

Summary of the Advisory Board's Evaluation for FY2023

Advisory Board Members:

Prof. Brenda Howard (UK Centre for Ecology & Hydrology)

Prof. Sergey Fesenko (Russian Institute of Radiology and Agroecology)

Prof. Wolfgang Raskob (Karlsruhe Institute of Technology)

Dr. Satoshi Yoshida (Institute for Environmental Sciences)

Evaluation period: April 1, 2023 - March 31, 2024

Annual Symposium: February 28, 29, 2024 at CORASSE Fukushima

Advisory Board meeting: March 1, 2024 (Fri) 9:00 ~ 12:00 at IER 6F Conference Room

➤ **Prof. Brenda Howard**

After 10 successful years IER has created a unique institute that is producing research to a global standard. As I presented in the advisory board's presentation, the IER has three features that create a distinctive character, namely:

1. High proportion of international researchers
2. Location and ready access to the Fukushima accident site and contaminated areas
3. Strong interactions with local communities and authorities

IER was established after the accident with both scientific and societal objectives; it has delivered in both categories and continues to evolve.

Areas for Consideration

■ Sustainability

It is now 13 years since the tsunami and the accident at the Fukushima Daiichi Nuclear Power Plant (FDNPP). It is common after such major events for funding to gradually decline with competition from both other topics and other groups. Therefore, it is important that IER considers its direction for the next decade and identifies new risks and challenges it may face.

A more formal risk register for different aspects of IER could be drafted to share amongst senior staff. The register would rank potential risks to IER in terms of their nature, likelihood and magnitude. Appropriate mitigation measures could be identified, and a lead person designated to take responsibility to monitor the situation. The type of issues to include within the register could be funding, staffing, facility accidents and performance, external threats (malicious activities, cyber threats, natural & environmental hazards, human health, etc.). As an example, in the UK risk registers are maintained for some large specific projects, for organizations and even for the country^{*1}. Whilst these examples commonly are maintained through management software (e.g. PRINCE2^{*2}) that cover regulatory compliance, a simpler approach would benefit IER. It might cover, for example, preparing for staff absence (retirement, resignation, illness, etc.).

It would also be valuable to identify other areas of research, novel forms of income and new collaborative opportunities. The current IER studies on tritium is an example.

*1 (https://assets.publishing.service.gov.uk/media/64ca1dfe19f5622669f3c1b1/2023_NATIONAL_RISK_REGISTER_NRR.pdf)

*2 (<https://www.prince2.com/blog/the-power-of-prince2-in-effective-risk-management/>)

■ Profile

To retain funding and secure new sources a strong and high profile is needed. It is essential to recognize who is assessing the profile and on what characteristics they base their valuation. For academic research the funding sources are commonly government departments, charities and major business organisations. The assessment may include several components (fit for purpose well-equipped facilities, successful completion of projects, number and size of grants, number and quality of publications, persuasive pitch and relevance of message, etc.). These aspects could be reviewed and targeted to maximise the effect.

For academic excellence, publishing scientific literature is important. Scientific publications are characterized by statistics such as number of times they are cited, quality of journal, time decay of citation, etc. and are held in bibliographic databases. We looked for publications from IER in three databases (Web of Science (WOS), Scopus and Google Scholar); these were compared to a spreadsheet of outputs provided by IER. In WOS we initially found it difficult to match the publications simply using the address, so we used staff names, years of employment and Fukushima University as search keys. There were significant discrepancies between the databases and the IER spreadsheet. Many more documents were found in the databases than in the IER spreadsheet. A copy of the file created by the Advisory Board can be made available to IER and I recommend that IER updates its own records using this format/information and establishes a protocol so that publications are recorded as they are published.

■ Communication

- Adapt presentations to best match the audience (e.g. general public, politicians, academic scientists, business people).
- The annual report. Production of the annual report may be considered to be a burden and only serves as a tick box exercise (as it is not widely circulated). The report could be re-evaluated starting with its audience and objectives. The focus could be on key outcomes and highlights of the year with less listing of activities and products. People want to know the importance of what you are doing and how you are planning to address issues of concern. Outputs (e.g. publications, meetings, project details) should be attached as appendices or annexes.

■ Risk assessment

In many countries risk assessment for work activities is compulsory. There are multiple goals, but the main drivers are worker safety and company protection from litigation. The advisory board was informed that there is no requirement for risk assessment in Japan. However, some consideration of key risks for staff is recommended.

■ Public session in annual meeting

The session open to the public is a well-established and good initiative. The presentations given in the session open to the public were too scientific and difficult to follow (even for me!). As mentioned in the board meeting, it is suggested to find out what the attendees felt about the talks and how they might be modified to adapt to audience knowledge and preferences.

■ Advisory Board

The Board has functioned for 9 years with the same membership and is due for a shake-up. You may prefer to replace members in a rolling program to maintain a consistency in knowledge and opinions.

➤ **Prof. Sergey Fesenko**

Fiscal year 2023 was one more successful year in the IER development. The Institute has succeeded in further developing the research, education and implementation of the research programs. In 2024 the IER celebrated 10th anniversary and became a mature institution in area of radioecology.

Independent evaluation made by the advisory board of ten years of research of Institute of Environmental Radioactivity on the consequences of the Fukushima Daiichi accident presented at the 10th IER Annual Symposium by Prof. Brenda Howard demonstrated permanent growth of the Institute achievements in both research and education of students specialised in radioecological studies. Although the performance of the IER in 2023 was very good, there are still some recommendations for further improvements.

The IER research program includes six projects: (i) "Rivers and Lakes", (ii) "Oceans", (iii) "Ecosystems", "(iv) Speciation Radiochemistry", (v) "Measurements and Analyses", and (vi) "Modelling". These projects are covering all the environments affected by the "Fukushima Daiichi" accident and possible options to respond the accident. However, effectiveness of the projects could be increased while combining some projects with similar research areas of another projects.

In particular, "Speciation Radiochemistry" projects could be a part of the ecosystem project which should (could) be expanded to the agricultural research. The "Measurements and Analyses" project could be in a closer coordination to all other projects that should be first who utilises the new techniques (in particular, robotics techniques) for sampling in the frame of the "Rivers and Lakes". This would demonstrate an importance of the developed methods from one side and could support research currently carried out by the IER from another side. Some other techniques developed by the "Measurements and Analyses" project could also be used in the field work of the IER.

The "Ecosystems" project plays a key role in the whole research IER program. Nowadays, it covers mainly forest ecosystems. In 2023 the research was mainly addressed to study forest of the Chernobyl 30 km zone. Without denying the importance of research in the 30 km zone, it should be emphasized that the main results of this research should be addressed to the Fukushima area. The analytical work aimed at the summary of the studies carried out other institutions could also be strengthened, considering cut cross cutting activities with all other projects.

The modelling project is a typical cross-cutting area and should be in a close cooperation with the other IER projects. The project should provide a set of models describing behaviour of radionuclides in all affected environments including, forests, rivers, lakes and the ocean and present an opportunity for long term predictions and optimizing remediation of the affected areas.

The IER is a part of the Fukushima University, and the academic research are in its priority. However, fundamental research should finally provide some practical outcomes that are important for a recovery of the areas affected by the FDNPP accident. Some of the IER projects follows this approach as formulated in the "Ocean" project "We will continue to listen to local requests and conduct research that will conduct research for solving future concerned issues in the coastal areas of Fukushima Prefecture." This is of special importance considering the tritium release to the Environment.

To fit this advice every section (project area) could be supplemented with small subsections, namely "modelling" and "data application".

Communication to the public was and is should be considered as a key activity of the IER. However, the presentations addressed to the public should be simpler, less scientific with a clear message that should be delivered to the audience.

The scientific and practical outputs provided by the IER in 2023 allow judgment that the institute confirmed its high reputation as a top-level research centre and is one of leading radioecological institutions in Japan.

➤ **Prof. Wolfgang Raskob**

As the years before, all scientists working in the six research areas perform excellent research under the headings Rivers and Lakes / Ocean / Ecosystems / Speciation Radiochemistry / Measurement and Analysis / Modeling. This could be concluded from the many publications in peer reviewed journals and elsewhere. Dissemination at the local level has many facets and is an integral part of the IER activities which is much appreciated. Such dual purpose of the research – on the one hand high level scientific research and on the other hand support of the local communities and authorities in managing the situation with the contamination

As proposed in 2023, there is a possibility to further shape the profile of the institute. One suggestion is to combine research groups into a wider research structure. For example, Rivers and Lakes + Ocean could be combined to “aquatic environment” and Ecosystems + Speciation Radiochemistry could be combined to “terrestrial environment”. Measurement and Analysis and Modeling are transversal activities interaction with the two main pillars of the IER. This suggestion might be also useful in restructuring the groups, but mainly should support the message that is transmitted to the outer world. If modelling and measurement and analysis are transversal research activities, interaction between the institute members will be intensified and results might be improved.

Interaction between the 6 research groups need better description in the activity report. From the discussion in Japan, such interaction is – at least partly – realized. In general, such interactions are extremely valuable and produce synergies.

The dissemination to the local population and authorities might be strengthened when research is directed towards management of the situation. At present most of the research activities are devoted to describe the situation and understand processes. However, to use such knowledge to perform research on possible management options to reduce contamination and support confidence in the living conditions in the contaminated areas.

IER has collected information for many years now. To understand processes, model, either conceptual or detailed, are important. I suggest to use such models for sensitivity and uncertainty analysis to identify those parameters/information that is crucial for the process understanding and modelling and which requires further research activities. It seems important to direct research in the longer term based on such sensitivity and uncertainty analysis.

The huge amount of data collected might be used to develop ecosystem models either via traditional approaches or via Artificial Intelligence (AI) methods. AI is a hot topic and might become even more important in future

The number of students of the Graduate School has to be extended. This might be done via better advertisement and by broadening the list of topics considered beyond nuclear. In general, broadening of the research topics to non-nuclear topics might be one possibility to attract scholars, professors and research money.

The activity report should be restructured. Layout of the research section might be

- One new chapter on cross cutting activities
- Each research activity can be structured such as
 - Introduction of work performed
 - One or two highlights of the research
 - Vision for the next period
 - Publications

➤ **Dr. Satoshi Yoshida**

国内外の大学・研究機関と連携し、また、競争的資金も獲得しつつ、引き続き多くの学術的な成果を挙げている。調査研究に加えて、福島住民への成果の還元と人材育成に関する取り組みも積極的に進めている。特に、成果報告会ではトリチウムをテーマとして取り上げて ALPS 処理水の海洋放出に関連した学術的重要性と社会的関心に対応する取り組みを行なったことは評価できる。引き続き、研究で得られた知見を基盤にして住民の不安や風評被害の低減に貢献していくことを期待する。

In collaboration with domestic and international universities and research institutions, as well as through obtaining competitive funding, IER continues to produce a number of academic achievements. In addition to research and studies, IER is also actively engaged in efforts related to the dissemination of research results to the local people of Fukushima and the development of human resources. In particular, it is commendable that IER has addressed the academic importance and social interest related to the oceanic discharge of ALPS treated water by focusing on tritium as a theme in the Annual Symposium. Based on the findings from the research, IER is expected to contribute continuously to reducing residents' anxiety and harmful rumors.

個別の研究は、事故から 13 年が経過した福島のニーズを踏まえて、放射性核種の長期的な挙動と今後の予測に関する研究に的確にシフトしており、成果を上げている。6つのプロジェクトの枠組みを超えて取り組んでいる課題が多くあり、それらの横断的な取り組みは研究所の大きな強みである。プロジェクトごとの説明に加えて、横断的な取り組みについてもしっかりと説明することが必要である。The individual research has shifted precisely to research on the long-term behavior of radionuclides and future predictions based on the needs of Fukushima 13 years after the accident and is producing achievements. There are many issues that are being addressed beyond the framework of the six projects, and these cross-cutting approaches are a major advantage of the Institute. In addition to individual projects, it is necessary to provide a specific explanation for these cross-cutting approaches.

若手人材の育成の場にもなっていた SATREPS が国際情勢もあって終了したことは残念であるが、それに変わる新たな国際共同研究の枠組みについて引き続き模索してほしい。IAEA との連携の中で、環境試料中の放射能に関する国際標準物質の作成に貢献していることは評価できる。

It is regrettable that SATREPS, which served as a platform for developing young human resources, has come to an end due to international circumstances. However, I hope that efforts will continue to explore new frameworks for international collaborative research to take its place. It is commendable that contributions have been made to the production of international reference materials for radioactive substances in environmental samples through collaboration with the IAEA.

大学院には、博士課程の学生 4 名を含めて 10 名の学生が在籍しており、レベルの高い研究を実施している。一方で、定員には達しておらず、これまで培った研究コミュニティとの連携による学生のリクルートがより一層進むことを期待する。

In the graduate school, there are a total of 10 students, including four doctoral students, conducting high-level research. However, the capacity has not been reached, and I hope that student recruitment through collaboration with the research community IER has cultivated will further progress.

研究所から環境放射能学入門の本が新たに出版された。これまでの研究成果の集大成であると共に、一般向けにも非常にわかりやすい教科書となっており、関係者の努力に敬意を表す。書店を通じた一般向けの販売も検討してはいかがか。アドバイザリーボード用に作成している資料は、詳細でよくまとまっているが、代わりに一般向けの公開を念頭に置いたよりシンプルな「研究ハイライト」の作成を検討してはいかがか。

A textbook on introductory environmental radioactivity has been newly published by IER. It serves as a culmination of previous research achievements and is remarkably user-friendly for the general public. I express my respect to all involved in its production. I suggest that you consider selling the book in general bookstores. Additionally, while the materials (activity report) prepared for the advisory board meeting are detailed and well-organized, you might consider instead producing a simpler "Research Highlights" that is more focused on ease of understanding for the general public.

前年度に比べて予算（収入）が減少しているので、引き続き広く予算の獲得に努めていただきたい。F-REI の予算を獲得していることは、今後の福島 of 長期的な復興に貢献する上でも評価できる。

Due to a decrease in budget (revenue) compared to the previous fiscal year, I hope that IER will continue making efforts to secure a wide range of budgets. Acquiring the budget for F-REI can be appreciated for its contribution to the long-term reconstruction and revitalization of Fukushima in the future.