings see OVG Schleswig, judgment of 19 June 2013, Az. 4 KS 3/08, juris.

⁵ Cf. on this the depiction on the website of the Federal Office for Radiation Protection (BfS) which is in charge of authorizations. The notifications of permission are published there as well. Available at http://www.bfs.de/de/transport/zwischenlager/dezentrale_zwischenlager/standorte/kkj.html.

⁶ Cf. on this and the following the report of *Streck* in the magazine *Telepolis* of 24 June 2014, available at <http://heise.de/-2237193>. The Statement of Intent is available at http://www.srswatch.org/uploads/2/7/5/8/27584045/statement_of_intent_march_april_2014.pdf.

⁷ Cf. concerning the planned export also the response of the German Government to the minor interpellation by several delegates of the faction Die Linke of 5 September 2014, BT-Drs. 18/2488, p. 3.

This process was criticised by various organisations and the media. In terms of content, the planned export of the fuel element spheres of AVR Jülich is objected because of the fact that also in the USA neither a refurbishment of the nuclear waste is guaranteed, nor exists there a permanent disposal site. Furthermore, the export would water down the Nuclear Non-Proliferation Treaty and it violates the polluter pays principle. It is also criticised that the priority is given to mere business-related interests and that the transports them-selves are redundant, unsafe and dangerous.⁸ In legal terms, the planned export of the fuel element spheres of AVR Jülich is objected, for example, because it violates both the provisions of the German nuclear law, which is in the meantime oriented towards the permanent disposal within Germany, and possibly the provisions of the European law.⁹

Against this background the subject and the question of the present legal opinion must be understood. Hereinafter, it shall be further examined in the substantive respect, whether the export of radioactive waste from the AVR Jülich to the USA is compatible with the statutory provisions of the German and European law.

B. Violation of the Provisions of the German Law

The export of the fuel element spheres of AVR Jülich to the USA could violate the provisions of the German nuclear law. Especially the Atomic Energy Act¹⁰ contains in particular substantive provisions about the transport (see I.) and the disposal (see II.) of radioactive waste. Moreover, there are statements about the disposal of spent fuel elements also in the Selection of Sites Act, StandAG (see III.).¹¹

I. No Export based on a mere Transport Permit according to § 4 Atomic Energy Act

An ordinary transport permit according to § 4(1) of the Atomic Energy Act is not sufficient to authorize the planned export of the fuel element spheres of AVR Jülich to the USA. Because the regulation of § 4 relates solely to the transport process of nuclear fuels.

Though the fuel element spheres of AVR Jülich in question are in fact nuclear fuels within the meaning of § 4(1) Sentence 1 of the Atomic Energy Act. After all, the fuel element spheres contain fissionable products within the meaning of the register of § 2(2) Sentence 1 Number 1a), b), c), and d) of the Atomic Energy Act and they have to be classified as nuclear fuels pursuant to the legal definition within the meaning of the Atomic Energy Act. Also, in principal the fuel element spheres of AVR Jülich would have to be transported in the case of

⁸ Cf. in addition to the above mentioned references for example the report in Spiegel Nr.33/2014, p.15, the press release of .ausgestrahlt of 21 July 2014, available at <https://www.ausgestrahlt.de/presse/artikel/9c96dfe4ab42695bc7d453c1f630a062/export-von-atommuell-muss-gestoppt.html>, or the article by Greenpeace of 05 July 2014, available at <https://www.greenpeace.de/themen/castortransporte-aus-juelich>.

⁹ Cf. in addition to the above mentioned references for example the notification of the information network Contratom, available at <http://www.contratom.de/2014/07/08/atommullexport-aus-julich-ist-illegal/>.

¹⁰ Atomic Energy Act (AtG), version of the notification of 15 July 1985, BGBl.I, p. 1595, that was changed at last by Art. 5 of the Act of 28 August 2013, BGBl. I, S. 3313.

¹¹ Standortauswahlgesetz (StandAG) of 23 July 2013, BGBl. I, p.2553.

an alleged export to the USA. This is why a transport permit according to § 4(1) of the Atomic Energy Act would also at least be necessary for such a transport.¹²

Nevertheless the regulation of the § 4 of the Atomic Energy Act relates only to the process of transportation as such. The regulation for the safety of the transport includes as well the standardization of the reservation on approval.¹³ This means that the transport within this rule is considered only as a link in a chain of different processes that are likewise regulated by the respective authorizations, like the import and export or the disposal of nuclear fuels. Except for the provisions concerning the safety of the transport¹⁴ this regulation thus does not contain any further substantive provisions.

In order to answer the question whether the export of the fuel element spheres of AVR Jülich to the USA is legal, therefore the whole prevailing legal regime for the utilization of radioactive residues and for the disposal of radioactive waste is relevant. A legalization of the export on the basis of an authorization pursuant to § 4 of the Atomic Energy Act is excluded.

II. No Export due to Violation of the Disposal Provisions of § 9a(1) Atomic Energy Act

The export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA could be substantively excluded in particular because it violates the provisions of § 9a(1) Atomic Energy Act and the - for an export necessary - authorization¹⁵ would be illegal in this case pursuant the Nuclear Waste Shipment Ordinance.¹⁶ Due to the amendment of the Atomic Energy Acts in 2002¹⁷ the provision of § 9a(1) was principally changed.¹⁸ The provision regulates the utilization of radioactive residues (see 1.) and prohibits thereby the shipment of certain nuclear fuels for a utilization a priori (see 2.) and it contains substantive provisions for the disposal of radioactive waste (see 3.).

1. The Export is no harm-free Utilization in the meaning of § 9a(1) Sentence 1 Atomic Energy Act

The provisions of § 9a (1) Sentence 1 of the Atomic Energy Act require for the disposal of radioactive residues in principal two different statements of facts concerning the disposal: aside from the possibility of direct permanent disposal by a controlled disposal of radioactive waste, which shall be analysed later, as it is regulated in Variant 2 of the second Half-Sentence of the norm, the harm-free utilization of radioactive residues is generally regulated in Variant 1 of the second Half-Sentence of the norm. According to that, also the person, who

¹² This however should indeed be also denied due to the reasons shown hereinafter.

¹³ Cf. on this and the following *Fischerhof*, Atomic Energy Act, § 4, Recital 1.

¹⁴ Cf. the provisions in § 4(2) Number 1 to 6 of the Atomic Energy Act.

¹⁵ Cf. reservation on approval in § 5(2) Sentence 1 Number 1b) of the Atomic Energy Act that is relevant in the case of the export of radioactive waste out of Europe, because in this case the approval provision of § 3 of the Atomic Energy Act is not relevant. The relevance of that requirement of approval is incidentally assumed at *Wollenteit*, *Verbringung*, p. 8ff.

¹⁶ Nuclear Waste Shipment Ordinance, Atomrechtliche Abfallverbringungsverordnung (AtAV) of 30 April 2009, BGBl. I, p. 1000.

¹⁷ Law of 25 July 2002, BGBl. I, p. 2674.

¹⁸ See for example *Müller-Dehn*, in: *Posser/Schmans/Müller-Dehn*, AtG § 9a Recital 179ff.

deals with the nuclear fuels from defunct plants within the meaning of § 7 of the Atomic Energy Act, has to take care that these residues must be utilized in a harm-free manner as far as they cannot be disposed in a harm-free manner.

Regardless of the ascertainment of this utilization provision by § 9a(1) Sentence 2 of the Atomic Energy Act – which shall be analysed in the following as well – the export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA could be already generally excluded since it does not constitute a harm-free utilization within the meaning of § 9a(1) Sentence 1 Half-Sentence 2 Variant 1 of the Atomic Energy Act.

According to the testimonies of the Statement of Intent of 1 April 2014 the fuel element spheres of AVR Jülich shall be refurbished in the centre for nuclear weapons SRS in the USA. That does not point towards an immediate permanent disposal but rather a utilization within the meaning of the Atomic Energy Act. According to the Atomic Energy Act, utilization means that the radioactive residues are directed to a new usage.¹⁹ It is however arguable whether the planned refurbishment constitutes a harm-free utilization that fulfils the provision of the Atomic Energy Act. The term harm-free derives from the Federal Emission Control Act.²⁰ There, the utilization is seen as harm-free, if both the manner and the product of utilization are environmentally sound. The utilization is not harm-free, if, for example, it leads to an accumulation within the cycle of pollutants, if overall the expected environmental damages are higher after the refurbishment.²¹

The Statement of Intent implies in particular that the fuel element spheres shall be separated from the containing graphite by a physical-chemical procedure.²² It is disputable whether this is feasible at all in practice, because the separation of uranium from the fuel element spheres was accomplished so far only in small amounts and only in the laboratory.²³ In contrast to the thus far executed refurbishment of nuclear waste of conventional pressurized and boiling water reactors, which is also challenging, the potential refurbishment of nuclear wastes of pebble bed reactors is especially problematic due to the fact that the nuclear fuel is merged with graphite and there is no technique so far for the removal of the graphite.²⁴ Also, the Statement of Intent it-self does not assume the necessary feasibility of the refurbishment, because it states only:²⁵

„DOE is considering the feasibility of using H-Canyon facilities at SRS to chemically remove the graphite from the fuel kernels.“

Accordingly, the DOE refers merely to a preliminary examination of the feasibility. Hence, neither the feasibility of the refurbishment, nor the overall harm-free utilization are by any means ensured.

¹⁹ *Fischerhof*, § 9a Recital 5.

²⁰ Cf. *Fischerhof*, § 9a Recital 5.

²¹ Cf. with further references *Jarass*, BImSchG, § 5 Recital 113.

²² Statement of Intent, Number I. 4, p. 2, available at http://www.srswatch.org/uploads/2/7/5/8/27584045/statement_of_intent_march_april_2014.pdf.

²³ Cf. the report of *Streck* in the magazine *Telepolis* of 24 June 2014, available at <http://heise.de/-2237193>, p. 3.

²⁴ Cf. to the course of the events also the depiction of the background article of *.ausgestrahlt*, available at <https://www.ausgestrahlt.de/mitmachen/juelich/hintergrund.html>.

²⁵ Statement of Intent, Number I. 4, p. 2, available at http://www.srswatch.org/uploads/2/7/5/8/27584045/statement_of_intent_march_april_2014.pdf.

Another fact argues further against the (economic) feasibility of the refurbishment: According to the previous notion of the German Government, a utilization of exactly the fuel element spheres of AVR Jülich was ineligible. The disposal report by the German Government from 1988 states explicitly that the fuel elements of AVR Jülich are economically not usable; consequently the permanent disposal was envisaged.²⁶

Furthermore, there are also other important reasons to reject the harmlessness of the utilization of the alleged refurbishment of the fuel element spheres of AVR Jülich in the centre for nuclear weapons SRS in the USA. The refurbishment of nuclear waste raises inter alia questions of safety and the protection of the environment. Concerning safety, the refurbishment is in particular problematic since especially high-temperature reactors as AVR Jülich produce weapons-grade material, for example plutonium. In this respect the whole purpose of the Atomic Energy Act would be subverted.²⁷ Concerning the protection of the environment, the refurbishment of nuclear waste usually results in an increase of waste and leads thereby to the intensification of the unresolved problem of permanent disposal. That is why the German Government has decided against the further potential refurbishment with the amendment of the Atomic Energy Act in 2002. The Explanatory Memorandum states this explicitly:²⁸

„Die Aufarbeitung von Kernbrennstoffen führt zu radioaktiven Immissionen und zu einem zusätzlichen Anfall von Plutonium. Das Gesetz enthält daher ein Verbot der Abgabe bestrahlter Brennelemente aus Kernkraftwerken an Wiederaufarbeitungsanlagen ab dem 1. Juli 2005.“

That means:

The refurbishment of nuclear fuels results in radioactive emissions and in the additional accumulation of plutonium. Therefore, the Act contains a prohibition of the shipment of irradiated fuel elements from nuclear plants to reprocessing plants from 1 July 2005 onwards.

This explanation is widely commended since the constitutionally indispensable protection of life and the environment from risks of nuclear energy is at stake.²⁹ When interpreting the term harmlessness, it is principally necessary to consider also the protective purpose of the Atomic Energy Act.³⁰ Pursuant § 1 Number 2 of the Atomic Energy Act, life and health must be protected from the dangers of nuclear energy and from the harmful impact of ionizing radiation. However, according to the findings of the German Government the possible refurbishment of the fuel element spheres of AVR Jülich would result in additional nuclear radiation and in the additional accumulation of the extremely dangerous plutonium. In due consideration of the legislative assessment in consequence of the amendment of the Atomic Energy Act in 2002, for both safety reasons and reasons for environmental protection, it can

²⁶ Report of the German Government for the disposal of the nuclear power plants and other nuclear facilities, BT-Drs. 11/1632 of 13 January 1988, p. 12.

²⁷ Cf. already the title of the Atomic Energy Act is „Gesetz zur friedlichen Verwendung der Kernenergie und den Schutz gegen ihre Gefahren“, which means Law for the peaceful uses of nuclear energy and the protection against its dangers. Therefore the utilization shall happen only for peaceful purposes. Cf. *Offermann-Clas*, NVwZ 1989, p. 1112, 1115.

²⁸ Draft law of 11 September 2011, BT-Drs. 14/6890, p. 14.

²⁹ *Breuer's* opinion is that this explanation instils respect „a limine“, cf. with further references. *Breuer*, Entsorgung, p. 113f.

³⁰ Similar *Fischerhof*, AtG, § 5 Recital 5.

therefore not be assumed that the refurbishment of the fuel element spheres of AVR Jülich constitutes a harm-free utilization.

Consequently, the export of the fuel element spheres of AVR Jülich to the USA is generally excluded since the planned refurbishment does not constitute a harm-free utilization within the meaning of § 9a(1) Sentence 1 Half-Sentence 2 Variant 1 of the Atomic Energy Act. The harmlessness of the utilization must be rejected because the technical feasibility of the refurbishment as well as its economic feasibility are uncertain. Furthermore, any refurbishment of fuel element spheres containing plutonium runs contrary to the ratio legis of the Atomic Energy Act.

2. Export is principally inadmissible according to § 9a(1) Sentence 2 of the Atomic Energy Act

In addition, the export of the fuel element spheres of AVR Jülich to the USA for refurbishment could be also inadmissible because it violates the explicit prohibition of § 9a(1) Sentence 2 of the Atomic Energy Act. According to this complemented provision of the amendment of the Atomic Energy Act, any shipment of irradiated nuclear fuel that originates from a plant for the commercial generation of electricity is inadmissible.³¹

It is therefore decisive, whether or not AVR Jülich (from which the fuel element spheres originate) was a plant for the commercial generation of electricity within the meaning of the Atomic Energy Act. The legal background of this regulation concerns the privileging of so called research reactors, which do not constitute plants for the generation of commercial electricity.³² The wording of that regulation of § 9a(1) Sentence 2 of the Atomic Energy Act is definite and precise. Thus, it is only crucial whether or not the radioactive residues originate from a plant that was built for the commercial generation of electricity. Pursuant the provisions for the authorization of such plants within § 7(1) Sentence 2 of the Atomic Energy Act only those plants that are not run commercially, like research reactors, are not included in the prohibition.³³ Apart from that, the norm is closed to a further analogy due to the lack of a regulatory gap.³⁴ The privileging of the research reactors is legislatively justified with the importance of research, for example for basic research, for material research and isotope research for medical purposes (e.g. cancer therapies), for biological measures (e.g. environmental analytics) as well as for the generation of tracers.³⁵ Prerequisite of all these cases is the use of neutron radiation, e.g. to produce isotopes. The concerned provision of the amended Atomic Energy Act relates consequently only to research reactors with an according objective. These objectives only are the reason that led the legislature to privilege research reactors in § 9a Atomic Energy Act due to the evident particularities of the research field.³⁶

According to the full name of AVR Jülich it is labelled as Versuchsreaktor (experimental reactor). This term however is for the analyses irrelevant pursuant to § 9a(1) Sentence 2 of the Atomic Energy Act – exactly like the occasionally vaguely and contradictory label as

³¹ Cf. also *Müller-Dehn*, in: *Posser/Schmans/Müller-Dehn*, AtG, § 9a Recital 187ff.

³² Cf. *Müller-Dehn*, in: *Posser/Schmans/Müller-Dehn*, AtG, § 9a Recital 188.

³³ Cf. Explanatory Memorandum of 11 September 2011, BT-Drs. 14/6890, p. 21.

³⁴ Similar also *Posser*, in: *Posser/Schmans/Müller-Dehn*, AtG, § 7 Recital 100.

³⁵ Cf. Explanatory Memorandum of 11 September 2011, BT-Drs. 14/6890, p. 19.

³⁶ See for the particularities of the research field Explanatory Memorandum of 11 September 2011, BT-Drs. 14/6890, p. 24.

Versuchs- oder Forschungsreaktor (experimental or research reactor) by politicians.³⁷ Because the name of the reactor is merely chosen by the consortium of the operators themselves it cannot influence the legal category. Moreover, § 9a(1) Sentence 2 of the Atomic Energy Act does not envisage an extra category for experimental reactors (just as the provisions of the plant approval in § 7(1) of the Atomic Energy Act). Pursuant the systematic of the Atomic Energy Act regarding the substantive disposal provisions, it is only decisive whether it is a privileged research reactor (e.g. in the medical field) or a nuclear plant that has generated electricity on a commercial basis.

According to those standards, the AVR Jülich constitutes definitively a plant that was built for the commercial generation of electricity. This is because AVR Jülich constitutes neither a plant for medical purposes, nor for biological measures. Also, no basic research was conducted in that plant, other than in the older research reactor DIDO (FRJ-2) of the FZJ³⁸. Instead, the AVR Jülich was built to generate electricity. It was ordered as nuclear power reactor by a consortium of 15 municipal power supply companies.³⁹ Furthermore, the AVR Jülich was actually used for the commercial generation of electricity. For doing so there was an energy supply contract between the former Rheinisch-Westfälische Elektrizitätswerk AG (today RWE AG) signed the 07.06.1968 respectively 24.06.1968.⁴⁰ According to the statistic of the International Atomic Energy Agency (IAEA) the AVR Jülich delivered in total 1.51 terra watt-hours of electricity. The IAEA refers explicitly to a commercial use after May, 19th 1969.⁴¹ According to media reports this generated about 3 Million DM of electricity revenue in the mid-1970s.⁴² Also, the German Government and the Federal Office for Radiation Protection (BfS) proceed in official documents on the assumption that AVR Jülich was a nuclear power reactor (for commercial generation of electricity) and not a research reactor (e.g. for medical purposes).⁴³ As reaction to a question to the Government, in 2010 the German Government confirmed that there were 21 research reactors in Germany; within the list of names given by the Government the AVR Jülich does not appear.⁴⁴

After all, AVR Jülich is clearly not a research reactor within the meaning of the Atomic Energy Act. The AVR was according to its provisions a plant which was built for the commercial generation of electricity and operated as such. Radioactive residues that originate from the AVR Jülich can in principal not be utilized in a harm-free manner by refurbishment due to the explicit prohibition by law. The export of fuel element spheres of AVR Jülich to

³⁷ The Statement of Intent of 1 April 2014 the AVR Jülich for example is called „German Research Reactor“, cf. number I.1., p. 1. The German Government also called the AVR Jülich recently vaguely as experimental reactor that though it has generated electricity on the other hand it has had a defining function as research and development reactor. Cf. the response of the German Government of 5 September 2014 to the minor interpellation by several delegates of the faction Die Linke of 5 September 2014, BT-Drs. 18/2488, p. 2.

³⁸ Cf. *Schubert*, Kugelhaufenreaktoren, p. 4.

³⁹ Cf. the background depiction of .ausgestrahlt, available at <https://www.ausgestrahlt.de/mitmachen/juelich/hintergrund.html>.

⁴⁰ See *Ziermann/Günther*, Abschlussbericht, p. 29.

⁴¹ Cf. the statistical depiction on the IAEA website, available at <http://www.iaea.org/PRIS/CountryStatistics/ReactorDetails.aspx?current=114>.

⁴² As in the newspaper article „Wird Jülichs Reaktor zur Atomruine?“ in *Welt am Sonntag* of 9 July 1978.

⁴³ Cf. the appearance of AVR Jülich in the list of nuclear power plants and not on the list of research reactors on the website of the Federal Office for Radiation Protection (BfS) available at http://www.bfs.de/de/kerntechnik/ereignisse/standorte/karte_kw.html, also according to a recent report after the Convention on Nuclear Safety from the year 2013 by the Federal Environment Ministry, AVR Jülich is mentioned on the list of nuclear power plants and not on the list of research reactors, cf. *BMU*, Bericht, p. 186ff.

⁴⁴ See the written answer dated the 17 September 2010, BT-Drs. 17/2988, p. 1f.

the centre for nuclear weapons SRS in the USA to discharge the nuclear fuels for refurbishment is for this reason in principle also inadmissible according to § 9a(1) Sentence 2 of the Atomic Energy Act.

3. Export is not a Controlled Disposal within the Meaning of § 9a(1) Sentence 1 of the Atomic Energy Act

On top of this, the planned export of the fuel element spheres of AVR Jülich to the USA is also inadmissible on the basis of § 9a(1) Sentence 1 Half-Sentence 2, Variant 2 of the Atomic Energy Act. Alternatively to the provision of the harm-free utilization that was only just rejected, this regulation introduces the possibility and substantive duty to dispose radioactive residues in a controlled way (direct permanent disposal). Controlled disposal means the disposal according to the provisions of the Atomic Energy Act.⁴⁵ According to the disposal regime of § 9a(1, 1b, 3) of the Atomic Energy Act, the controlled disposal envisages an interim disposal for the nuclear fuels until a repository for permanent disposal is available.⁴⁶

Pursuant the Statement of Intent of 1 April 2014 the fuel element spheres of AVR Jülich are not supposed to be disposed permanently in the centre for nuclear weapons SRS in the USA – rather the USA plans instead the refurbishment of the fuel elements for the extraction of the uranium of the nuclear fuels.⁴⁷ Besides, also in the USA there is no repository site for the controlled disposal of radioactive waste. Moreover, according to the disposal regime of § 9a(3) Sentence 1 of the Atomic Energy Act the Federal State of Germany has the duty to establish repositories for the permanent disposal of radioactive waste that originate from German nuclear power plants – and not any other country. For these reasons the export of the fuel element spheres of AVR Jülich to the USA for the permanent disposal is also inadmissible on the basis of § 9a(1) Sentence 1 Half-Sentence 2 Variant 2 of the Atomic Energy Act.

4. Interim Result

The export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA for refurbishment violates the disposal regime of § 9a(1) of the Atomic Energy Act. Such a disposal of the radioactive residues does not constitute a harm-free utilization within the meaning of the Atomic Energy Act. Furthermore, the shipment of the fuel element spheres for the refurbishment is evidently inadmissible since the AVR Jülich was a plant for the commercial generation of electricity. Moreover, the disposal of the fuel element spheres of AVR Jülich cannot be considered a controlled disposal, because the direct permanent disposal abroad is not envisaged; also at present there is no repository for the permanent disposal of the concerned nuclear waste – neither in Germany, nor in the USA.

Regardless of the actual type of action, the executive authority is bound to the provisions of the Atomic Energy Act due to the principle of the priority of the law that is deduced from Art.

⁴⁵ *Fischerhof*, AtG, § 9a Recital 6.

⁴⁶ Cf. also Explanatory Memorandum of 11 September 2011, BT-Drs. 14/6890, p. 6.

⁴⁷ Cf. on this and the following again the report of *Streck* in the magazine *Telepolis* of 24 June 2014, available at <http://heise.de/-2237193>, p.2.

20(3) of the Basic Law for the Federal Republic of Germany.⁴⁸ The required authorization for the export of the radioactive residues to the USA pursuant § 5(2) Sentence 1 Number 1b) of the Nuclear Waste Shipment Ordinance must be rejected due to the shown violation of the provisions of the Atomic Energy Act according to the preconditions of approval of § 9(1) Number 4 of the Nuclear Waste Shipment Ordinance read in conjunction with § 8(1) Number 4 of the Nuclear Waste Shipment Ordinance.

III. No Export due to § 1(1) of the Selection of Sites Act (StandAg)

At last, it must be analysed, if in reference to the Selection of Sites Act any changes in the shown disposal regime occur that exceptionally allow the export of the fuel element spheres of AVR Jülich. According to § 1(1) Sentence 1 of the Selection of Sites Act the purpose of the Selection of Sites Act is to provide procedural instruction in order to find a site suited as repository for permanent disposal of the radioactive waste generated in Germany.

Already according to this original ratio legis, it can be stated that by the Selection of Sites Act no change of the disposal regime specified in the Atomic Energy Act shall take place. According to the Explanatory Memorandum, the Selection of Sites Act shall rather codify merely the procedure of the selection of a site. This is supposed to help in the search for the envisaged permanent disposal pursuant § 9a (3) Sentence 1 of the Atomic Energy Act.⁴⁹ In the case of the controlled disposal by a permanent disposal of the nuclear waste, the disposal regime of the Atomic Energy Act is thereby confirmed by § 1(1) Sentence 1 of the Selection of Sites Act. In particular, it is stated that the repository site for a permanent disposal of waste that was produced in Germany must be sought exclusively on German territory, including the waste that was produced abroad by the refurbishment of irradiated fuel elements originating from German nuclear power plants.⁵⁰ The Explanatory Memorandum emphasizes:⁵¹

„Die Beseitigung bzw. Endlagerung der radioaktiven Abfälle, die bei der Nutzung der Kernenergie in Deutschland entstehen, soll in nationaler Verantwortung gelöst werden. Eine Entsorgung in anderen Ländern und ein Export von radioaktiven Abfällen zur Endlagerung kommen nicht in Betracht.“

That means:

The disposal and/or the permanent disposal of radioactive waste that emerges by the use of nuclear energy in Germany shall be solved in national responsibility. The disposal in other countries and the export of radioactive waste for the permanent disposal do not come into consideration.

This supports the above mentioned explanation after which the export of the fuel element spheres of AVR Jülich for the permanent disposal in the USA is inadmissible (see Subparagraph B. II. 3.). Furthermore, the whole law does not even concern the matter of disposal of the harm-free utilization through potential refurbishment of the fuel element spheres in the centre for nuclear weapons SRS in the USA which was examined above in detail. In this respect this basic disposal regime of the Atomic Energy Act can also not be

⁴⁸ Sommermann, in: v. Mangoldt/Klein/Starck, GG II, Art. 20 Recital 270ff.

⁴⁹ Cf. Draft law of 14 May 2013, BT-Drs. 17/13471, p. 1.

⁵⁰ Cf. the wording of § 1(1) Sentence 1 of the Selection of Sites Act as well as the Explanatory Memorandum of the draft law of 14 May 2013, BT-Drs. 17/13471, p. 19.

⁵¹ Cf. draft law of 14 May 2013, BT-Drs. 17/13471, p. 2.

changed by the Selection of Sites Act. Any legalization of the export of the fuel element spheres of AVR Jülich for the refurbishment in the USA, as it is mentioned in the Statement of Intent of 1 April 2014, is not possible on the basis of § 1(1) Sentence 1 of the Selection of Sites Act.

Furthermore, no change of the disposal regime of the Atomic Energy Act takes place by § 1(1) Sentence 2 of the Selection of Sites Act that would allow the export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA. This provision was complemented in the Selection of Sites Act on the recommendation of the Ecology Committee in the German Federal Parliament.⁵² It states that in order to reach the (above depicted) legal objective of the Selection of Sites Act no international treaties shall be concluded that allows the shipment of radioactive waste for the purpose of permanent disposal outside of Germany. Also, this provision as proved by the definite wording of § 1 (1) Sentence 2 of the Selection of Sites Act relates only to the matter of disposal of discarding by permanent disposal and not to the utilization by refurbishment. Simply based on the wording of this provision neither a change of the principal disposal regime of the Atomic Energy Act, nor the legalization of the export of the fuel element spheres of AVR Jülich for refurbishment can be effected.⁵³ Furthermore, the Explanatory Memorandum of this provision confirms by the amendment statement effected on the recommendation of the Ecology Committee in the German Federal Parliament of § 1(1) Sentence 2 of the Selection of Sites Act, that the scope of the matter of disposal of the Atomic Energy Act shall rather be restricted and not expanded. Accordingly, it is explained there that the amendment statement in view of a (further reaching) EU-Directive served the unequivocal conclusion that Germany does not export its nuclear waste abroad. In that way it shall be ensured that any disposal abroad of spent fuel rods originating from the generation of electricity is prohibited in each and every case.⁵⁴

For the moment it can be left undetermined to what extent the EURATOM Directive mentioned in § 1(1) Sentence 2 of the Selection of Sites Act effectively provides an expanded basis for the export of radioactive waste (more at Subparagraph C. I.) that had to be restricted then again by a provision of the Selection of Sites Act. Because regardless of this, no changes of the disposal regime of the Atomic Energy Act take place, neither by the actual purpose in § 1(1) Sentence 1 of the Selection of Sites Act, nor by the amendment statement in § 1(1) Sentence 2 of the Selection of Sites Act. The provision of § 1(1) Sentence 1 of the Selection of Sites Act rather states unequivocally that the law overall refers only to the matter of disposal of § 9a(1) Sentence 1 of the Atomic Energy Act and serves to codify the procedure of the selection of a permanent disposal site within the meaning of § 9a(3) Sentence 1 of the Atomic Energy Act. In this respect § 1 (1) Sentence 1 of the Selection of Sites Act specifies further unequivocally that the permanent disposal refers to the waste produced domestically and that a permanent disposal site must be sought exclusively on German territory. In order to guarantee that all the domestically generated radioactive waste is stored in a (still missing) German permanent disposal site, § 1(1) Sentence 2 of the Selection of Sites Act further clarifies that a future export of radioactive waste abroad for the purpose of permanent disposal is inadmissible due to international treaties. Overall the export of the fuel element spheres of

⁵² Cf. decision-recommendation of 26 June 2013, BT-Drs. 17/14181, p. 1, 3.

⁵³ This applies regardless of whether a further export prohibition could have been enshrined within the regulation as it was partly demanded in the media, cf. the background information of .ausgestrahlt, available at <https://www.ausgestrahlt.de/mitmachen/atom-muell/atommuell-export.html>.

⁵⁴ Cf. Decision-recommendation of 26 June 2013, BT-Drs. 17/14181, p. 11f.

AVR Jülich for the purpose of refurbishment in the centre for nuclear weapons SRS in the USA is also pursuant § 1(1) of the Selection of Sites Act not admissible as an exception.

IV. Interim Result

The export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA violates the provisions of the German Law. A transport permit pursuant § 4(1) of the Atomic Energy Act is not sufficient for the export of the radioactive waste of AVR Jülich abroad. Any authorization according to the Nuclear Waste Shipment Ordinance would be illegal because the shipment violates provisions of the Atomic Energy Act. Regardless of the question whether or not AVR Jülich is a research reactor, § 9a(1) Sentence 1 of the Atomic Energy Act prohibits the export because a harm-free utilization of the fuel element spheres cannot be ensured. Furthermore, the utilization of the fuel element spheres by the planned refurbishment in the centre for nuclear weapons SRS in the USA is also unequivocally prohibited pursuant § 9a(1) Sentence 2 of the Atomic Energy Act, because the AVR Jülich was a plant for the commercial generation of electricity and not a (non-commercial) research reactor. Any permanent disposal of the radioactive waste of AVR Jülich abroad – though admittedly not at the first step but however indirectly envisaged – is according to the disposal regime of § 9a(1) Sentence 1, § 9a(3) of the Atomic Energy Act prohibited in principal. This exclusion is furthermore confirmed by the provision in § 1(1) Sentence 2 of the Selection of Sites Act.

C. Violation of the Provisions of the European Law

Furthermore, it must be examined if there are provisions on the European level that prohibit the export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA. Such provisions could derive for example from a Directive of the European Atomic Energy Community (EURATOM) (see I.) and further possibly also from the European Union law (see II.).

I. No Export due to Art. 4(2, 4) of Directive 2011/70/EURATOM

The export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA could also violate substantive provisions of the Directive 2011/70/EURATOM.⁵⁵ This directive attempts to establish a community framework for the responsible and safe management of spent fuel elements and radioactive waste.

In principal, the fuel element spheres of AVR Jülich fall under the scope of the directive, because pursuant Art. 2(1a) of the Directive 2011/70/EURATOM the directive applies to all stages of disposal of spent fuel elements from civilian use.

Then, concerning its substantive disposal provisions, the Directive 2011/70/EURATOM also differentiates between the matters of refurbishment and permanent disposal. According to Art. 4(2) of the Directive 2011/70/EURATOM, in the case radioactive waste or spent fuel

⁵⁵ Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel elements and radioactive waste, ABl. EU 2011 Nr. L 199, p. 48.

elements are shipped to another country for the purpose of refurbishment or processing, it applies that the final responsibility for the permanent disposal of the fuel elements as well as of any other in the processing generated waste stays with the country of origin without further restrictions. This provision does not allow for any exception, also not for radioactive waste that originates from research reactors. Germany as member state of the European Atomic Energy Community therefore cannot abdicate its responsibility for the permanent disposal (in accordance with the directive) as stated in the directive by referring to the refurbishment of the fuel element spheres of AVR at the centre for nuclear weapons SRS in the USA.

With regards to the permanent disposal, Art. 4(4) Sentence 1 Half-Sentence 1 of the Directive 2011/70/EURATOM states now that in principle all radioactive waste must be stored within the member state from which they originate. However, this general principle does not apply for the shipment of spent fuel elements from research reactors pursuant Art. 2(3b) of the Directive 2011/70/EURATOM. It is therefore decisive here at first, to what extent the AVR Jülich could qualify as a research reactor. The Directive 2011/70/EURATOM itself does not contain any definition of the term research reactor. Also the Treaty establishing the European Atomic Energy Community⁵⁶, on which the concerned directive is based, does not define the term. Nevertheless, other EURATOM directives lead to the conclusion that also within the legislative authority of the European Atomic Energy Community the term “research reactor” is interpreted rather in a narrow sense and that a research reactor must be differentiated from a nuclear power plant (for the purpose of generation of electricity). For instance, within the definition of the term “nuclear plant” in Art. 3 Number 1 a) of the Directive 2009/71/EURATOM⁵⁷ firstly the term enrichment plant is mentioned, then the term nuclear plant and separately the term research reactor. Furthermore, according to the 19th Recital of the Directive 2011/70/EURATOM – the directive in question – a research reactor cannot be a reactor for the purpose of generation of electricity. This Recital differentiates i.e. between radioactive waste that originates from the generation of electricity and radioactive waste originating from industrial, agricultural, medical or research activities. After all, the standards regarding the term research reactor in the Directive 2011/70/EURATOM are similar to those of the German Atomic Energy Act. In due consideration of the recently made explanations (Subparagraph B. II. 2) the privileging of AVR Jülich pursuant Art. 3(3b) of the Directive 2011/70/EURATOM is therefore out of the question, for the reason that AVR Jülich was a reactor used for the generation of electricity.

However, according to Art. 4(4) Sentence 1 Half-Sentence 2 of the Directive 2011/70/EURATOM, on certain preconditions also a permanent disposal abroad shall be possible. Since the permanent disposal abroad deviates thereby from the polluter pays principle and from the basic principle of national responsibility mentioned in the 25th Recital of the Directive 2011/70/EURATOM⁵⁸, the permanent disposal abroad must be seen as exception to the rule. According to the relation of rule and exception the preconditions of such

⁵⁶ Consolidated version of the Treaty establishing the European Atomic Energy Community (2010/c 84/01), Abl. EU 2010 Nr. C84, p. 1.

⁵⁷ Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, ABI. EU 2009 Nr. L 172, p. 18.

⁵⁸ This Recital reinforces once more the basic nuclear principle of national responsibility, after which every member state it-self assumes the responsibility for the safe disposal of spent fuel elements and radioactive waste in the end.

a permanent disposal abroad as mentioned in the directive must be consequently interpreted in a narrow sense.⁵⁹

According to these preconditions – by means of Art. 4(4) Sentence 2 b) and c) of the Directive 2011/70/EURATOM – it is required for the permanent disposal abroad *inter alia* that the repository for permanent disposal in the country of destination is already operating before the shipment takes place and that a high safety level is guaranteed in the country of destination. These preconditions are not met in the case of the planned export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA. Because already according to the Statement of Intent of 1 April 2014 it is uncertain whether the first stage before the permanent disposal is technically feasible – i.e. at first the separation of the graphite and the uranium. On the part of various associations the feasibility is principally contested (see the explanations at Subparagraph B. II. 1). Moreover, also the USA are not equipped with an operative permanent disposal repository and therefore the USA do not have a storage plan for the radioactive waste of AVR Jülich (see the explanations at Subparagraph B. II. 3). Since a permanent disposal of the fuel element spheres of AVR in the USA is not further specified and (at present) also not viable, the export violates also the substantive provisions of Art. 4(4) Sentence 1 of the Directive 2011/70/EURATOM. These directive provisions are in principal addressed to Germany as member state of the European Atomic Energy Community and they are in view of their objectives binding. Furthermore, the provisions are formulated clear and unequivocal and without further conditions, complete in themselves and whole. Even if a domestic act of transformation was ignored, the provisions unfold both direct applicability and a priority over possibly opposing national law.⁶⁰

II. No Export on the Basis of the Principle of Origin and the Polluter Pays Principle of Art. 191(2) of the Treaty on the Functioning of the European Union

The European Union law contains a number of principles concerning the environmental law. For instance, the principle of origin and the polluter pays principle could argue against the export of the fuel element spheres of AVR Jülich to the USA. In principle, it must be paid attention to the fact that these provisions are merely legal principles. Concrete legal consequences cannot be derived from them regularly.⁶¹ However, since they are binding in principle and since any deviation therefore requires an additional legitimation, they shall be discussed in the following.

At first it must be stated that the environmental principle of the European Union law can at present be principally applied even though the export of radioactive waste represents a process that belongs to the domain of nuclear energy. Although the relevant provisions of the European Atomic Energy Community regularly represent the more specific legal basis concerning the nuclear energy law.⁶² However, the questions here are less questions of energy law or of the safety of the mere transport of nuclear waste. Special emphasis is rather placed on the aspect of environmental protection of the refurbishment and of the subsequent

⁵⁹ Also *Roßnagel/Hentschel*, *Verbringung*, p. 7ff.

⁶⁰ About the general principles of legal acts of the European Communities with regards to the *de minimis* provision of Art 249 EC Treaty for example *Biervert*, in: *Schwarze*, *EU-Kommentar*, Art. 249 EGV Recital 5f.

⁶¹ Cf. on this and the following *Frenz*, *Handbuch VI*, Chapter 29, Recital 4609ff.

⁶² With further references *Frenz*, *Handbuch VI*, Chapter 30, Recital 4699.

permanent disposal abroad. Due to this overlap, environmental related aspect can indeed be based on the wide-ranging environmental competence of the European Union.⁶³

The principles concerning environmental protection of the Union law are found in Art. 191(2) Subsection 1 Sentence 2 of the Treaty on the Functioning of the European Union. In the actual case, primarily the principle of origin must be considered. Accordingly, the environmental policy of the European Union is based on the principle that environmental damages have to be combatted primarily at their origin. This principle, which becomes often relevant in the sphere of waste legislation, requires to combat the environmental damage at the source, also in order to prevent relocations of the environmental damages.⁶⁴ If this is taken into consideration, the export of the fuel element spheres of AVR Jülich has to be omitted. Exceptional reasons for the shipment of the radioactive waste are not evident. This applies in particular because a refurbishment in the USA is not ensured, a safe permanent disposal cannot be guaranteed at this point, whereas the transport and the refurbishment increase the health risks and aggravate the environmental problems (see the explanations at Subparagraph B. II. and B. III.).

Moreover, the polluter pays principle obtains importance in view of the planned export of the fuel element spheres of AVR Jülich to the USA. Accordingly, in principle the polluter is accountable for the realization of the required precautionary measures.⁶⁵ If the consequential costs, which emerge by the permanent disposal of radioactive waste, are taken into consideration there are also no reasons that argue in favour of the export of the fuel element spheres of AVR Jülich to the USA. The producer of the radioactive waste was initially a German operator consortium. In the meantime the Forschungszentrum Jülich is responsible for the disposal, a society which is at 90% owned by the Federal Republic of Germany and at 10% by the federal state North Rhine-Westphalia.⁶⁶ If Germany is – pursuant the polluter pays principle – also accountable for the so far unforeseeable consequential costs of the disposal of the radioactive waste, there is no evident reason why Germany should be able to abdicate its responsibility by exporting the fuel element spheres to the USA.

Even though these considerations taken legally and individually are not sufficiently operable, they obtain importance for example when interpreting Art. 4(4) Sentence 1 of EU Directive 2011/70/EURATOM. (Subparagraph C. I.). Furthermore, they predetermine that an export of radioactive waste, as the one of AVR Jülich, for refurbishment and permanent disposal, as in the centre for nuclear weapons SRS in the USA, must be omitted also by future legal acts of the European Union.

III. Interim Result

The export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA also contradicts the provisions of the European law. According to Art. 4(2) of the Directive 2011/70/EURATOM the shipment of the fuel element spheres of AVR Jülich to the USA for refurbishment fails to abdicate Germany's responsibility for permanent disposal.

⁶³ Cf. about the general overlap of energy and environmental politics again *Frenz*, Handbuch VI, Chapter 30, Recital 4688.

⁶⁴ With further references *Frenz*, Handbuch VI, Chapter 29, Recital 4619ff.

⁶⁵ Cf. *Frenz*, Handbuch VI, Chapter 29, Recital 4626.

⁶⁶ Cf. the self-disclosure on the website of the FZJ, available at http://www.fz-juelich.de/portal/EN/AboutUs/FactsFigures/_node.html.

According to Art. 4(4) Sentence 1 Half-Sentence 1 of the Directive 2011/70/EURATOM, in principal a permanent disposal has to take place domestically. This provision applies to the radioactive waste of AVR Jülich because a privileging of AVR Jülich as a research reactor does not come into consideration. Also, the exceptionally envisaged permanent disposal abroad as in Art 4(4) Sentence 1 Half-Sentence 2 of the Directive 2011/70/EURATOM is out of question, because the preconditions of Art 4(4) Sentence 2 of the Directive 2011/70/EURATOM are not met by the envisaged treatment of the radioactive waste in the USA. This result is overall supported by the environmental law principles of the European Union law that are basically applicable to the sphere of nuclear energy. Especially the principle of origin and the polluter pays principle of Art 191(2) Subsection 1 Sentence 2 of the Treaty on the Functioning of the European Union argue in particular against a refurbishment of the fuel element spheres abroad and principally in favour of a domestic permanent disposal of the radioactive waste. There are no evident reasons to exceptionally derogate from those principles for the export of the radioactive waste abroad.

D. Result

The export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA violates the provisions of the German law. A transport permit pursuant § 4(1) of the Atomic Energy Act is not sufficient for the export of the radioactive waste of AVR Jülich abroad. Any authorization according to the Nuclear Waste Shipment Ordinance would be illegal because the shipment violates provisions of the Atomic Energy Act. Regardless of the question whether or not AVR Jülich is a research reactor, § 9a(1) Sentence 1 of the Atomic Energy Act prohibits the export because a harm-free utilization of the fuel element spheres cannot be ensured. Furthermore, the utilization of the fuel element spheres by the planned refurbishment in the centre for nuclear weapons SRS in the USA also unequivocally prohibited pursuant § 9a(1) Sentence 2 of the Atomic Energy Act, because the AVR Jülich was a plant for the commercial generation of electricity and not a research reactor. The indirectly envisaged permanent disposal of the radioactive waste of AVR Jülich abroad is according to the disposal regime of § 9a(1) Sentence 1, § 9a(3) of the Atomic Energy Act in principal prohibited. This exclusion is furthermore confirmed by the provision in § 1(1) Sentence 2 of the Selection of Sites Act.

The export of the fuel element spheres of AVR Jülich to the centre for nuclear weapons SRS in the USA also contradicts the provisions of the European law. According to Art. 4(2) of the Directive 2011/70/EURATOM the shipment of the fuel element spheres of AVR Jülich to the USA for refurbishment fails to abdicate Germany's responsibility for permanent disposal. According to Art. 4(4) Sentence 1 Half-Sentence 1 of the Directive 2011/70/EURATOM a permanent disposal has to take place domestically in principal. This provision applies for radioactive waste of AVR Jülich because a privileging of AVR Jülich as a research reactor does not come into consideration. Also, the exceptionally envisaged permanent disposal abroad as in Art 4(4) Sentence 1 Half-Sentence 2 of the Directive 2011/70/EURATOM is out of question, because the preconditions of Art 4(4) Sentence 2 of the Directive 2011/70/EURATOM are not met by the envisaged treatment of the radioactive waste in the USA. This result is overall supported by the environmental law principles of the European Union law that are basically applicable to the sphere of nuclear energy. Especially the principle of origin and the polluter pays principle of Art 191(2) Subsection 1 Sentence 2 of

the Treaty on the Functioning of the European Union argue in particular against a refurbishment of the fuel element spheres abroad and principally in favour of a domestic permanent disposal of the radioactive waste. There are no evident reasons to exceptionally derogate from those principles for the export of the radioactive waste abroad.

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