



**INTEGRATED
REGULATORY
REVIEW SERVICE (IRRS)
FOLLOW-UP MISSION
TO
SWITZERLAND**

Brugg, Switzerland

8 to 17 April, 2015

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY



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Regulatory
Review Service
IRRS



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Mission date:	<i>8 to 17 April, 2015</i>
Regulatory body:	<i>ENSI</i>
Location:	<i>ENSI HQ in Brugg, SWITZERLAND</i>
Regulated facilities and activities:	<i>Nuclear power plants, research reactors, fuel cycle facilities, waste management and storage facilities, emergency preparedness and response, transport, decommissioning, occupational exposure control, environmental monitoring, control of discharges and public exposure, interfaces with nuclear security</i>
Organized by:	<i>International Atomic Energy Agency (IAEA)</i>

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The number of recommendations, suggestions and good practices is in no way a measure of the status of the regulatory body. Comparisons of such numbers between IRRS reports from different countries should not be attempted.

CONTENTS

EXECUTIVE SUMMARY	6
I. INTRODUCTION	8
II. OBJECTIVE AND SCOPE.....	9
III. BASIS FOR REVIEW	10
1. LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES	12
2. GLOBAL NUCLEAR SAFETY REGIME.....	15
3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY.....	16
4. MANAGEMENT SYSTEM OF THE REGULATORY BODY	19
5. AUTHORIZATION	21
6. REVIEW AND ASSESSMENT	22
7. INSPECTION.....	23
8. ENFORCEMENT	25
9. REGULATIONS AND GUIDES.....	26
10. TRANSPORT OF RADIOACTIVE MATERIAL.....	27
11. EMERGENCY PREPAREDNESS AND RESPONSE	29
12. OCCUPATIONAL, PUBLIC AND ENVIRONMENTAL EXPOSURE CONTROL	32
13. WASTE MANAGEMENT (POLICY AND STRATEGY, PREDISPOSAL AND DISPOSAL), DECOMMISSIONING	34
14. INTERFACES WITH NUCLEAR SECURITY	35
15. REGULATORY IMPLICATIONS OF THE TEPCO FUKUSHIMA DAIICHI ACCIDENT	36
POLICY DISCUSSIONS.....	41
APPENDIX I - LIST OF PARTICIPANTS.....	43
APPENDIX II - LIST OF COUNTERPARTS	44
APPENDIX III - MISSION PROGRAMME.....	46
APPENDIX IV - RECOMMENDATIONS (R) AND SUGGESTIONS (S) FROM THE 2011 IRRS MISSION THAT REMAIN OPEN.....	47
APPENDIX V - RECOMMENDATION (RF) FROM THE 2015 IRRS FOLLOW-UP MISSION	48
APPENDIX VI - REFERENCE MATERIAL PROVIDED BY ENSI.....	49
APPENDIX VII - IAEA REFERENCE MATERIAL USED FOR THE REVIEW	53

EXECUTIVE SUMMARY

At the request of the Government of Switzerland, an international team of senior experts in nuclear and radiation safety met representatives of the [Swiss Federal Nuclear Safety Inspectorate](#) (ENSI) from 8 to 17 April 2015 to conduct the Integrated Regulatory Review Service (IRRS) follow-up mission to Switzerland. The follow-up mission took place mainly at the ENSI's headquarters in Brugg.

The initial mission took place in November-December 2011 and was limited in its scope with respect to the nuclear sector and as such it did not include the medical and industrial sectors which have their own regulatory frameworks and Regulatory Bodies. An international team of eighteen senior nuclear safety experts met representatives of ENSI, to conduct an IRRS mission to review the effectiveness of the Swiss regulatory framework for nuclear safety and radiation safety in the context of the nuclear sector. The IRRS mission assessed the following areas: responsibilities and functions of the government; the global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities of the regulatory body including the authorization, review and assessment, inspection and enforcement processes; regulations and guides; emergency preparedness and response; interfaces with nuclear security; occupational radiation protection, environmental monitoring; control of radioactive discharges and materials for clearance; waste management; and transport.

The purpose of the follow-up mission was to review the measures undertaken following the recommendations and suggestions of the 2011 IRRS mission. A review of the current status of the progress on the post Fukushima Daiichi accident actions was also included in the scope of the follow-up mission. No additional area of review was considered for this follow up mission. The IRRS mission also included two policy discussions on Decommissioning and Long Term Operation Concept.

The review compared the Swiss regulatory framework for nuclear and radiation safety against IAEA safety standards as the international benchmark for safety. The mission was also used to exchange information and experience between the IRRS team members and the Swiss counterparts in the areas covered by the IRRS.

The IRRS team consisted of seven senior regulatory experts from six IAEA Member States, three IAEA staff members and one IAEA administrative assistant.

The mission included interviews and discussions with ENSI, ENSI Board, Federal Department of the Environment, Transport, Energy and Communications (DETEC), Federal Office of Civil Protection (FOCP), Swiss Federal Office of Energy (SFOE), Federal Office of Public Health (FOPH), Swiss Accident Insurance Fund (Suva), Federal Nuclear Safety Commission (NSC).

Throughout the mission, the IRRS team was extended full cooperation in regulatory, technical, and policy issues by all parties; in particular, ENSI provided assistance and demonstrated extensive openness and transparency.

The IRRS team concluded that the recommendations and suggestions from the 2011 IRRS mission have been considered systematically by a comprehensive action plan. Significant progress has been made in many areas and many improvements were carried out following the implementation of the action plan. Specifically, the IRRS team determined that 7 out of 12 recommendations and 17 of the 18 suggestions made by the 2011 IRRS mission had been effectively addressed and therefore are considered closed. Three of the recommendations from the initial IRRS mission, which are related to ensuring that an independent and competent safety authority makes final safety decisions and has the authority to issue legally binding technical regulatory requirements and licence conditions, have not been fully addressed and therefore they have been superseded by one recommendation raised in this follow-up mission to provide additional focus to further aid progress in these matters. Effort to successfully close this new recommendation would result in the necessary strengthening of ENSI's authority and status and build the necessary confidence among interested parties as the sole competent technical authority with the ability to issue legally binding technical safety requirements, licence conditions on nuclear safety, security and radiation safety in its oversight domain. Two other

recommendations and one suggestion remain open from the 2011 IRRS mission. They are related to threshold for prosecution, building and maintaining competence of the parties that have responsibilities in relation to safety and development of a comprehensive national radiation emergency response plan. The IRRS team made the following general observations:

- Switzerland is faced with a number of challenges in relation to the nuclear phase-out including maintaining sufficient number of staff with adequate competences in nuclear safety at a national level for the whole life cycle.
- ENSI has demonstrated leadership and has taken initiative in enhancing cooperation among the national regulatory authorities and international organizations.
- ENSI has made significant progress in revising and completing its regulatory framework, enhanced its regulatory programmes in review and assessment, made substantial progress in its inspection process and developed an approach to an effective decommissioning regulatory program.
- In the area of emergency preparedness and response, improvements were made in implementing the new emergency classification system for nuclear power plants and enhanced communication capabilities.
- ENSI continued the strategic, systematic and well organized utilization of the lessons learned from the TEPCO Fukushima Daiichi accident in its regulatory practices. ENSI and NPP operators have effectively implemented both medium and long-term safety improvement plans.

The findings by the IRRS team of 2011 that remain open can be found in Appendix IV.

The new IRRS team finding is summarized in Appendix V.

At the end of the mission, an IAEA and an ENSI press release were issued.

I. INTRODUCTION

At the request of the Government of Switzerland, an international team of senior experts in nuclear and radiation safety met representatives of the [Swiss Federal Nuclear Safety Inspectorate](#) (ENSI) from 8 to 17 April 2015 to conduct the Integrated Regulatory Review Service (IRRS) follow-up mission to Switzerland. The follow-up mission took place mainly at the ENSI's headquarters in Brugg. The review mission was formally requested by the Government of Switzerland in June 2013. A preparatory meeting was conducted from 20 to 21 October 2014 at ENSI Headquarters in Brugg, to discuss the purpose, objectives, scope and detailed preparations of the review in connection with the previous IRRS mission conducted in 2011.

The initial mission took place in November-December 2011 and was limited in its scope with respect to the nuclear sector and as such it did not include the medical and industrial sectors which have their own regulatory frameworks and Regulatory Bodies. An international team of eighteen senior nuclear safety experts met representatives of ENSI, to conduct an IRRS mission to review the effectiveness of the Swiss regulatory framework for all facilities and activities under the jurisdiction of ENSI, and the effectiveness of the regulatory functions implemented by ENSI.

The purpose of this peer review was to review the measures undertaken following the recommendations and suggestions of the 2011 IRRS mission. A review of the current status of the progress on the post Fukushima Daiichi accident actions was also included in the scope of the follow-up mission.

The IRRS team consisted of seven senior regulatory experts from six IAEA Member States, three IAEA staff members and one IAEA administrative assistant.

The IRRS Team carried out a review of the measures undertaken following the recommendations and suggestions of the 2011 IRRS mission in the following areas: responsibilities and functions of the government; the global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities of the regulatory body including the authorization, review and assessment, inspection and enforcement processes; regulations and guides; emergency preparedness and response; interfaces with nuclear security; occupational radiation protection, environmental monitoring; control of radioactive discharges and materials for clearance; waste management; and transport. No additional area of review was considered for this follow up mission.

The IRRS mission also included two policy discussions on Decommissioning and Long Term Operation Concept. The IRRS review addressed all facilities and activities regulated by ENSI: five nuclear power plants, three research reactors and spent fuel and waste management facilities. Radiation sources in non-nuclear facilities, which are not regulated by ENSI were not included in the scope.

ENSI developed an action plan after the initial IRRS mission based on its findings. The detailed results of this action plan implementation and supporting documentation were provided to the team as advance reference material for the mission. During the mission the IRRS Team performed a systematic review of all topics by reviewing the advance reference material, conducting interviews with the board, management and staff of ENSI. Meetings with SFOE, DETEC, FOCP, NSC, FOPH and Suva were also organized. During the entire course of the mission the IRRS Team received excellent support and cooperation from ENSI.

II. OBJECTIVE AND SCOPE

The purpose of the peer review was to review the regulatory framework for nuclear safety and radiation safety, in the context of the nuclear sector, in Switzerland, specifically the measures undertaken following the recommendations and suggestions of the 2011 IRRS mission. The facilities and activities addressed by the review were all facilities and activities regulated by ENSI, namely the five nuclear power plants (Beznau I and II, Mühleberg, Gösgen and Leibstadt), three research reactors, spent fuel and waste management facilities. Radiation sources in non-nuclear facilities, which are not regulated by ENSI, were not included in the scope. The review was carried out by comparison against IAEA safety standards as the international benchmark for safety.

It is expected that the IRRS mission will facilitate regulatory improvements in Switzerland and throughout the world from the knowledge gained and experiences shared by ENSI and the IRRS reviewers and through the evaluation of the effectiveness of the Swiss nuclear regulatory framework and its good practices.

The key objectives of this follow-up mission were to establish the progress made in addressing the recommendations and suggestions reported by the 2011 IRRS Mission and in doing so provide further evidence of the extent that the Swiss regulatory framework for nuclear and radiation safety complies with the IAEA Safety Standards.

For completeness the key objectives of the 2011 Mission were:

- Providing ENSI, through completion of the IRRS questionnaire, with an opportunity for self-assessment of its activities against international safety standards;
- Providing Switzerland (ENSI) with a review of its regulatory programme and policy issues relating to nuclear safety and emergency preparedness;
- Providing Switzerland (ENSI) with an objective evaluation of its nuclear safety and emergency preparedness regulatory activities with respect to international safety standards;
- Contributing to the harmonization of regulatory approaches among IAEA Member States;
- Promoting the sharing of experience and exchange of lessons learned;
- Providing reviewers from IAEA Member States and the IAEA staff with opportunities to broaden their experience and knowledge of their own field;
- Providing key staff with an opportunity to discuss their practices with reviewers who have experience of other practices in the same field;
- Providing Switzerland (ENSI) with recommendations and suggestions for improvement;
- Providing other States with information regarding good practices identified in the course of the review.

III. BASIS FOR REVIEW

A) Preparatory work and IAEA Review Team

At the request of the Swiss Government authorities, a preparatory meeting for the Integrated Regulatory Review Service (IRRS) follow-up was conducted from 20 to 21 October 2014. The preparatory meeting was carried out by the appointed Team Leader Mr Jean-Christophe Niel, Deputy Team Leader Ms Cynthia Pederson, and the IRRS IAEA Team representatives, Ms Adriana Nicic and Mr Stephen Evans.

The IRRS mission preparatory team had discussions regarding the progress made by ENSI in addressing measures undertaken following the recommendations and suggestions of the 2011 IRRS missions with the senior management of ENSI represented by Mr Hans Wanner, Director General and Mr Georg Schwarz, Director, and members of ENSI senior management and staff. The discussions resulted in agreement that the following areas of its regulatory programme were to be reviewed by the IRRS follow-up mission:

- A review of the progress made to address the recommendations and suggestions made by the 2011 mission;
- Selected policy issues.

ENSI representatives made presentations on the major regulatory changes in nuclear and radiation safety since 2011, as well as progress made in implementing recommendations and suggestions of the 2011 IRRS mission.

IAEA staff presented the IRRS principles, process and methodology for an IRRS follow-up mission. This was followed by a discussion on the tentative work plan for the implementation of the IRRS in Switzerland in April 2015.

The proposed IRRS Team composition (senior regulators from Member States to be involved in the review) was discussed and the size of the IRRS Team was tentatively confirmed. Logistics including meeting and work space, counterparts and Liaison Officer identification, proposed site visits, lodging and transportation arrangements were also addressed.

The ENSI Liaison Officer for the preparatory meeting and the IRRS mission was Ms Rosa Sardella, Deputy Director, ENSI.

ENSI provided the IAEA (and the review team) with the advance reference material for the review in February 2015. In preparation for the mission, the IRRS team members conducted a review of the advance reference material prior to the commencement of the IRRS mission.

B) Reference for the review

The most relevant IAEA safety standards used as review criteria are: GSR Part 1, Safety Requirements on Governmental, Legal and Regulatory Framework for Safety, GS-R-2, Preparedness and Response for a Nuclear or Radiological emergency and GS-R-3, Safety Requirements on The Management System for Facilities and Activities. The complete list of IAEA publications used as the reference for this mission is given in Appendix VII.

C) Conduct of the review

An initial IRRS Team meeting was conducted on Wednesday, 8 April 2015, in Brugg by the IRRS Team Leader and the IRRS IAEA Team Coordinator to discuss the general overview, the focus areas and specific issues of the mission, to clarify the basis for the review and the background, context and objectives of the IRRS and to agree on the methodology for the review and the evaluation among all reviewers. They also presented the agenda for the mission.

The Liaison Officer was present at the initial IRRS Team meeting, in accordance with the IRRS guidelines, and presented logistical arrangements planned for the mission.

The reviewers also reported their first impressions of the advance reference material.

The IRRS entrance meeting was held on Wednesday, 8 April 2015, with the participation of representatives of ENSI Board and ENSI senior management and staff. Opening remarks were made by Mr Hans Wanner, Director General of ENSI, Ms Anne Eckhardt, President of the ENSI Board and Mr Jean-Christophe Niel, IRRS Team Leader. Mr Wanner gave an overview of ENSI, the major regulatory challenges in nuclear safety since 2011 and presented a status of IRRS findings.

During the mission, a review was conducted for all the review areas with the objective of providing the Swiss Government and ENSI with recommendations and suggestions for improvement as well as identifying good practices. The review was conducted through meetings, interviews and discussions.

The IRRS Team performed its activities based on the mission programme given in Appendix III.

The IRRS exit meeting was held on Friday 17 April 2015. The opening remarks at the exit meeting were presented by Mr Wanner and were followed by the presentation of the results of the mission by the IRRS Team Leader, Jean-Christophe Niel. Closing remarks were made by Mr Greg Rzentkowski, Director, Division of Nuclear Installation Safety.

An IAEA as well as an ENSI press release were issued at the end of the mission.

1. LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES

1.1. ESTABLISHMENT OF A FRAMEWORK FOR SAFETY

2011 mission RECOMMENDATIONS, SUGGESTIONS	
R1	Recommendation: The government should consider providing ENSI with the authority to issue regulatory requirements.
R2	Recommendation: ENSI should formalize and implement its graded approach for regulatory oversight of nuclear safety including as example research reactors, transport and decommissioning.
R3	Recommendation: The government should take appropriate measures to ensure conventional safety requirements are being supervised and complied with at all nuclear facilities and that there are effective interfaces between conventional, radiation and nuclear safety.

Changes since the initial IRRS mission

Recommendation 1: This recommendation has been considered by ENSI and by the government. Their conclusion is that there are no concrete advantages for nuclear safety to be gained from the implementation of this recommendation. The same effect is considered to be achieved with the current system in which ENSI can issue guidelines and legally binding orders to the licensees.

The IRRS team considers that one of the differences between issuing binding regulations and orders is that if ENSI issues an order to a licensee, the licensee can appeal to the court and in doing so the process is prolonged; however according to ENSI this has not happened so far. Furthermore, the IRRS team was informed by DETEC that if ENSI issued an ordinance, in the individual case the licensee could appeal to the court as well. The IRRS team was also advised by ENSI that for significant safety matters ENSI can decide that the order takes effect immediately.

With regard to issuing binding regulations (Acts and Ordinances) ENSI has a role in the process which is also defined in the ENSI Act, in which ENSI has to be consulted in the process. It is worthwhile noting that the Federal Nuclear Safety Commission (NSC) has a largely similar role as ENSI in this process in that both organizations provide advice to DETEC who then makes the final decision. In the legislation process, this advice is given as part of a consultation within the federal administration. The IRRS team was informed that if conflicting advices would be given, the legal framework allows for settlement procedures to be initiated.

Guidelines issued by ENSI provide additional details to implement the ordinances. If the licensee is not willing to follow a guideline, ENSI can issue an order to require the licensee to comply. According to ENSI their orders do not need to be limited to the scope of the guidelines, but need to be within the scope of the Nuclear Energy Act.

Although the government and ENSI concluded that that there is no advantage for nuclear safety if recommendation 1 is implemented, the government is willing to re-examine this aspect in a future amendment of the nuclear energy legislation.

Recommendation 2: ENSI has comprehensively reassessed and extended its Basic Inspection Programme in 2013 to include security, transportation of radioactive materials and other installations. In addition, X-ray equipment and radioactive sources at all nuclear installations are now included in the Basic Inspection Programme. ENSI has applied a graded approach to safety when evaluating the content of different inspection and inspection intervals in the Basic Inspection Programme.

To formalise and implement the graded approach more generally in ENSI's safety oversight, ENSI has established and published its Regulatory Framework Strategy, which requires that the level of detail in ENSI's guidelines to be consistent with the potential danger and risk. The policy is reflected,

e.g., in the new ENSI-G08 guideline which specifies different requirements applicable for nuclear power plants and for other nuclear installations.

Recommendation 3: ENSI and other authorities having responsibilities in the area of conventional safety at nuclear facilities have met and discussed this matter with the objective of ensuring that interfaces between the organisations are effective and that conventional safety requirements are being implemented.

An agreement has been reached (and a MoU is undergoing signature) where roles, responsibilities and procedures for overseeing conventional safety at nuclear facilities have been defined. Joint team inspections have been conducted by ENSI and Suva and there is a plan to continue these on a regular basis. In addition, ENSI inspectors have received training on conventional safety matters for them to be able to identify potential safety issues at nuclear facilities and notify Suva accordingly. According to the ENSI and Suva the oversight of conventional safety at nuclear facilities has increased and provided more confidence.

Status of the findings in the initial missions

Recommendation 1 has not been fully addressed and is superseded by Recommendation RF1.

Recommendation 2 is closed; ENSI has formalized and implemented a graded approach in its oversight activities.

Recommendation 3 is closed on the basis of progress made and confidence in the effective completion; one organization still has to sign the MoU.

1.2. COMPETENCE FOR SAFETY

2011 mission RECOMMENDATIONS, SUGGESTIONS	
R4	Recommendation: The government should evaluate the needs for building and maintaining competence of the parties that have responsibilities in relation to safety in the near, mid-term and long-term future. It should then adopt the appropriate strategy to fulfil those needs.

Changes since the initial IRRS mission

Recommendation 4: The measures described during the follow-up mission addressed mostly research activities in the area of nuclear energy. The adopted strategy to fulfill the identified needs is, according to counterparts, in the Energy Research Strategy developed by Federal Energy Research Commission (CORE) and approved by the Government. In the Governmental position on the Energy Research 2013-2016, safety matters related to decommissioning and radioactive waste were addressed, and in general the need to preserve and develop competence in nuclear technology for ensuring the safety of the population. Indication of a long term commitment is embedded in the draft Nuclear Energy Act, where (in Art 74a) a regular reporting to the Parliament on the latest developments on nuclear technology is required. In addition to the Energy Research Strategy, there is a research programme for Radioactive Waste (2013-2016) funded by the Government focusing on final disposal of radioactive waste. ENSI has, as described in module 3, developed a Human Capital Management Concept that has assessed the expected resources necessary to carry out ENSI's mission through 2022.

During the Follow-Up mission the IRRS team also discussed the general education provided in Switzerland in the area of nuclear energy and safety, and how educational needs have been studied when considering the implementation of the recommendation. Education is provided by different universities and also by the industry. However, based on the discussions during the mission it was not evident that the areas of research and education had been coherently assessed to ensure competence in the near, mid and long term perspective.

Although there are several measures taken in Switzerland in the area of nuclear energy research, the government has not holistically evaluated the needs for building and maintaining the competence of

the different parties having responsibilities in relation to safety, and particularly in the context of the long term perspective e.g. greater than 15 years. The strategy should be developed by the government and include inputs from and be adopted by all relevant stakeholders such as the Government, ETH Domain and Universities, Cantons, ENSI and the representatives from the nuclear industry.

Status of the findings in the initial missions

Recommendation 4 is open; a comprehensive evaluation has not been conducted on the needs for building and maintaining the competence of all different parties involved. Additionally, the existing mid term strategy only addresses research.

There are no new observations from the follow up mission.

2. GLOBAL NUCLEAR SAFETY REGIME

There were no findings in this area in the original IRRS mission.

Since IRRS's mission in 2011, ENSI has maintained or even strengthened its implication/commitment both at bilateral and multilateral levels.

Since autumn 2014, Switzerland has been a member of the IAEA Board of Governors, whereby ENSI has the role as alternate to the Swiss Governor. ENSI is also extensively involved in European associations of regulators as the Western European Nuclear Regulators' Association (WENRA), which ENSI has chaired since the end of 2011, or the association of the Heads of the European Radiological protection Competent Authorities (HERCA).

As examples, ENSI has incorporated the measures identified in the IAEA Action Plan on Nuclear Safety in its daily regulatory activities, has ensured that its guideline for decommissioning (ENSI-G17) is consistent with the recommendations of the WENRA and the IAEA and also took benefit from exchanges within HERCA's working group regarding emergency preparedness.

ENSI has also extensive exchanges with its counterparts in many countries and Switzerland has periodic bilateral commissions with its neighbors including Germany, Italy, and France.

In September 2014, ENSI implemented a comprehensive strategy for international cooperation with other countries and international organizations in order to contribute to the continual improvement of nuclear safety.

In relation to the TEPCO Fukushima Daiichi accident, ENSI prepared the National Report submitted to the 2nd Extraordinary Meeting of CNS, and the National Report and status reports on the European Stress Test exercise. It is recognised by the IRRS team that Switzerland was the initiator and one of the main promoters of the Vienna Declaration on Nuclear Safety in February 2015.

There are no new observations from the follow up mission.

3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

3.1. EFFECTIVE INDEPENDENCE DURING CONDUCT OF REGULATORY ACTIVITIES

New observations from the follow-up mission

As part of the review of progress in resolving Recommendations 1, 5 and 6 the team conducted discussions with representatives of ENSI, NSC, SFOE and DETEC on the process and mechanism of making regulatory decisions and advising DETEC in licensing matters. There is a potential conflict of interest in safety decisions due to the fact that DETEC has both regulatory functions as a licensing authority and a nuclear energy promotional role. Moreover, the team has concerns because the existing structure may necessitate DETEC to resolve potential conflicting technical positions of ENSI and NSC.

It is recognized that some progress has been made since 2011 as described in Modules 1, 3 and 5. The team has concluded that ENSI has taken reasonable action within their control but there remain fundamental issues on a legal level regarding ENSI's authority and recognition to build the necessary confidence among interested parties. However, based on the progress made thus far and the discussions held in this mission, the IRRS team believes that compliance with the IAEA safety standard GSR Part 1 in this area has not been achieved.

The IRRS team therefore concludes:

- The government has not made sufficient progress to ensure that ENSI has the sole authority to make final safety decisions including legally binding regulatory requirements for the complete range of activities which includes waste management and the deep geological disposal facility.
- DETEC does not have the competence nor the independence to resolve different technical positions it receives from ENSI and NSC therefore there is a potential for an incorrect safety decision to be made by DETEC. The Federal Court ruling of 2013 (BGE 139 II 185 Ruling dated 28 March 2013) does not fully resolve this issue.

The above issues need to be resolved in order to meet the IAEA safety standards. Therefore the IRRS team opened new recommendation RF1 which incorporates the remaining unresolved issues from Recommendations 1, 5 and 6.

FU Mission RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: *The government has not ensured that an independent and competent safety authority makes final safety decisions.*

(1)	BASIS: GSR Part 1, Requirement 7 states that <i>“Where several authorities have responsibilities for safety within the regulatory framework for safety, the government shall make provision for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties”.</i>
(2)	BASIS: GSR Part 1 para. 4.28 states that <i>“There shall be consistency in the decision making process of the regulatory body and in the regulatory requirements themselves, to build confidence among interested parties”.</i>

(3)	BASIS: GSR Part 1 para. 2.8 states that <i>“To be effectively independent, the regulatory body shall have sufficient authority and sufficient staffing and shall have access to sufficient financial resources for the proper discharge of its assigned responsibilities. The regulatory body shall be able to make independent regulatory judgements and decisions, free from any undue influences that might compromise safety, such as pressures associated with changing political circumstances or economic conditions, or pressures from government departments or from other organizations. Furthermore, the regulatory body shall be able to give independent advice to government departments and governmental bodies on matters relating to the safety of facilities and activities”.</i>
(4)	BASIS: GSR Part 1 para. 2.9 states that <i>“No responsibilities shall be assigned to the regulatory body that might compromise or conflict with its discharging of its responsibility for regulating the safety of facilities and activities”.</i>
(5)	BASIS: GSR Part 1 para. 2.12 states that <i>“Where several authorities are involved in the authorization process, the regulatory requirements shall apply, and they shall be applied consistently and without undue modification”.</i>
RF1	<p>Recommendation: The government should:</p> <p>(1) strengthen ENSI’s independent regulatory authority by giving ENSI the ability to issue binding technical safety requirements and licence conditions on nuclear safety, security and radiation protection, and</p> <p>(2) strengthen ENSI’s position as the competent, technical authority, by having NSC provide their technical safety input to ENSI solely in an open and transparent manner.</p>

3.2. STAFFING AND COMPETENCE OF THE REGULATORY BODY

2011 mission RECOMMENDATIONS, SUGGESTIONS	
S1	Suggestion: ENSI should ensure there are sufficient competent staff to complete the development of the decommissioning program, to fulfill its duties regarding the safety of radioactive waste management and to further develop ENSI’s emergency preparedness.

Changes since the initial IRRS mission

Suggestion 1: In 2012 ENSI instituted organizational changes which improve this situation. As it relates to the areas of decommissioning, waste management and emergency preparedness, ENSI has created a Decommissioning section in the Waste Management division which is staffed by three people who are developing a comprehensive decommissioning regulatory program. Additionally, ENSI has hired two new staff members to increase the staffing level in emergency preparedness.

Also, ENSI has developed a Human Capital Management Concept that has assessed the expected resources necessary to carry out their mission through 2022. Considerations included: (1) the changes in expected workload such as completion of the Fukushima modifications and projected Mühleberg NPP shut down and decommissioning, and (2) expected staffing losses through retirements or other departures. ENSI believes they can manage the planned reductions through normal attrition and continue to have sufficient technical staff to accomplish their work.

Status of the findings in the initial missions

Suggestion 1 is closed; a Human Capital Management Concept has been developed, the decommissioning section has been created and additional hiring of emergency preparedness staff performed.

3.3. LIAISON WITH ADVISORY BODIES AND SUPPORT ORGANIZATIONS

2011 mission RECOMMENDATIONS, SUGGESTIONS	
R5	Recommendation: Government should ensure that relevant authorities, commissions and committees, for example the NSC, involved in nuclear safety matters, provide its recommendations and advice directly to ENSI before it issues its final decision. This should be done in an open and transparent manner, in order to allow ENSI to make an informed decision.

Changes since the initial IRRS mission

Recommendation 5: ENSI and NSC have developed a Memorandum of Understanding to define the manner in which NSC's reports are included in ENSI's decision making process. The steps in the protocol are summarized as follows:

1. NSC informs ENSI on which topics they plan to give an expert opinion so that ENSI can factor that into their planning.
2. ENSI prepares a final draft of its safety evaluation report.
3. The ENSI document is sent electronically to NSC and the process-supervisory authority which is normally Federal Office of Energy or DETEC.
4. NSC may ask for technical meetings with representatives of ENSI and the process-supervisory authority.
5. NSC informs ENSI and the process-supervisory authority of their conclusions.
6. ENSI reviews the conclusions of NSC and documents the ENSI evaluation of same in an appendix to the ENSI safety evaluation report.
7. ENSI's final safety evaluation report and NSC's expert opinion report are submitted to the process supervising authority and made available to the public.

Having this protocol has improved the situation since the initial mission. As a result of the implementation of this protocol, ENSI makes now their final safety evaluation that is provided to DETEC and the public. However, the protocol does not address the waste management programme nor „Deep Geological Repository” sectoral plan; ENSI proposed inclusion of these issues but NSC declined to include them. As a consequence, different technical views provided by ENSI and NSC have to be resolved by DETEC which is not a technically competent and independent safety authority. In addition, the process does not provide sufficient confidence that decisions taken by DETEC are solely based on the technical advice provided by ENSI in relation to safety. Furthermore, this may hinder public confidence in the nuclear safety authority.

Status of the findings in the initial missions

Recommendation 5 has not been fully addressed and is superseded by Recommendation RF1.

4. MANAGEMENT SYSTEM OF THE REGULATORY BODY

Management System

The IRRS team was informed that ENSI's management system and the supporting software applications, which were identified as a good practice by the initial IRRS mission, continue to be used. Since 2011, approximately 700 documents of the management system have been updated, modified or created and the system currently contains over 900 documents.

Changes since the initial IRRS mission

ENSI's management system was re-certified according to ISO 9001 (Management System) and ISO 14001 (Environmental Management) in 2013.

The Risk Management process was updated and expanded to include Business Continuity Management and a new main process, "Communication", was added to the management processes.

In order to address Government's requirement for ISO 17020 accreditation, ENSI initiated a project to obtain accreditation as an inspection body. The assessment for accreditation took place in March 2015.

ENSI plans to obtain OHSAS 18001 (Occupational Health and Safety) certification in 2015 or 2016.

Safety culture

2011 mission RECOMMENDATIONS, SUGGESTIONS	
S2	Suggestion: ENSI should explicitly address safety culture in its management system to achieve a common understanding of the key safety culture aspects within the organization.

Changes since the initial IRRS mission

Suggestion 2: In 2012 ENSI started a project aimed at defining and implementing an approach for gaining a better understanding of its safety culture and its possible impact on the licensees' safety. The project was carried out in three phases and involved extensive participation of ENSI staff, including personnel from the Human and Organizational Factors Section.

During phase I of the project, a descriptive analysis of ENSI's current oversight culture was conducted. During phase II, the attributes of oversight culture that ENSI is striving to achieve were identified and the outputs of this phase were used as a major input in developing ENSI's Mission Statement (published in 2014), which was reflected in the management system, under the revised main process "Management". A link to the Mission Statement, which contains guiding principles and supporting statements, is provided in the manual and the document is also included in the new employee's training package, which is provided to each new staff member. Phase III of the project resulted in a comprehensive document, which describes the outcomes of the project and includes an action plan aimed at addressing the opportunities for improvement that were identified. ENSI's Executive Board reviewed the document and decided which measures will be implemented at an organizational level. The implementation of a number of actions have already started, including introduction of the "one-hour for safety" presentations, which are taking place every month. In addition, discussions of safety culture aspects and staff's contributions to nuclear safety are discussed at an organizational unit level.

The responsibility for following-up the implementation of the actions was assigned to one senior manager, who will report the results as part of the annual management review. The IRRS team was informed that success of the corrective actions taken, as part of this project, will be further evaluated and further actions to support ENSI's safety culture will be identified and taken, as appropriate.

ENSI Report on Oversight Practice

The initial IRRS mission noted that ENSI started a project related to the regulatory oversight of safety culture, “Safety culture in nuclear power operation and regulation in Switzerland”. This project was finalised and ENSI produced a report, Oversight of Safety Culture in Nuclear Installations, which was published in 2014. The report describes ENSI’s understanding and regulatory practices for the oversight in the area of safety culture. Its main purposes are to present the elements of ENSI’s current oversight and planned activities, which relate directly to safety culture and to facilitate a common understanding among ENSI staff and licensees of all these aspects.

Status of the findings in the initial missions

Suggestion 2 is closed; ENSI has addressed safety culture in its management system and is implementing actions to support achieving a common understanding of safety culture aspects by its staff.

Process implementation

2011 mission RECOMMENDATIONS, SUGGESTIONS	
S3	Suggestion: ENSI should establish an appropriate approach in the management system to address organizational changes.

Changes since the initial IRRS mission

Suggestion 3: In response to this suggestion, ENSI has taken action to revise the main process “Management” and has formally established a sub-process addressing organizational changes, which is integrated in ENSI’s management system. To date, this sub-process has not been applied because no organisational changes occurred in ENSI since its development. ENSI has indicated they will apply this new sub-process to future organizational changes.

Status of the findings in the initial missions

Suggestion 3 is closed; ENSI has established a sub-process for addressing organizational changes and integrated it in its management system.

There are no new observations from the follow up mission.

5. AUTHORIZATION

2011 mission RECOMMENDATIONS, SUGGESTIONS

R6	Recommendation: The government should revise relevant legislation in order to provide ENSI with the authority to formulate binding conditions on nuclear safety, security and radiation protection. This should be fully reflected in various licences, orders or in their amendments whenever it is necessary before or after the issuance of the authorization.
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Changes since the initial IRRS mission

Recommendation 6: Since the original mission, a decision of the Swiss Federal Supreme Court in 2013 (BGE 139 II 185 Ruling dated 28 March 2013) describes the relationship between the roles and activities of the licensing authority and the supervisory authorities. In particular the Federal Supreme Court argued that *“These authorities consequently have the status of an expert instance stipulated by law, from whose assessment the decision making authority and also the appeal courts may diverge only on valid grounds, specifically in those cases where the law contains openly formulated provisions in view of the technical or scientific nature of the matter, even if such bodies have the right of free appraisal of evidence (...). Specifically, this applies if the decision-making authority does not have the requisite technical expertise at its disposal, as applies in particular to the relationship between DETEC as the licensing authority and ENSI”*. This ruling reinforces the role of ENSI as the regulatory body setting technical and other requirements for the licensees and also defines its relationship with the licensing authority, however the ruling does not give ENSI the authority to formulate binding conditions on nuclear safety, security and radiation protection as proposed by the Recommendation.

Additionally, the ruling specifies that in safety matters, ... “DETEC may and should base itself on ENSI’s assessment unless there are valid grounds for opposing it”. It remains unclear what constitutes “valid grounds” and therefore the Supreme Court decision is open to interpretation and as such does not completely prevent that DETEC’s decisions will not compromise safety.

Status of the findings in the initial missions

Recommendation 6 has not been fully addressed and is superseded by Recommendation RF1.

There are no new observations from the follow up mission.

6. REVIEW AND ASSESSMENT

2011 mission RECOMMENDATIONS, SUGGESTIONS	
R7	Recommendation: ENSI and other relevant authorities should establish a regulatory requirement for licensees to independently verify all safety information internal or coming from its contractors notably design organizations and vendors, prior to its submittal to the regulatory body.
S4	Suggestion: ENSI should develop a formal process for conducting regulatory reviews of safety analysis reports of nuclear facilities.

Changes since the initial IRRS mission

Recommendation 7: ENSI has made a comprehensive analysis of the possible gaps in the legislative framework and its guidelines with respect to the recommendation (how the requirement for independent verification has been addressed and if there are needs to strengthen it further). As a result of the analysis, ENSI decided to add a requirement in the ENSI guideline “ENSI-G07; Organisation of Nuclear Organisations”.

To verify how licensees fulfil the new requirement, ENSI has also conducted inspections at the licensees in 2013. In most cases licensees’ practices and procedures fulfilled the requirement. In the cases of incompatibilities corrective measures have been taken by the licensees. The new requirement has been considered very useful in ENSI’s activities and in clarifying roles of ENSI and licensees with regard to responsibility for safety.

Suggestion 4: ENSI has now included a regulatory review process for the safety analysis report (SAR) in the process of “Safety Assessment” in ENSI’s management system. Review is managed by the site inspectors and is in most cases triggered by a notification of a SAR change by the licensee. In addition, SARs are periodically reviewed by ENSI in connection with Periodic Safety Reviews.

During the Follow-Up mission the IRRS team discussed with the counterpart other possible sources or factors (than plant modifications) which could result in a situation where an SAR would not be compatible with the nuclear power plant, and if there is a regulatory process in place to capture these. Examples discussed included aging phenomena, operating experience, changes in the plant environmental conditions or in general changes in assumptions made in the safety or accident analyses.

As a result of the discussion, ENSI changed the management system by adding all modifications requiring permits and the results of annual facility conferences as possible initiators to check if the information in the SAR is up to date.

Status of the findings in the initial missions

Recommendation 7 is closed; ENSI has established a requirement for the licensees to conduct independent safety verification prior to submitting their assessment to ENSI for approval.

Suggestion 4 is closed; a process has been established in the management system for SAR review.

There are no new observations from the follow up mission.

7. INSPECTION

7.1. NUCLEAR POWER PLANTS

2011 mission RECOMMENDATIONS, SUGGESTIONS	
S5	Suggestion: ENSI should consider reassessing its current inspection programme for nuclear power plants to determine if it covers adequately all levels of defence in depth which is the basis used in ENSI's systematic safety assessment. ENSI should also consider issuing more detailed guidance on the contents of the inspections conducted within the Basic Inspection Programme to ensure that inspections cover all areas of the responsibility of the regulatory body.

Changes since the initial IRRS mission

Suggestion 5: In view of the results of the Mission 2011, ENSI decided to accelerate the process for the accreditation of its inspection body. To obtain this accreditation ENSI completed an intensive assessment of its inspection process and enhanced the inspection process significantly. The set of universally used process documents was enlarged and the level of detail was increased. Specific procedures for several inspection areas were added. Computer based tools to support planning and evaluation of inspections were upgraded significantly (System: IASIBE). The Basic Inspection Programme (BIP) was extended for all subjects and the levels of defence in depth, the fundamental safety functions and the barriers concerned have been included. The results from all types of inspection could be therefore directly linked to ENSI's systematic safety assessment. The scope of the BIP was significantly extended by including security, transportation of radioactive materials and all other nuclear installations. In addition, for all types of nuclear installations, the X-Ray equipment and radioactive sources have been included. ENSI did a cross-check to ensure that the BIP covers all areas of the responsibility of the regulatory body.

Status of the findings in the initial missions

Suggestion 5 is closed; ENSI has significantly enhanced its inspection process and the related inspection programs with inspections now covering all areas of the responsibility of the regulatory body.

7.2. SCOPE AND EFFECTIVENESS OF THE INSPECTION PROCESS

2011 mission RECOMMENDATIONS, SUGGESTIONS	
R8	Recommendation: ENSI should evaluate the effectiveness of the inspection process and coverage of the inspection programmes to ensure that also all other nuclear facilities (e.g. waste facilities, decommissioning, X-ray equipment and radioactive sources at the nuclear facilities) are adequately addressed.

Changes since the initial IRRS mission

Recommendation 8: ENSI completed a comprehensive evaluation of its inspection process which resulted in the Basic Inspection Programme (BIP) extended to all areas of regulatory responsibility of ENSI. The levels of defence in depth, the fundamental safety functions and the barriers concerned have been included. The scope of the BIP was significantly extended by including security, transport of radioactive materials and all other nuclear installations (e.g. waste facilities, decommissioning). In addition, for all types of nuclear installations, X-Ray equipment and radioactive sources have been included. ENSI did a cross-check to ensure that the BIP covers all areas of the responsibility of the regulatory body.

Status of the findings in the initial missions

Recommendation 8 is closed; ENSI has completed an extensive evaluation of its inspection process and the coverage of its inspection programmes. All nuclear facilities are now addressed adequately.

There are no new observations from the follow up mission.

8. ENFORCEMENT

2011 mission RECOMMENDATIONS, SUGGESTIONS

R9

Recommendation: The Government should change the legal framework in such a way that the threshold for prosecution should be commensurate with safety significance, in accordance with a graded approach. The legal framework should also - given the importance of openness and transparency for nuclear safety - allow prosecution of a licensee in order to avoid the detrimental effects of blame on an individual.

Changes since the initial IRRS mission

Recommendation 9: ENSI took the lead on the recommendation by taking a number of initiatives to promote discussion on this matter. ENSI identified 3 main issues:

1. Threshold for prosecution is too low
 - The threshold for prosecution of minor violations appears to be too low. Furthermore, ENSI is required to notify the prosecuting authorities (Office of the Attorney General or SFOE) about offences against the nuclear Energy Act. This may result in the reduced reporting of safety and non-compliance issues. In a learning safety culture, assignment of blame is not the underlying reason for investigating and determining the root cause of an event as a basis for corrective actions to be taken.
2. Criminal liability of the license holder
 - Criminal law focuses on individual liability not on the liability of legal persons, for example NPP operators. Incidents in nuclear facilities are often failure of the organization rather than individuals.
3. ENSI as the prosecuting authority
 - ENSI's role as a safety regulator is its primary mission. However, in certain circumstances ENSI has the duty to prosecute offences („contraventions”) against the Radiological Protection Act, with the consequence that ENSI is at the same time the regulatory and prosecuting authority. This dual role does not comply with ENSI's regulatory philosophy.

ENSI has analysed the issues in detail and has proposed solutions for discussions with the responsible ministry. These discussions are still ongoing. There are similar discussions for the „Just Culture” topic in other high-risk industries (eg. hospitals, civil aviation). As a result of the IRRS Team interviews with DETEC and ENSI, the team believes the parties have recognized and understood the issues. There is significant work to be done. The ultimate responsibilities for resolving the issues with the legal framework is with the government to revise it to be consistent with IAEA Safety Standards. Since the inconsistency may discourage the reporting of safety issues, resolution of this recommendation should be considered urgent and requires prompt action.

Status of the findings in the initial missions

Recommendation 9 is open; ENSI has taken a number of initiatives for dialogue with the ministries, and discussions are still ongoing. The ultimate responsibilities for resolving the issues with the legal framework is with the government to revise the law to be consistent with IAEA Safety Standards.

There are no new observations from the follow up mission.

9. REGULATIONS AND GUIDES

2011 mission RECOMMENDATIONS, SUGGESTIONS	
S6	Suggestion: ENSI should follow its comprehensive program to complete the regulatory framework in the future. The regulatory framework should be completed in a timely manner.
S7	Suggestion: ENSI should continue to develop a decommissioning regulatory program that integrates all hazards assessments. Special attention should be given to conventional safety prior to issuing new permits for decommissioning.

Changes since the initial IRRS mission

Suggestion 6: In 2011, ENSI presented a plan to complete its regulatory framework to the IRRS team. In 2011 the IRRS team stated that should ENSI follow this plan the outcomes would meet the IAEA Safety Standards. ENSI revised this plan to reflect the new strategy of the government (phase out). ENSI developed in addition a strategy paper (ENSI’s Regulatory Framework Strategy) defining the key goals of ENSI regulation. In accordance with its strategy paper ENSI has developed and published the majority of the missing guidelines. Currently three guidelines are not ready to be published (G02, G21, G16). In addition ENSI did a cross reference check of its regulatory framework with the WENRA Reference Levels. For each Level ENSI identified if and where the requirements from the Level were covered within the ENSI framework. The methodology and results from the cross reference activity was presented to the IRRS team. The results from the TEPCO Fukushima Daiichi accident and the contents of the IAEA Safety Standards were adequately considered in the process of issuing new guidelines.

Suggestion 7: ENSI extended its regulatory framework by issuing a guideline for decommissioning (ENSI-G17). The scope of this guideline includes the decommissioning of all nuclear installations that are subject to nuclear energy legislation. ENSI did a cross-check activity to ensure that the guideline ENSI-G17 is consistent with the recommendations of WENRA and IAEA. ENSI developed a comprehensive decommissioning regulatory plan (“AUKOS”). Within this project ENSI evaluated recommendations and legal regulations from international organisations as well as technical activities for decommissioning and fundamentals of supervision in the decommissioning phase. The IRRS team consider the AUKOS papers to be reasonable and cover the relevant aspects of decommissioning. In addition, ENSI now has an agreement (Memorandum of Understanding) on closer cooperation between ENSI and the other authorities relevant for work safety in particular with regard to the decommissioning of nuclear facilities including aspects of conventional safety. At the time of the follow-up Mission, one organization still has to sign the MoU.

Status of the findings in the initial missions

Suggestion 6 is closed on the basis of progress made and confidence in the effective completion; ENSI has made substantial progress in revising and completing its regulatory framework. There are only a few guidelines to be published in due course. In addition ENSI has developed a new mission statement defining the key goals of ENSI regulation.

Suggestion 7 is closed on the basis of progress made and confidence in the effective completion; ENSI has developed a comprehensive decommissioning regulatory plan that covers all relevant aspects of the organisation of decommissioning oversight. The decommissioning regulatory plan has items yet to be implemented. One organization still has to sign the MoU.

There are no new observations from the follow up mission.

10. TRANSPORT OF RADIOACTIVE MATERIAL

10.1. INTERFACE BETWEEN REGULATORY AUTHORITIES

2011 mission RECOMMENDATIONS, SUGGESTIONS	
R10	Recommendation: The government should ensure that the Swiss Authorities responsible for the transport of radioactive material operate a collaborative process for the timely exchange of information regarding authorisations, inspections and enforcement actions to provide coordinated and effective regulatory oversight.
S8	Suggestion: ENSI should use the process recommended above for the exchange of information as a basis to collaborate with Suva on compliance inspection programmes for companies subject to licences under RPA as well as NEA.

Changes since the initial IRRS mission

Recommendation 10: Immediately following the IRRS Mission in December 2011, ENSI, FOPH and Suva used the already established coordination meetings required by the existing Radiation Protection Ordinance (RPO) Art.136, to form a forum of control and licensing authorities in radioactive transport. Regular periodic meetings started in December 2012. Subsequent meetings have been held in April 2013, January 2014, June 2014 and December 2014, held at each of the offices on a rotational basis. It was also confirmed by FOPH and Suva that telephone and e-mail communications take place between the three regulatory bodies on a regular basis.

Art.32 of the revised RPO which is currently passing through Ministerial process, will require FOPH to set up a database to record all authorisations required by RPO including licenses relating to the transport of radioactive material and details of the information to be recorded is set out accordingly. All Regulatory Bodies (ENSI, FOPH, Suva) will be required to use the database relating to the issuing and modification of licenses resulting from regulatory activities.

The drafting process for the revised RPO has taken some 3 years and at the time of writing this report it is expected that the revised RPO will be enacted by early 2017.

Regular annual meetings take place involving ENSI, FOPH, Suva, Police, Military, Civil Defence, Swiss Aviation Authority and Border Control Authorities with topics of Regulatory Work, Approval Procedures and Supervision being examples of the standard agenda items. The last meeting took place in January 2015.

Suggestion 8: Standard agenda items in the newly established forum of control and licensing authorities (ENSI, FOPH, Suva) are Regulatory Oversight, Supervision and International Affairs to promote information sharing and explore opportunities for collaborative approaches.

As an indication of harmonisation the validity period of all licenses issued to non-nuclear operators (to enable them to work on nuclear installations) has been extended from 3 to 10 years to align with those issued by FOPH.

No license has been withdrawn by any of the regulatory bodies and there have been no significant inspection findings recorded that would risk a license being withdrawn.

A joint inspection involving ENSI and Suva has taken place concerning the manufacture of Type A waste packages in the non-nuclear sector and therefore under the jurisdiction of Suva. The inspection included audits of the quality management system and manufacturing processes.

Status of the findings in the initial missions

Recommendation 10 is closed on the basis of progress made and confidence in the effective completion; steps to revise the legal requirements in Swiss law (SDR) have been taken which will require formal exchange of information. Meanwhile, ENSI, FOPH and Suva have taken steps to

intensify existing coordination meetings, hold a joint inspection and have taken other steps to evidence closer collaboration.

Suggestion 8 is closed on the basis of progress made and confidence in the effective completion; positive steps have been taken as evidence that closer collaboration is now routinely taking place between ENSI, FOPH and Suva.

10.2. ADOPTION OF GRADED APPROACH FOR TRANSPORT PACKAGES BY ENSI

2011 mission RECOMMENDATIONS, SUGGESTIONS	
R11	Recommendation: The government should ensure that there is appropriate and effective regulatory oversight and enforcement authority for all activities relating to packages that are used to transport radioactive material when such activities are undertaken on a facility that is not regulated under NEA.
S9	Suggestion: ENSI should issue a guidance document to specify the requirements for transport casks and other types of transport packages for radioactive material, including details of applying a graded approach to package components and management controls (activities).

Changes since the initial IRRS mission

Recommendation 11: The Swiss transport law for road transport SDR, which implements the European Agreement ADR, will also be revised in 2017 by Art.25 Abs.3 to define more clearly the roles and responsibilities of ENSI, FOPH and Suva by making reference to the revised RPO. This will complete the necessary changes to the SDR that was in force at the time of the 2011 Mission.

Clearly changes to the Swiss transport law will follow its own necessary process nonetheless the revised law will merely clarify the newly established understanding between the parties involved. The pursuit of a bottom-up approach, evidenced by a joint inspection involving ENSI and Suva, provides a level of confidence that the necessary level of agreement between the parties involved has been reached which may need further formal confirmation if the change to the law does not materialise.

At one of the trilateral meetings it was agreed that a future process would be that when a company applies for a transport license according to RPO from ENSI they will be asked if they also want to operate in other (non-nuclear) sectors. If the answer is yes then ENSI will involve Suva and FOPH in the process in order to avoid duplication of licensing/regulatory activities. ENSI plans to include these steps into their corresponding management process at the next update. This will close any potential gap in regulatory oversight that may result due to a lack of understanding of the Swiss licensing processes on the part of an applicant.

Suggestion 9: A guidance document has been prepared by ENSI, Suva and FOPH that describes the duties of the package designer, manufacturer, owner and user. The document is currently at draft 6 dated April 2015 following a meeting between the parties held in January 2015.

Status of the findings in the initial missions

Recommendation 11 is closed on the basis of progress made and confidence in the effective completion; in conjunction with the significant progress made with respect to Recommendation 10 and Suggestion 8 there is now clarity in the respective roles and responsibilities of the Regulatory Bodies involved.

Suggestion 9 is closed on the basis of progress made and confidence in the effective completion; ENSI, FOPH and Suva have reached agreement on a draft guidance document; expected to be issued in 2015.

There are no new observations from the follow up mission.

11. EMERGENCY PREPAREDNESS AND RESPONSE

2011 mission RECOMMENDATIONS, SUGGESTIONS	
R12	Recommendation: ENSI should make the emergency classification consistent with GS-R-2.
S10	Suggestion: ENSI should fully integrate the emergency preparedness and response into the scope of the regular inspection (e.g. the proper status and functioning of emergency equipment, emergency dosimetry, personal protective equipment, evacuation routes, control room conditions for emergency situation, etc.).
S11	Suggestion: ENSI is suggested to work towards the improvement of communication redundancy to provide alternative communication means to the land-based lines in case of natural disasters.
S12	Suggestion: The government should consider the development of a comprehensive national radiation emergency response plan based on the existing “Consensus Paper” on national cooperation in case of a nuclear accident.
S13	Suggestion: ENSI is encouraged to initiate having longer exercises than the current few-hour long drills for testing the procedures over several shift changes.

Changes since the initial IRRS mission

Many changes in EPR occurred in Switzerland since the IRRS mission in 2011. The Fukushima accident in March 2011 led the Federal Council to create an interdepartmental working group (called IDA-NOMEX) to consider modifications to legislative and organisational provisions in emergency management in case of extreme events in Switzerland.

The efforts of ENSI for Emergency Preparedness and Response (EPR) were concentrated in three main areas: the IDA-NOMEX working group, the post-Fukushima action plan and the IRRS Action Plan.

The working group was composed of representatives from organizations representing all levels of the government, from federal to the cantons and also from utilities. The working group identified fifty-six measures and a schedule to solve them through 2016. ENSI was assigned to take part of 12 and to lead 4 of them, as follows:

- To compile a report on the existing situation regarding assistance and treatment for persons severely exposed to ionizing radiation, as well as to draw up arrangements with the power plant operators, and to suggest specific alternative solutions.
- To develop requirements for the redundancy and availability of measurement and forecasting systems for NPP.
- To review the reference scenarios and their assumptions for the purpose of emergency preparedness in the areas surrounding NPP.
- To review the zoning concept in the areas surrounding NPP with a view to amending the Emergency Preparedness Ordinance.

ENSI has enhanced its involvement in international activities on EPR. It is strongly involved in HERCA (chairs working group on emergencies) and supports IAEA’s efforts on „Assessment and Prognosis” what will be part of the general emergency exercise in September 2015.

The initiatives on the IRRS Action Plan related to EPR were the following:

Recommendation 12: A roadmap was created to achieve the new nuclear emergency classification system. The NPP licensees were requested to carry out an analysis of the implementation of a system compatible with the GS-R-2 in May 2013. A working group composed by representatives from ENSI and the licensees was created to this purpose.

Following the submittal of the analysis results to ENSI at the end of October 2013, several meetings were held in 2014 to discuss the implementation of the new classification system. ENSI has specified that the use of the US NRC emergency class terminology and the development of Emergency Action Levels (EAL) along the lines of the document Nuclear Energy Institute (NEI) 99-01, Revision 6 (Development of EAL for non-passive reactors) constituted an acceptable approach.

ENSI also established contact with several European countries and with the HERCA working group on emergencies with the objective of drawing on these countries' experience for the implementation of a new emergency classification system in Switzerland.

A set of four emergency classes has been defined to be implemented in Switzerland, corresponding to a "general emergency", "site emergency", "alert" and "unusual event". Existing EALs already used by the NPP licensees for the warning and alert of the authorities (so called RABE-criteria, based on dose rate values, pressure in containment, core exit temperatures, etc.) were tentatively assigned to the new set of emergency classes. The incidents and findings defined in the guideline ENSI-B03 will constitute the basis of the emergency class "unusual event".

Following an initiative of the NPP licensees, the already existing EALs (RABE-criteria) will be complemented and the defined EALs assigned to the newly defined classes. It can be stressed that NPP licensees have a joint approach and have a single position on these issues.

According to the schedule established in the ENSI document "New Swiss Emergency Classification", it is expected that the implementation of the new classification system will be completed by January 2016.

ENSI has also introduced the Standard Reporting Form (SRF) and the General Emergency at Nuclear Facility (GENF) form for the emergency communication to the IAEA. These forms are already used by ENSI and related procedures are tested during emergency exercises. The draft country fact sheet of Switzerland developed within the HERCA/WGE framework references the new emergency classes.

Within the frame of the ongoing revision of the Radiological Protection Ordinance, ENSI submitted a formal proposal to change Annex 6 of the Nuclear Energy Ordinance (Reporting on events and findings relating to safety). If the validation process of the revision of the Radiological Protection Ordinance is delayed for any reason, ENSI has the capacity to issue an order to all NPP licensees requiring them to use the new classification.

Suggestion 10: ENSI established a Basic Inspection Programme (BIP) identifying generic inspections common to all nuclear power plants as well as plant specific inspections. Inspection topics are assigned to the different specialized sections according to their field of competence and responsibility.

The observation of the annual emergency exercises is considered an element of the inspection regime with respect to EPR. ENSI showed reports issued following inspections do include a section dedicated to EPR. A presentation on the database on the BIP also demonstrated that EPR is fully integrated in the process.

At present, the BIP already includes an extended scope of topics related to EPR, e.g. the filtered containment venting systems, the operational readiness of the emergency ventilation system of the control room and emergency power supply systems.

In complement to the pre-existing checklist for EPR, ENSI decided to add the elements to the list of regularly inspected items: (1) the process of updating and verification of emergency documentation; (2) the operational readiness of the onsite and offsite emergency control centres; and (3) the process of warehouse management in the external emergency store in Reitnau (common installation for all utilities where mobile equipment is stored).

Suggestion 11: ENSI has reviewed possible technical solutions for improving redundancy in communication means. Since November 2013, ENSI is part of the national secure radio network for

the authorities and organisations responsible for rescue and security. This system is called POLYCOM. All NPP, authorities and organizations that have a role in emergency response, security and rescue make use of this system.

This new redundancy was first used during the General Emergency Exercise at the Leibstadt NPP, in November 2013.

Additionally, the implementation of a satellite-based solution is currently under discussion with the NPP operators.

Suggestion 12: Initially the implementation of the measures proposed by the IRRS Action Plan were delayed due to other priorities, such as the joint efforts demanding by the IDA NOMEX working group and the implementation of the new tasks given to the Federal NBCN Crisis Management Board.

On 19 September 2014, as a result of a high level meeting between the Director General of ENSI and the new Director General of the FOCP, it was decided that a mandate to the FOCP should be given for the creation of such a National Radiation Emergency Plan (NREP).

The FOCP received the mentioned mandate and a project coordinator was nominated to create the NREP. A draft of the Plan and a work schedule were presented during the set of interviews between representatives of ENSI, FOCP and the IRRS Team. Completion of the Plan is expected by the end of 2016.

Just the initial step to get the NREP was implemented (nomination of the national coordinator and work schedule). There are many additional steps to be done until the completion of the NREP.

Suggestion 13: ENSI has modified guideline ENSI-B11 (Emergency Exercises) to allow for longer emergency exercises for the licensed NPP, in accordance with the suggestion.

It should be noted that the organisation of General Emergency Exercises is under the responsibility of the FOCP.

The report of the General Emergency Exercise 2013, ODYSSEUS, demonstrated that it was designed to take course over a period of 2 days. Two NPPs were involved, Leibstadt and Beznau. National and international emergency response and preparedness partners also took part in the exercise. This exercise also demonstrates the capability of the Reitnau external storage facility and the transport of the stored material to the NPP.

Status of the findings in the initial missions

Recommendation 12 is closed on the basis of progress made and confidence in the effective completion; ENSI is planning to issue orders to require the new classification system and proposed the change of Annex 6 of the Nuclear Energy Ordinance.

Suggestion 10 is closed; EPR is integrated in ENSI's Basic Inspection Program.

Suggestion 11 is closed; ENSI was integrated into the national radio system, used by other authorities, agencies and operators for emergency communication.

Suggestion 12 is open; the National Radiation Emergency plan is still in its initial stage.

Suggestion 13 is closed; ENSI guideline has been changed to specify the longer exercises and one such exercise has been conducted.

There are no new observations from the follow up mission.

12. OCCUPATIONAL, PUBLIC AND ENVIRONMENTAL EXPOSURE CONTROL

12.1. OCCUPATIONAL RADIATION PROTECTION

2011 mission RECOMMENDATIONS, SUGGESTIONS	
S14	Suggestion: ENSI, FOPH and Suva, in the planned review of the RPO, should ensure that the RPO is harmonized with international requirements, especially concerning worker protection, particularly in terms of dose values. In addition, there should be an adequate balance between ordinances and guidelines, a clear link established in ordinances for any necessary guidelines and clarity provided as to which worker protection ordinances apply to nuclear facilities.

Changes since the initial IRRS mission

Suggestion 14: Switzerland's radiological protection legislation is currently based on the recommendations of the ICRP-60. Radiation Protection Act and Radiation Protection Ordinance (RPO) are authoritative in particular for three regulatory bodies: Swiss Federal Office of Public Health FOPH (medicine, research and protection of the public), National Accident Insurance Fund Suva (industry) and Swiss Federal Nuclear Safety Inspectorate ENSI (nuclear installations). The revision of the RPO and related technical ordinances are in progress and are to be finished in 2017. Several authorities (including those three) are actively involved in the revision. The main goal of RPO revision is to make the country's legislation on radiological protection compatible with ICRP recommendations, as well as with the relevant IAEA Safety Standards and EU directives. Major modifications related to ENSI's area of responsibilities, which will be included in the revised RPO, are:

- adoption of the system of A- and B-workers, dosimetry for air-crews
- system of dose limits, dose constraints and reference levels
- clearance levels adopted according to the IAEA BSS
- regulations for the NORM-industries
- radon at workplaces
- reference to IAEA GSR part 7 "Emergency Preparedness and Response"
- three different exposure situations (planned / emergency / existing)
- emergency exposure situations reference levels
- specific regulations on high activity and orphan sources

The Memorandum of Understanding (MoU) on the surveillance of conventional work safety between Suva, Federal Coordination Commission for Occupational Safety (FCOS), State Secretariat for Economic Affairs (SECO), Labour-Inspectorate of the Cantons Aargau, Bern and Solothurn as well as ENSI is being signed and the collaboration among these organisations has been already established and improved. Progress has been made especially in relation to conventional work safety, in which currently there is an overlap of responsibilities between ENSI and Suva. A group of ENSI-inspectors have been trained in worker protection measures and several team inspections have been carried out together with Suva, one concerning conventional work safety as defined in MoU. A joint inspection on conventional work protection has already taken place. Clarification regarding the radiation protection regulation will be addressed in the revised RPO, which will indicate that ENSI may also issue guidance for radiation protection. The IRRS team was informed that the revised RPO will support better coordination in the area of radiation safety within the current Swiss regulatory framework based on ICRP recommendation. Furthermore it will provide for better alignment with international standards, the IAEA BSS and the relevant EU directives.

Status of the findings in the initial missions

Suggestion 14 is closed on the basis of progress made and confidence in the effective completion; RPO revision is yet to be finalized to achieve harmonization with the international requirements and balance between the ordinances and guidelines.

12.2. CONTROL OF RADIOACTIVE DISCHARGES, MATERIALS FOR CLEARANCE AND ENVIRONMENTAL MONITORING

2011 mission RECOMMENDATIONS, SUGGESTIONS

S15	Suggestion: ENSI and FOPH should develop a similar joint document on strategies of site and environmental remediation based on WS-R-3.
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Changes since the initial IRRS mission

Suggestion 15: Switzerland's legislation related to the nuclear, radioactive and chemical materials is quite well developed with coherent approach and well developed procedures for interaction during the licensing and permit process between different responsible authorities. In connection with a current revision of the Radiation Protection Ordinance (RPO), IRRS team was informed that the requirements on the use of areas with long-term contamination and the responsibility for measures to be implemented will be defined when RPO is finalised. All stakeholders consider that the revised RPO will provide the strategy for environmental remediation.

Federal Office of Public Health (FOPH) is the responsible authority to evaluate the public exposures, whereas in case of emergency, the NEOC (National Emergency Operations Center) is responsible in this regard, according to the NBCN Operations Ordinance. Article 152 of the draft RPO makes the Federal NBCN Crisis Management Board responsible for submission of an application to the Federal Council for transitioning from emergency exposure to existing exposure situations. According to article 155 of the draft RPO, the FOPH is responsible to define the reference levels for the use of contaminated areas, which shall not be higher than 20 mSv per year (exclusive of radon exposure). According to article 176 of the same draft, the FOPH is responsible for the preparation of the long-term remedial actions to cope with effects after the transition from emergency exposure to existing exposure situations. The IRRS team was informed that authorities, FOPH, ENSI and NEOC, will define together the methods to evaluate the radiation exposure.

The IRRS team noted that the progress of revision of the RPO is very good and all involved parties have good common understanding of how to complete this work. The revised RPO will include all necessary provisions and there is no need for an additional regulatory document. When the RPO will be in place, the work on different guidelines may begin. The IRRS team considered that the guideline on the release of material from regulatory control, which has to take into account the decommission wastes, should be one of the priorities.

Status of the findings in the initial missions

Suggestion 15 is closed on the basis of progress made and confidence in the effective completion; RPO, which is considered by all parties to provide the common strategy, is yet to be finalized.

There are no new observations from the follow up mission.

13. WASTE MANAGEMENT (POLICY AND STRATEGY, PREDISPOSAL AND DISPOSAL), DECOMMISSIONING

13.1. DECOMMISSIONING REGULATOR RESOURCES

2011 mission RECOMMENDATIONS, SUGGESTIONS	
S16	Suggestion: ENSI should continue to be an active participant in the IAEA and other international decommissioning forums to gain valuable regulatory experience for the decommissioning of the Swiss research and power reactors.
S17	Suggestion: ENSI should develop a human resources plan for providing inspectors and other technical specialists required to regulate reactor decommissioning projects and to ensure end point criteria are met for terminating the licences.

Changes since the initial IRRS mission

Suggestion 16: ENSI has completed an “AUKOS” management review of the decommissioning program; organization, resources, regulatory assessment and advanced training needs. ENSI created a new decommissioning section, and has increased staff to provide regulatory focus on decommissioning and allow for participation at international forums. ENSI is an active participant in international decommissioning forums, including the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency (NEA) and the Western European Nuclear Regulators Association (WENRA). ENSI has been extensively engaged with the German nuclear regulator, exchanging information and visiting decommissioning sites to gain regulatory insight, practical decommissioning knowledge and lessons learned.

Suggestion 17: ENSI has completed an “AUKOS” management review of the decommissioning program comprehensive needs that includes organization, human resources, regulatory assessment and advanced training needs. ENSI has created a decommissioning section to manage and focus on developing the decommissioning program. ENSI has produced Guideline G17/e, “Decommissioning of Nuclear Installations” that provides requirements for decommissioning and detailed requirements for the application of documents for decommissioning. Following the actions identified in the management plan, ENSI is in the process of evaluating the human resources needs for the comprehensive decommissioning regulatory program. This includes the cross-cutting IRRS Suggestions in Module 3 Responsibilities and Functions of the Regulatory Body, Module 5 Authorization, Module 6 Review and Assessment, Module 7 Inspection, Module 8 Enforcement, and Module 9 Regulations.

ENSI has performed a human resource assessment of internal talent and is evaluating potential external resources required for implementing an effective decommissioning regulatory program. This evaluation includes assessing the resource gaps and is also evaluating the specialized technical training needs to regulate a reactor decommissioning program from the transition from plant operation to decommissioning status and to completion of the decommissioning at license termination. ENSI has made significant progress for developing a comprehensive and structured approach using the “AUKOS” process to have an effective decommissioning regulatory program.

Status of the findings in the initial missions

Suggestion 16 is closed; ENSI has created a new section and increased staff to provide regulatory focus on decommissioning and allow for participation at international forums.

Suggestion 17 is closed on the basis of progress made and confidence in the effective completion; significant progress has been made by ENSI employing the “AUKOS” process and it is expected that ENSI will complete the remaining decommissioning resource issues.

There are no new observations from the follow up mission.

14. INTERFACES WITH NUCLEAR SECURITY

14.1. ENSI SUPERVISION ACTIVITY

2011 mission RECOMMENDATIONS, SUGGESTIONS

- S18** **Suggestion:** The Government should consider complementing the responsibilities assigned to ENSI for nuclear safety and security with the responsibility in the supervision of accounting for and control of nuclear material, so as to enhance the efficiency of the supervision system and the effectiveness of related activities by implementing a completely integrated approach.

Changes since the initial IRRS mission

Suggestion 18: The suggestion has been considered by the Government. Currently, DETEC does not see the need or benefits to make changes in the allocation of responsibilities related to safeguards. Justification for their position is mostly related to the political (i.e. foreign affairs) aspects.

Noting DETEC's decision, the IRRS team maintains its position which it hopes would continue to be a consideration when opportunities arise to revise the Swiss legislation in the future. The allocation of responsibilities in the area of safeguards between ENSI and SFOE could be done so that SFOE would still be responsible for the cross boundary part of safeguards whilst at the same time providing an integrated approach to nuclear safety and safeguards regulatory oversight by ENSI which would serve to create and maintain clarity of roles, responsibilities and requirements for the licensee with respect to nuclear material for which they are responsible.

Status of the findings in the initial missions

Suggestion 18 is closed; the suggestion has been considered by the Government.

There are no new observations from the follow up mission.

15. REGULATORY IMPLICATIONS OF THE TEPCO FUKUSHIMA DAIICHI ACCIDENT

15.1. UPDATE ON THE ACTIONS FOR ADDRESSING THE REGULATORY IMPLICATIONS OF THE TEPCO FUKUSHIMA DAIICHI ACCIDENT

General implications

An immediate consequence in Switzerland to the TEPCO Fukushima Daiichi accident in Japan was the decision of the responsible Minister to stop licensing activity in Switzerland related to new nuclear power plants and soon after the Swiss Government decided on phasing-out nuclear power. This decision was supported by the two chambers of the Parliament and its consequences have been inserted into the draft Nuclear Energy Act (NEA). The draft modification is under consideration by the Parliament and may also be the subject of a referendum. The phase-out policy is reflected in NEA in four subjects: no general licence for a new nuclear power plant may be issued; Switzerland will not reprocess spent nuclear fuel; developments in science and technology on newer reactor designs need to be followed up; and the operators of nuclear power plant need to submit long term operation concepts of units about to reach 40 years of operation and every ten years thereafter.

As immediate consequences of the phase-out decision, three projects aimed at building new nuclear reactors have been cancelled and the Federal Council (Government) included the phase-out concept into its Energy Strategy until 2050.

A consequence of the phase-out directly affecting ENSI was that the then new System Division (mainly meant to deal with the new built project) was disbanded and therefore the operating experience feedback and event analysis activities had to be reorganized in ENSI.

Follow-up investigations and measures

Immediate actions by ENSI and by the licensees were described in the initial IRRS mission report and shall not be repeated here. Thirty seven checkpoints were mentioned then and it was noted that full implementation was expected by 2015. At the time of the follow-up mission all Checkpoints have been addressed and the activity by ENSI related to the Checkpoints is expected to be completed by the end of 2015.

Already at the early stage it was recognized that investigations more detailed and thorough than the immediate ones need to be performed in order to reach conclusions and measures based on thorough, in-depth analyses. ENSI requested the operators to update hazard analyses for all relevant hazard types using the latest state-of-the-art methods and techniques. The results are briefly summarized below.

For *seismic safety* of the plants the 2011 action plan took advantage of the performance of the so called PEGASOS Refinement Project. Apparently this project required more time than originally planned, it was completed in 2013 and the results are being reviewed by ENSI. In the meantime intermediate results were provided and applied by the operators. Accordingly for earthquake events of $10^{-4}/y$ return frequency it is required that their radiological consequences may not exceed a dose of 100 mSv, whereas the most frequent events (return frequency of $10^{-3}/y$) shall be limited by a dose of 1 mSv. The analyses included postulated loss of off-site power; re-evaluation of containment and primary circuit isolation seismic robustness; and, the potential flooding effect of the nearby dams. It was concluded that there is no need for automatic seismic shut down systems for the Swiss plants.

For *flooding hazards* events of frequency higher than $10^{-4}/y$ were taken into account, including seismically induced flooding, historical flooding information, and possible clogging of water intake due to debris. The Swiss plants except for Mühleberg are provided with seismically protected groundwater wells for alternative cooling water source. Implementation of diverse ultimate heat sink with the use of flood-safe drinking water network and emergency power supply at the Mühleberg NPP will be completed by end of August 2015.

For *extreme weather conditions* the first evaluations were completed in 2011. ENSI provided detailed requirements for a refined safety analysis that includes wind, rain, snow and extreme temperatures.

The analysis has been completed in 2014 based on events with a return period of 10^4 years and is being reviewed by ENSI. Results so far evaluated do not imply any essential safety concern.

For increased safety of *spent fuel pools* (SFP) a seismic safety analysis and analysis of protection against hydrogen combustion were initiated in 2012. All pools have been provided with external hook-up points for water supply by 2013 and with additional level and temperature measurements by 2014. For Mühleberg and Beznau NPP ENSI additionally required the back fitting of an earthquake and flooding resistant spent fuel pool cooling system. The respective back fittings will be completed in 2017 for the Beznau NPP resp. in 2020 after the permanent shutdown of the Mühleberg NPP.

Consequences of long lasting *station blackout* (SBO) were investigated right after the accident (compared with IRRS report, 2011). Since then a number of back fitting steps were defined and completed such as implementation of external hook-up points for diesel generators and of various purpose accident management diesels; increased independence of power supply. The EU Stress Test has shown that during outages an SBO represents an increased hazard to containment integrity; analyses on this issue were submitted by the licensees in 2014 and are being reviewed by ENSI.

Further containment integrity related measures were taken on the *filtered venting* and *hydrogen management* systems. In reply to a recommendation by the EU Stress Test peer review (to rely more on passive systems for hydrogen management) ENSI ordered the installation of passive autocatalytic hydrogen recombiners in containments at all NPPs (except for Mühleberg, where the containment is filled with inert nitrogen atmosphere).

In the area of *severe accident management* and *emergency preparedness and response* the concept of long term operability of emergency organizations has been reviewed in 2012, updated in 2013 and evaluated by ENSI in 2014. Establishment of off-site emergency rooms and infrastructure was requested from all NPPs. Organization of general emergency exercises were also decided (for more on this, see the next section).

Topical Inspections and review conclusions by ENSI

The topical inspections were started in 2011 after the accident and continued in the next years. Topical inspections in 2011 were reported by the initial IRRS mission. The inspection topics in 2012 were: strategy of NPPs for prolonged loss of power supply; assessment of external event hazards; and NPP emergency preparedness facilities. In 2013 the radiation protection equipment of the power plants were inspected.

The topical inspections did not reveal any important deficiency. Minor issues for improvement were identified that have since been implemented.

The reviews by ENSI of the analyses submitted by the operators confirmed adequate protection of the Swiss NPPs against the BDBA events investigated and ENSI concludes that substantial safety margins are available in all plants. Nevertheless a number of specific additional safety increasing measures were requested from the licensees by ENSI.

Follow-up of the European Stress Test

As discussed in the initial IRRS mission report, Switzerland was an active participant of the European Stress Test (ST) exercise. As part of this exercise a European peer review team reviewed the Swiss National report and the activities behind it and offered two recommendations. These were related to the investigations of margins with respect to extreme weather conditions and to possible hydrogen dispersion outside the containment, respectively.

As for the safety margin issue, in 2013 ENSI prepared detailed requirements to increase earthquakes and flood related safety margins. The results of these analyses were submitted to ENSI by the licensees in 2014 and presently are being evaluated.

As results of the safety margin increasing project the Swiss NPPs have performed or are performing a number of safety increasing actions (all BDB): thus, among others, the Gösgen NPP had to reinforce the electrical cabinets, in Leibstadt minor modifications were made including containment isolation reinforcement, in Beznau accident management mobile equipment connections have been installed, while in Mühleberg a number of specific modifications were performed like ventilation of the

bunkered diesel, or improvement in the isolation of primary circuit, of containment venting valve and of water tightness of the bunker.

For increasing the margins related to extreme weather conditions the requirements are under preparation.

The hydrogen propagation outside containment was specified and analysed in 2013-2014 (see above).

Eight more issues identified by the ST were considered open by ENSI. All these issues have been addressed by both ENSI and the licensees, several of them have since been closed.

For details the reader is referred to the annually published Fukushima Action Plan of ENSI available from ENSI website. The Action Plan was first published in 2012 with the aim of providing information to the general public on the regulatory activities of ENSI related to the accident. It reports on the status of all actions planned and conducted. The last edition was issued in February 2015 as all actions are expected to be completed (from the part of ENSI) by the end of 2015.

ENSI participation in the national emergency preparedness working group

After the TEPCO Fukushima Daiichi accident the Federal Council established an interdepartmental working group (IDA NOMEX) with the aim of determining and performing those emergency preparedness related modifications in the legal and governmental organizational systems, which follow from the lessons learned from the accident.

The working group submitted a report in July 2012 in which 56 measures were proposed over all possible areas related to emergency preparedness. ENSI was given the lead of four groups consisting of representatives from other organizations. These groups had the tasks and reached the results as follows:

No. 5: assistance and treatment of persons with severe radiation exposure – completed in 2013, as a result arrangements with the responsible hospital were confirmed to be adequate;

No. 10: availability and redundancy of measurement and forecasting systems of NPPs – completed in 2013, a set of requirements on measuring and forecasting system were set and the existing system was checked for ability to independently operate for 72 hours. It was concluded that the normal communication lines are not always available and an alternative communication system was initiated to use (POLYCOM, which is used by police and ambulance, fire brigades and is maintained by the army);

No. 14: review of reference scenarios and their assumptions for emergency preparedness in the surroundings of NPPs – finalized in 2014, pre-calculated scenarios were prepared with and without filtered releases. Source terms considered embrace a large spectrum of possible releases. The source term of a core melt type scenario was artificially increased by a factor of ten for each of the scenarios considered. Following the work on the reference scenarios, the KI tablets were distributed within a 50 km radii of NPPs. Note that the final reference scenario to be used as a basis for emergency preparedness is to be confirmed by the Federal Council;

No. 18: review of zoning concept in the vicinity of NPPs – finalized in 2014, lifting the overlap of the sectors was recommended and emergency preparedness beyond the 20 km protective zone was found needing improvement.

CONCLUSION [1]

The Team considers that ENSI continued the strategic, systematic and well organized utilization of the lessons learned from the TEPCO Fukushima Daiichi accident. ENSI and NPP operators have effectively implemented both medium and long-term safety improvement plans that were established in the past four years and pursued new initiatives for enhancing safety of the Swiss nuclear power plants.

15.2. FOLLOW-UP/ UPDATE ON THE 2011 MODULE-WIDE CONCLUSIONS

It is to be noted at this point that the initial IRRS mission in 2011 raised very few issues related to the specific Modules. Most of these issues have been discussed in the previous section; the remaining topics shall be briefly reviewed here. More details are found in each of the modules in this report.

Role, responsibility and cooperation of the regulatory body

The regulatory implications of the TEPCO Fukushima Daiichi accident clearly demonstrate the vital importance of building and maintaining the competence of a nuclear safety regulatory body by providing it with the necessary independence to provide a basis of trust for all stakeholders. In this respect independence of and trust in ENSI was reinforced when an attempt of establishing a parallel nuclear regulatory authority (aimed at representing second opinions besides the views of ENSI) was rejected by the Swiss Parliament in 2013.

The initial IRRS mission offered a Recommendation on channelling other existing second opinions into the decision making process of ENSI. As discussed in Module 3 above, a MoU to this effect was established between ENSI and the Federal Nuclear Safety Commission for some issues. Although this mechanism has beneficial results, the existence of second opinions related to nuclear safety parallel to the decisions by ENSI is not considered to be in accordance with the IAEA Safety Standards and therefore not acceptable. The issue is addressed in Module 3 by a new Recommendation.

In this context it is worth mentioning the Code of Conduct issued by ENSI, which is intended to give instruction to the ENSI staff and Board in handling conflicts of interest of various types.

It is recognised by the IRRS team that ENSI has taken significant steps to revise the scope and detail of its approach to nuclear safety regulatory oversight in the context of changes necessary to take advantage of the lessons learned from the TEPCO Fukushima Daiichi accident. The issues that remain are for the Swiss government to address as it concerns the independence of ENSI and the clarification that under all circumstances ENSI alone has the authority to determine what actions need to be undertaken by a licensee to achieve the necessary levels of nuclear safety appropriate at any time for a licensed nuclear facility in Switzerland.

International activities

ENSI has prepared several summary reports for various occasions on the Swiss activities related to the Fukushima implications, among others the National Report submitted to the 2nd Extraordinary Meeting of CNS, and the National Report and status reports on the European Stress Test exercise. Although not directly related to the accident it is recognised by the IRRS team that Switzerland was the initiator and one of the main promoters of the Vienna Declaration on Nuclear Safety in February 2015.

Implications on regulatory functions and activities

The activity of ENSI has been influenced by the lessons learned from the TEPCO Fukushima accident in several ways. The concrete actions to be taken by ENSI have been summarized in an Action Plan as described before; more general implications are mentioned in brief here.

The *management system* of the regulatory body now encompasses a number of changes partly due to the accident. Thus ENSI initiated its accreditation as an *inspection* organization according to ISO 17020 that, among others calls for a formalized and extended training program of the inspectors; the accreditation is in its final steps. Risk management has been updated, human capital management developed and implemented and self-reflection on regulatory safety culture was initiated, while the operating experience feedback process was reassigned in the new ENSI organization.

The *review and assessment* activities related to the safety re-assessment of the NPPs have been mentioned in the previous section. It is noted, that according to the normal practice, ENSI communicates its decision to the licensees in regulatory letters. In case of the decisions related to the Fukushima implications, ENSI found it appropriate to issue orders on the requirements set for the licensees. Altogether six such orders have so far been issued.

Similarly, the topical *inspections* related to the follow-up of the accident are discussed in the previous section.

ENSI is performing a systematic programme of revising its *guidelines*. The general need for the periodic revision of guidelines was enhanced by the Swiss Government decision on cancelling the new build programme. In the framework of this it has so far issued four new guidelines and published seven revised guidelines. In addition several guidelines are in various stages of production. It is noted that due to the phase-out decision and the shutdown of research reactors four guidelines have been cancelled.

The role of ENSI as a nuclear regulator in *emergency preparedness* is primarily the oversight of the emergency preparedness and response activity of the licensees. (Activities of ENSI related to other than emergency preparedness are discussed in the previous section). As a direct consequence of the TEPCO Fukushima Daiichi accident the need for extended emergency exercises has been realized. Such an exercise was organized in 2013 with the participation of two NPPs (Leibstadt and Beznau) which involved the national organizations having leading role in nuclear emergency preparedness and response. The exercise was based on a scenario initiated by an earthquake and lasted two days. The Reitnu external storage facility was also involved in the exercise. The next general exercise is planned to 2015 with the participation of the Gösigen NPP.

CONCLUSION (2)

The Team concludes that ENSI has effectively addressed the issues raised by the conclusions of the initial IRRS mission on the regulatory implications of the TEPCO Fukushima Daiichi accident. Furthermore, ENSI has systematically made use of the lessons learned from these implications in its regulatory practices.

POLICY DISCUSSIONS

Summary of Policy Discussion on Decommissioning

The Decommissioning Policy Issues discussion was initiated by an ENSI presentation on the current Switzerland status and issues under evaluation. With the 2013 announcement by BWK Energy AG, Mühleberg NPP will be the Switzerland's first large power reactor to permanently cease operations in 2019. ENSI will be conducting a review of the decommissioning project that will become the basis for the DETEC decommissioning order. In preparation for the first decommissioning, ENSI has taken the following actions:

- Established a decommissioning organization section
- Issued ENSI-G17/e Guidance, "Decommissioning of Nuclear Installations"
- Developed a "Supervisory Concept for the Decommissioning of a Nuclear Power Plant" (AUKOS)
- Updated its resource planning and started specific training activities
- Intensified its international cooperation
- Initiated a working group for the coordination of the involved authorities on a national and cantonal level

Discussion focused on IAEA Member States IRRS Team participants experience with decommissioning optimization and expected future developments, cooperative agreements with member states regulators (e.g. peer reviews, cross inspections), regulator decommissioning challenges (public communications, resources and requirements), and lessons learned. IRRS team members provided insight on the decommissioning experiences and lessons learned from previous decommissioning projects and the current status of the decommissioning activities in their individual countries. These included:

- France
- Germany
- United Kingdom
- United States

The meeting conclusions included the need to continue to learn from other countries experiences and decommissioning regulatory programs and to cooperate in regulator's decommissioning activities as well as on the broader issues, such as public communications, associated with decommissioning and waste management.

LTO Concepts for NPPs

In Switzerland the operating licences for the existing nuclear power plants are not limited in time. This means that currently a nuclear power plant can be operated as long as the safety requirements are met. This is confirmed by ENSI by means of continuous regulatory oversight as well as by Periodic Safety Reviews conducted every ten years. In addition to PSR conducted for plants with 40 years of operation, the licensees submitted additional safety analyses for long-term operation (LTO) to demonstrate that the design limits of the safety-relevant plant components are not reached in case of an extended period of operation. ENSI has issued two corresponding LTO safety evaluations, one in 2010 (Beznau NPP) and one in 2012 (Mühleberg NPP). Currently there is no legislative basis for ENSI to require additional demonstrations for safety for long term operation.

The phase-out decision has initiated a process to change the relevant nuclear and energy legislation to reflect the new situation. Discussions on the main lines for changes in the Nuclear Energy Act have included a ban on general licenses for new builds, ban on changing the general licenses for existing nuclear power plants and confirmation that the existing NPPs can operate as long as they are safe. ENSI has raised concerns on the safety challenges related to the long term operation and how they should be tackled with the Nuclear Energy Act. As a result, the draft Nuclear Energy Act has a new article requiring licensees to establish a comprehensive LTO concept indicating the intended life time of the plant, demonstration that design limits are not exceeded, proof of availability for competent staff, and a back-fitting program to improve safety. These LTO concepts are required to be submitted for ENSI's review and approval before completion of 40 years of operation.

It was concluded that ensuring the safety of nuclear power plants prior their final shutdown situation is a generic challenge for all countries with NPPs. Discussions on the draft Nuclear Energy Act included:

- Safety criteria for licensees to establish a back-fitting program and for ENSI to judge its adequacy for long term operation
- Difference between the requirements and content of Periodic Safety Reviews and Long Term Operation concept
- Shut down criteria for NPPs vs. minimum level of safety (in Switzerland shut down criteria are defined in the legal framework according to the "Provisional shutdown ordinance" SR 732.114.5)
- Human and organizational factors for long term operation i.e. staffing plans and programmes to ensure competent staff until the end of operations
- Holistic approach for safety, prioritization of safety improvements, stability of regulatory decision making, cost-benefit thinking in regulatory decision making
- Utilities reactions on the draft Nuclear Energy Act

APPENDIX I - LIST OF PARTICIPANTS



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APPENDIX II - LIST OF COUNTERPARTS

	IRRS Experts	COUNTERPART
1.	LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES	
	TIIPPANA Petteri	ALTORFER Felix, SCHWARZ Georg
2.	GLOBAL NUCLEAR SAFETY REGIME	
	PEDERSON Cynthia	WANNER Hans
3.	RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY	
	PEDERSON Cynthia	ALTORFER Felix, VEYRE Jean-Claude
4.	MANAGEMENT SYSTEM OF THE REGULATORY BODY	
	NICIC Adriana	VEYRE Jean-Claude
5.	AUTHORIZATION	
	LUX Ivan	SCHEFER Andreas, SCHWARZ Georg
6.	REVIEW AND ASSESSMENT	
	TIIPPANA Petteri	SCHULZ Ralph
7.	INSPECTION	
	WILDERMANN Thomas	BILLETER Daniel, SARDELLA Rosa
8.	ENFORCEMENT	
	WILDERMANN Thomas	SCHEFER Andreas, SARDELLA Rosa
9.	REGULATIONS AND GUIDES	
	WILDERMANN Thomas	FLURY Peter, KRIETSCH Torsten
10.	TRANSPORT AND RADIOACTIVE MATERIAL	
	WHITTINGHAM Stephen	THEIS Stefan, KOCH Frank
11.	EMERGENCY PREPAREDNESS AND RESPONSE	
	DOS SANTOS Raul	RUSCH Ronald, BLUST Ernst
12.	OCCUPATIONAL, PUBLIC AND ENVIRONMENTAL EXPOSURE CONTROL	
	SNEVE Malgorzata	CARTIER Franz, HAMMER Johannes, PILLER Georges, SCHEIDEGGER Roland
13.	WASTE MANAGEMENT (POLICY AND STRATEGY, PREDISPOSAL AND DISPOSAL), DECOMMISSIONING	

	IRRS Experts	COUNTERPART
	WATSON Bruce	WIESER Michael, KRIETSCH Torsten
14.	INTERFACES WITH NUCLEAR SECURITY	
	TIIPPANA Petteri	MATTLI Hans, ALTORFER Felix
15.	REGULATORY IMPLICATIONS OF THE TEPCO FUKUSHIMA DAI-ICHI ACCIDENT	
	LUX Ivan	SARDELLA Rosa

APPENDIX III - MISSION PROGRAMME

IRRS Follow-up Mission to Switzerland (8 – 17 April 2015)

Time	Wed 8.4	Thu 9.4	Fri 10.4	Sat 11.4	Sun 12.4	Mon 13.4	Tue 14.4	Wed 15.4	Thu 16.4	Fri 17.4	
9:00-10:00	Team building meeting:	Interviews	Interviews	Team discuss findings	Free day Social Program	8-9 Meeting with DETEC (Bern)	TM finalize report	TL/TC write Exec. Sum	Submission of the Draft to the Host		Written comments by the Host
10:00-11:00	<ul style="list-style-type: none"> 5 min./TM self-intro Refresher training 		9-10 Meeting with ENSI Board (ENSI)						Host reads Draft	TC drafts the Press Release	
11:00-12:00	Initial Team Meeting: <ul style="list-style-type: none"> IRRS process Main objectives 		10-12 Meeting with SFOE (ENSI)								
12:00-13:00	Lunch	Lunch	Lunch	Lunch		Lunch	Lunch	Lunch	Lunch		
13:00-14:00	<ul style="list-style-type: none"> Report writing Schedule 	Interviews	Interviews	TM finalize findings/ TM write report		Secretariat edits the report	Cross-reading	Secretariat edits report		Discussion by the Host	Departures of Team Members
14:00-15:00	<ul style="list-style-type: none"> First observations 		14:00-16:00 Meeting with FOCP (ENSI)					Discussion of Executive Summary	Host reads Draft		
15:00-16:00	Entrance Meeting		14:15-16:15 Meeting with Suva, FOPH (ENSI)			Discussion of results of cross-reading	TL finalises the presentation			Presenting the final Draft of the Report to the Host	
16:00-17:00	Policy Issue 1		15:00-16:00 Meeting with NSC (ENSI)					Written preliminary findings delivered	Secretariat edits report		
17:00-18:00	Policy Issue 2	Daily Team Meeting	Daily Team Meeting	Daily Team Meeting		TM finalize report	Dinner	Dinner	Free	Farewell Dinner	
18:00-19:00	Dinner	Dinner	Dinner	Dinner		Dinner					
19:00-20:00					TM write report		TM write findings	Secretariat edits findings TM write report	TM Read Draft	Secretariat edits the report	
20:00-24:00											

**APPENDIX IV - RECOMMENDATIONS (R) AND SUGGESTIONS (S) FROM THE 2011
IRRS MISSION THAT REMAIN OPEN**

Module	R/S	Recommendations/Suggestions
1.1	R1	Recommendation: The government should consider providing ENSI with the authority to issue regulatory requirements.
1.2	R4	Recommendation: The government should evaluate the needs for building and maintaining competence of the parties that have responsibilities in relation to safety in the near, mid-term and long-term future. It should then adopt the appropriate strategy to fulfil those needs.
3.3	R5	Recommendation: Government should ensure that relevant authorities, commissions and committees, for example the NSC, involved in nuclear safety matters, provide its recommendations and advice directly to ENSI before it issues its final decision. This should be done in an open and transparent manner, in order to allow ENSI to make an informed decision.
5	R6	Recommendation: The government should revise relevant legislation in order to provide ENSI with the authority to formulate binding conditions on nuclear safety, security and radiation protection. This should be fully reflected in various licences, orders or in their amendments whenever it is necessary before or after the issuance of the authorization.
8	R9	Recommendation: The Government should change the legal framework in such a way that the threshold for prosecution should be commensurate with safety significance, in accordance with a graded approach. The legal framework should also - given the importance of openness and transparency for nuclear safety - allow prosecution of a licensee in order to avoid the detrimental effects of blame on an individual.
11	S12	Suggestion: The government should consider the development of a comprehensive national radiation emergency response plan based on the existing “Consensus Paper” on national cooperation in case of a nuclear accident.

APPENDIX V - RECOMMENDATION (RF) FROM THE 2015 IRRS FOLLOW-UP MISSION

Module	RF	Recommendations, Suggestions or Good Practices
3.1	RF1	<p>Recommendation: The government should:</p> <ul style="list-style-type: none">(1) strengthen ENSI's independent regulatory authority by giving ENSI the ability to issue binding technical safety requirements, licence conditions on nuclear safety, security and radiation protection, and(2) strengthen ENSI's position as the competent, technical authority, by having NSC provide their technical safety input to ENSI solely in an open and transparent manner.

APPENDIX VI - REFERENCE MATERIAL PROVIDED BY ENSI

IRRS Follow-Up Modules:

Module 1	Responsibilities and functions of the government
Module 2	Global nuclear safety regime
Module 3	Responsibilities and functions of the regulatory body
Module 4	Management system of the regulatory body
Module 5	Authorisation
Module 6	Review and assessment
Module 7	Inspection
Module 8	Enforcement
Module 9	Regulations and guides
Module 10	Emergency preparedness and response
Module 11a	Occupational radiation protection
Module 11b&c	Environmental monitoring & control of radioactive discharges and materials for clearance
Module 11d	Waste management (policy and strategy, predisposal and disposal)
Module 11e	Transport of radioactive material
Module 12	Interfaces with nuclear security
Module 13	Regulatory implications of the TEPCO Fukushima Dai-ichi accident

Legislation:

1. Nuclear Energy Act (NEA,732.1)
2. Federal Act on the Swiss Federal Nuclear Safety Inspectorate (ENSIG,732.2)
3. Nuclear Energy Ordinance (NEO, 732.11)
4. Safeguards Ordinance (732.12)
5. Ordinance on Vessels and Piping classified as important to safety in Nuclear Installations (732.13)
6. Ordinance on the Federal Nuclear Safety Commission (NSC Ordinance, 732.16)
7. Ordinance on the Swiss Federal Nuclear Safety Inspectorate (ENSIV, 732.21)
8. Swiss Federal Nuclear Energy Liability Act (732.44)
9. DETEC Ordinance on the Threat Assumptions and Security Measures for Nuclear Installations and Nuclear Materials (732.112.1)
10. DETEC Ordinance on the Hazard Assumptions and the Assessment of the Protection against Accidents in Nuclear Installations (732.112.2)
11. DETEC Ordinance on the Methodology and the General Conditions for Checking the Criteria for the Provisional Taking out of Service of Nuclear Power Plants (732.114.5)
12. Ordinance on the Requirements for the Personnel of Nuclear Installations (VAPK, 732.143.1)
13. Ordinance on the Security Guards of Nuclear Installations (VBWK, 732.143.2)
14. Ordinance on Personal Security Background Checks in the Area of Nuclear Installations (PSPVK, 732.143.3)
15. Personnel Rules of the Swiss Federal Nuclear Safety Inspectorate (ENSI Personnel Rules, 732.221)
16. Ordinance on Fees of the Swiss Federal Nuclear Safety Inspectorate (ENSI Fee Ordinance, 732.222)
17. Radiological Protection Act (RPA, 814.50)
18. Radiological Protection Ordinance (RPO, 814.501)
19. Ordinance on Personal Dosimetry (Dosimetry Ordinance, 814.501.43)
20. Ordinance on the Handling of Unsealed Radioactive Sources (814.554)
21. Ordinance on Alerting and Alarming (Alarming Ordinance, AV, 520.12)
22. Ordinance on the Organisation of Operations in Connection with NBC and Natural Events (NBCN Operations Ordinance, 520.17)
23. Ordinance on Emergency Preparedness in the Vicinity of Nuclear Installations (732.33)

24. Federal Constitution of the Swiss Confederation (101)
25. Federal Act on Freedom of Information in the Administration (Freedom of Information Act, FoIA, 152.3)
26. Federal Act on Administrative Procedure (Administrative Procedure Act, APA, 172.021)
27. Federal Act on the Consultation Procedure (Consultation Procedure Act, CPA, 172.061)
28. Federal Act on the Protection of the Environment (Environmental Protection Act, EPA, 814.01)

ENSI Guidelines:

- A01 Requirements for deterministic accident analysis for nuclear installations: Scope, methodology and boundary conditions of the technical accident analysis
- A04 Application documents for modifications to nuclear installations requiring a permit
- A05 Probabilistic Safety Analysis (PSA): Quality and Scope
- A06 Probabilistic Safety Analysis (PSA): Applications
- A08 Source Term Analysis: Scope, Methodology and Boundary Conditions
- B01 Ageing Management
- B02 Periodic Reporting by the Nuclear Installations
- B03 Reports by the Nuclear Installations
- B04 Clearance measurement of materials and areas from controlled zones
- B05 Requirements for the conditioning of radioactive waste
- B06 Vessels and Piping classified as important to safety: Maintenance
- B07 Vessels and piping classified as important to safety: Qualification of non-destructive testing
- B09 Collecting and reporting of doses of persons exposed to radiation
- B10 Initial training, recurrent training and continuing education of personnel
- B11 Emergency Exercises
- B12 Emergency preparedness in nuclear installations
- B13 Training and continuing education of the radiation protection personnel
- B14 Maintenance of electrical and instrumentation and control equipment classified as important to safety
- G01 Safety classification for existing nuclear power plants
- G03 Specific design principles for deep geological repositories and requirements for the safety case
- G04 Design and Operation of Storage Facilities for Radioactive Waste and Spent Fuel Elements
- G05 Transport and storage casks for interim storage
- G07 The Organisation of Nuclear Installations
- G09 Operational Documentation
- G11 Vessels and Piping classified as important to safety: Engineering, manufacture and installation
- G13 Radiation protection measuring devices in nuclear installations: Concepts, requirements and testing
- G14 Calculation of radiation exposure in the vicinity due to emission of radioactive substances from nuclear installations
- G15 Radiation protection objectives for nuclear installations
- G17 Decommissioning of Nuclear Installations
- R007 Guideline for the radiological monitored area of the nuclear installations and the Paul Scherrer Institute
- R046 Requirements for the application of computer-based instrumentation and control important to safety in nuclear power plants
- R048 Periodic Safety Review (No longer valid. Replaced by A03, which is not available in English)
- R050 Requirements important to safety for fire protection in nuclear installations
- R101 Design criteria for safety systems of nuclear power plants with light-water reactors

Processes:

- Management Processes*
- HPB0000 Introduction
- HPB0020 Management

Performance Mandate 2009-2011
Organisational Bylaws
HPB0040 Finance Controlling
HPB0060 Human Resources
 ENSI HCM Concept
 ENSI Staff Executive Regulations
HPB0070 Risk Management
HPB0080 Improvement
HPB0100 Topical Issue and Project Management
 AAU1606 Priorities and Level of processing Draft
SBP0024 Organizational Changes

Assessment of Facilities

HPB0140 Regulatory Basis
 AAU1192 Specification: Guidelines
 SPB0142 Guidelines
 SPB0143 Designation of new Principles
HPB0160 Expert Reports
HPB0180 Permits

Surveillance of Operation

HPB0220 Emergency Preparedness
HPB0260 Inspection
 IAU9000 Inspection Planning
 IAU9010 Basic Inspection Programme
HPB0280 Occurrence Processing
HPB0320 Planned Maintenance Outage
HPB0340 Enforcement
HPB0350 Systematic Safety Evaluation
HPB0360 Radiation Measurements
HPB0380 Remote Monitoring and Forecasting
AAU1635 Control of Periodic Reporting and Notifications

Supporting Processes

HPB0400 System Management
HPB0420 Information Technology
HPB0430 Environmental Management
HPB0440 Health and Safety
HPB0460 Purchasing
HPB0480 Administration and Archiving
HPB0490 Infrastructure and Operations

Miscellaneous Reports

1. IRRS action plan, 2012
2. Memorandum of Understanding regarding Supervision of Conventional Occupational Safety in Nuclear Installations between the Swiss Federal Nuclear Safety Inspectorate (ENSI), the Swiss Accident Insurance Fund (Suva), the State Secretariat for Economic Affairs (SECO), the Federal Coordination Commission for Occupational Safety (FCOS) and the Labour Inspectorates of the Cantons of Aargau, Bern and Solothurn, Draft 2015
3. Agreement on the Consideration of Recommendations by the NSC in ENSI's Expert Reports between the Swiss Federal Nuclear Safety Inspectorate (ENSI) and the Federal Nuclear Safety Commission (NSC), 2015
4. Review of Emergency Preparedness Measures in Switzerland, Report by the IDA NOMEX Interdepartmental Working Group, June 2012

5. 6th National Report of Switzerland in Accordance with Article 5 of the CNS, August 2013
6. ENSI's International Strategy, 2014
7. ENSI's Research Strategy, 2013
8. Code of Conduct of the Swiss Federal Nuclear Safety Inspectorate (ENSI Code of Conduct), 2013
9. ENSI's Regulatory Framework Strategy, 2015
10. Quality Management Guideline for the Manufacture and Use of Packaging for the Transport of Radioactive Material, Published by ENSI, Suva, FOPH, Draft no. 6 dated 2 April 2015
11. Oversight of Safety Culture in Nuclear Installations, 2014
12. Integrated Oversight, 2014
13. Fukushima - Event Sequences, 2011
14. Fukushima – Analysis, 2011
15. Fukushima - Radiological Effects, 2011
16. Fukushima - Lessons learned, 2011
17. ENSI Action Plan Fukushima 2013
18. ENSI Action Plan Fukushima 2014
19. EU Stress Test: Swiss Progress Report, ENSI review of the operators' progress reports, September 2011
20. EU Stress Test: Swiss National Report, ENSI review of the operators' reports, December 2011
21. EU Stress Test: Swiss National Action Plan, December 2012
22. EU Stress Test: Swiss National Action Plan, December 2014
23. Implementation of post-Fukushima International Recommendations, 2014
24. 2nd Extraordinary Meeting of the Contracting Parties CNS 2012: Summary Report

Policy Issues

Decommissioning – Document as basis for the discussion

LTO Concept – Document as basis for the discussion

APPENDIX VII - IAEA REFERENCE MATERIAL USED FOR THE REVIEW

1.	INTERNATIONAL ATOMIC ENERGY AGENCY - Fundamental Safety Principles, No SF-1, IAEA, Vienna (2006)
2.	INTERNATIONAL ATOMIC ENERGY AGENCY - Governmental, Legal and Regulatory Framework for Safety, General Safety Requirements Part 1, No. GSR Part 1, IAEA, Vienna (2010).
3.	INTERNATIONAL ATOMIC ENERGY AGENCY – The Management System for Facilities and Activities. Safety Requirement Series No. GS-R-3, IAEA, Vienna (2006).
4.	INTERNATIONAL ATOMIC ENERGY AGENCY - Preparedness and Response for Nuclear and Radiological Emergencies, Safety Requirement Series No. GS-R-2, IAEA, Vienna (2002).
5.	INTERNATIONAL ATOMIC ENERGY AGENCY - Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, General Safety Requirements Part 3, No. GSR Part 3, IAEA, Vienna (2014).
6.	INTERNATIONAL ATOMIC ENERGY AGENCY - Safety assessment for facilities and activities, General Safety Requirements Part 4, No. GSR Part 4, IAEA, Vienna (2009)
7.	INTERNATIONAL ATOMIC ENERGY AGENCY - Predisposal Management of Radioactive Waste, General Safety Requirement Part 5, No. GSR Part 5, IAEA, Vienna (2009).
8.	INTERNATIONAL ATOMIC ENERGY AGENCY - Decommissioning of Facilities, Safety Requirement Series No. GSR Part 6, IAEA, Vienna (2014).
9.	INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Nuclear Power Plants: Design, Specific Safety Requirements No. SSR-2/1, IAEA, Vienna (2012).
10.	INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Nuclear Power Plants: Commissioning and Operation, Specific Safety Requirements Series No. SSR-2/2, IAEA, Vienna (2011).
11.	INTERNATIONAL ATOMIC ENERGY AGENCY - Site Evaluation for Nuclear Installations, Safety Requirement Series No. NS-R-3, IAEA, Vienna (2003).
12.	INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Research Reactors, Safety Requirement Series No. NS-R-4, IAEA, Vienna (2005).
13.	INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Nuclear Fuel Cycle Facilities, Safety Requirement Series No. NS-R-5, IAEA, Vienna (2014)
14.	INTERNATIONAL ATOMIC ENERGY AGENCY - Disposal of Radioactive Waste, Specific Safety Requirements No. SSR-5, IAEA, Vienna (2011)
15.	INTERNATIONAL ATOMIC ENERGY AGENCY – Regulations for the Safe Transport of Radioactive Material, Specific Safety Requirements No. SSR-6, IAEA, Vienna (2012)
16.	INTERNATIONAL ATOMIC ENERGY AGENCY - Organization and Staffing of the Regulatory Body for Nuclear Facilities, Safety Guide Series No. GS-G-1.1, IAEA, Vienna (2002).
17.	INTERNATIONAL ATOMIC ENERGY AGENCY - Review and Assessment of Nuclear Facilities by the Regulatory Body, Safety Guide Series No. GS-G-1.2, IAEA, Vienna (2002).
18.	INTERNATIONAL ATOMIC ENERGY AGENCY - Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body, Safety Guide Series No. GS-G-1.3, IAEA, Vienna (2002).

19.	INTERNATIONAL ATOMIC ENERGY AGENCY - Documentation Used in Regulating Nuclear Facilities, Safety Guide Series No. GS-G-1.4, IAEA, Vienna (2002).
20.	INTERNATIONAL ATOMIC ENERGY AGENCY - Arrangements for Preparedness for a Nuclear or Radiological Emergency, Safety Guide Series No. GS-G-2.1, IAEA, Vienna (2007)
21.	INTERNATIONAL ATOMIC ENERGY AGENCY - Criteria for use in Preparedness and Response for a Nuclear or Radiological Emergency, General Safety Guide Series No. GSG-2, IAEA, Vienna 2011)
22.	INTERNATIONAL ATOMIC ENERGY AGENCY - Commissioning for Nuclear Power Plants, Safety Guide Series No. SSG-28, IAEA, Vienna (2014)
23.	INTERNATIONAL ATOMIC ENERGY AGENCY - Periodic Safety Review of Nuclear Power Plants, Safety Guide Series No. SSG-25, IAEA, Vienna (2013)
24.	INTERNATIONAL ATOMIC ENERGY AGENCY - A System for the Feedback of Experience from Events in Nuclear Installations, Safety Guide Series No. NS-G-2.11, IAEA, Vienna (2006)
25.	INTERNATIONAL ATOMIC ENERGY AGENCY - Occupational Radiation Protection, Safety Guide Series No. RS-G-1.1, IAEA, Vienna (1999)
26.	INTERNATIONAL ATOMIC ENERGY AGENCY - Assessment of Occupational Exposure Due to Intakes of Radionuclides, Safety Guide Series No. RS-G-1.2, IAEA, Vienna (1999)
27.	INTERNATIONAL ATOMIC ENERGY AGENCY - Assessment of Occupational Exposure Due to External Sources of Radiation, Safety Guide Series No. RS-G-1.3, IAEA, Vienna (1999)
28.	INTERNATIONAL ATOMIC ENERGY AGENCY - Radiological Protection for Medical Exposure to Ionizing Radiation, Safety Guide Series No. RS-G-1.5, IAEA, Vienna (2002)
29.	INTERNATIONAL ATOMIC ENERGY AGENCY - Environmental and Source Monitoring for Purposes of Radiation Protection, Safety Guide Series No. RS-G-1.8, IAEA, Vienna (2005)
30.	INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Radiation Generators and Sealed Radioactive Sources, Safety Guide Series No. RS-G-1.10, IAEA, Vienna (2006)
31.	INTERNATIONAL ATOMIC ENERGY AGENCY - Deterministic Safety Analysis for Nuclear Power Plants, Specific Safety Guides Series No. SSG-2, IAEA, Vienna (2010)
32.	INTERNATIONAL ATOMIC ENERGY AGENCY - Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide Series No. SSG-3, IAEA, Vienna (2010)
33.	INTERNATIONAL ATOMIC ENERGY AGENCY - Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide Series No. SSG-4, IAEA, Vienna (2010)
34.	INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Conversion Facilities and Uranium Enrichment Facilities, Specific Safety Guide Series No. SSG-5, IAEA, Vienna (2010)
35.	INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Uranium Fuel Fabrication Facilities Specific Safety Guide Series No. SSG-6, IAEA, Vienna (2010)
36.	INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Uranium and Plutonium Mixed Oxide Fuel Fabrication Facilities, Specific Safety Guide Series No. SSG-7, IAEA, Vienna (2010)

37.	INTERNATIONAL ATOMIC ENERGY AGENCY - Licensing Process for Nuclear Installations, Specific Safety Guide Series No. SSG-12, IAEA, Vienna (2010)
38.	INTERNATIONAL ATOMIC ENERGY AGENCY - Geological Disposal Facilities for Radioactive Waste Specific Safety Guide Series No. SSG-14, IAEA, Vienna (2011)
39.	INTERNATIONAL ATOMIC ENERGY AGENCY - Storage of Spent Nuclear Fuel Specific Safety Guide Series No. SSG-15, IAEA, Vienna (2012)
40.	INTERNATIONAL ATOMIC ENERGY AGENCY - Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material, Specific Safety Guide No SSG-26, IAEA, Vienna, (2014)
41.	INTERNATIONAL ATOMIC ENERGY AGENCY - Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material, Safety Guide No TS-G-1.2 (2002)
42.	INTERNATIONAL ATOMIC ENERGY AGENCY - Radiation Protection Programmes for the Transport of Radioactive Material, Safety Guide No TS-G-1.3, IAEA, Vienna, (2007)
43.	INTERNATIONAL ATOMIC ENERGY AGENCY - The Management System for the Safe Transport of Radioactive Material Safety Guide No TS-G-1.4, IAEA, Vienna, (2008)
44.	INTERNATIONAL ATOMIC ENERGY AGENCY - Compliance Assurance for the Safe Transport of Radioactive Material, Safety Guide No TS-G-1.5, IAEA, Vienna, (2009)
45.	INTERNATIONAL ATOMIC ENERGY AGENCY - Schedules of Provisions of the IAEA Regulations for the Safe Transport of Radioactive Material (2009 Edition), Safety Guide No TS-G-1.6 (Rev.1), IAEA, Vienna, (2014)
46.	INTERNATIONAL ATOMIC ENERGY AGENCY - Classification of Radioactive Waste, General Safety Guide No. GSG-1, IAEA, Vienna (2009)
47.	INTERNATIONAL ATOMIC ENERGY AGENCY - Regulatory Control of Radiation Sources, General Safety Guide No. GS-G-1.5, IAEA, Vienna (2004)
48.	INTERNATIONAL ATOMIC ENERGY AGENCY - Decommissioning of Nuclear Power Plants and Research Reactors, Safety Guide Series No.WS-G-2.1, IAEA, Vienna (1999)
49.	INTERNATIONAL ATOMIC ENERGY AGENCY - Decommissioning of Medical, Industrial and Research Facilities (1999) Safety Guide Series No.WS-G-2.2, IAEA, Vienna (1999)
50.	INTERNATIONAL ATOMIC ENERGY AGENCY - Regulatory Control of Radioactive Discharges to the Environment, Safety Guide Series No.WS-G-2.3, IAEA, Vienna (2000)
51.	INTERNATIONAL ATOMIC ENERGY AGENCY - Decommissioning of Nuclear Fuel Cycle Facilities, Safety Guide Series No.WS-G-2.4, IAEA, Vienna (2001)
52.	INTERNATIONAL ATOMIC ENERGY AGENCY - Predisposal Management of Low and Intermediate Level Radioactive Waste, Safety Guide Series No.WS-G-2.5, IAEA, Vienna (2003)
53.	INTERNATIONAL ATOMIC ENERGY AGENCY - Predisposal Management of High Level Radioactive Waste, Safety Guide Series No.WS-G-2.6, IAEA, Vienna (2003)
54.	INTERNATIONAL ATOMIC ENERGY AGENCY - Management of Waste from the Use of Radioactive Materials in Medicine, Industry, Agriculture, Research and Education, Safety Guide Series No.WS-G-2.7, IAEA, Vienna (2005)

55.	INTERNATIONAL ATOMIC ENERGY AGENCY - The Management System for the Disposal of Radioactive Waste, Safety Guide Series No GS-G-3.4, IAEA, Vienna (2008)
56.	INTERNATIONAL ATOMIC ENERGY AGENCY - Safety Assessment for the Decommissioning of Facilities Using Radioactive Material, Safety Guide Series No.WS-G-5.2, IAEA, Vienna (2009)
57.	INTERNATIONAL ATOMIC ENERGY AGENCY - Storage of Radioactive Waste, Safety Guide Series No. WS-G-6.1, IAEA, Vienna (2006)