

**ACTIVITIES OF ATOMIC ENERGY REGULATORY  
BOARD**

**DEPARTMENT OF ATOMIC ENERGY**

**PUBLIC ACCOUNTS COMMITTEE  
(2013-14)**

**NINETIETH REPORT**

---

**FIFTEENTH LOK SABHA**



**LOK SABHA SECRETARIAT  
NEW DELHI**

**PAC NO. 2017**

# **NINETIETH REPORT**

**PUBLIC ACCOUNTS COMMITTEE**  
**(2013-14)**

**(FIFTEENTH LOK SABHA)**

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**DEPARTMENT OF ATOMIC ENERGY**



*Presented to Lok Sabha on: 09.12.2013*

*Laid in Rajya Sabha on: 09.12.2013*

**LOK SABHA SECRETARIAT  
NEW DELHI**

**December, 2013 /Agrahayana, 1935 (Saka)**

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# **COMPOSITION OF THE PUBLIC ACCOUNTS COMMITTEE**

## **(2013-14)**

Dr. Murli Manohar Joshi

-

Chairman

### **LOK SABHA**

2. Shri Anandrao Adsul
3. Dr. Baliram
4. Shri Ramen Deka
5. Shri Sandeep Dikshit
6. Dr. M. Thambi Durai
7. Shri T.K.S. Elangovan
8. Shri Jayaprakash Hegde
9. Dr. Sanjay Jaiswal
10. Shri Bhartruhari Mahtab
11. Shri Abhijit Mukherjee
12. Shri Sanjay Brijkishorlal Nirupam
13. Shri Ashok Tanwar
- <sup>1</sup>14. Shri Ajay Maken
15. Shri Dharmendra Yadav

### **RAJYA SABHA**

16. Shri Prasanta Chatterjee
17. Shri Prakash Javadekar
- <sup>2</sup>18. Shri Ashwani Kumar
19. Shri Satish Chandra Misra
- <sup>3</sup>20. Dr. V. Maitreyan
21. Shri N.K. Singh
22. Smt. Ambika Soni

### **SECRETARIAT**

- |    |                       |   |                   |
|----|-----------------------|---|-------------------|
| 1. | Shri Devender Singh   | - | Joint Secretary   |
| 2. | Shri Abhijit Kumar    | - | Director          |
| 3. | Ms. Miranda Ingudam   | - | Under Secretary   |
| 4. | Shri Deepankar Kamble | - | Committee Officer |

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<sup>1</sup> Elected w.e.f. 14<sup>th</sup> August, 2013 *vice Dr. Girija Vyas* appointed as Minister of Housing, Urban Development & Poverty Alleviation w.e.f. 17<sup>th</sup> June, 2013.

<sup>2</sup> Elected w.e.f. 3<sup>rd</sup> September, 2013 *vice Dr. V. Maitreyan* ceased to be a Member upon his retirement as a Member of Rajya Sabha w.e.f. 24<sup>th</sup> July, 2013.

<sup>3</sup> Elected w.e.f. 3<sup>rd</sup> September, 2013 *vice Dr. E.M. Sudarsana Natchiappan* appointed as Minister of State for Commerce and Industry w.e.f. 17<sup>th</sup> June, 2013.

**COMPOSITION OF THE PUBLIC ACCOUNTS COMMITTEE**  
**(2012-13)**

**Dr. Murli Manohar Joshi                      -                      Chairman**

**LOK SABHA**

2.        Shri Anandrao Vithoba Adsul
3.        Dr. Baliram
4.        Shri Sandeep Dikshit
5.        Dr. M. Thambidurai
6.        Shri T.K.S. Elangovan
7.        Shri Anant Kumar Hegde
8.        Shri Bhartruhari Mahtab
9.        Shri Sanjay Nirupam
- 10        Shri Shripad Yesso Naik
- <sup>4</sup>11.      Shri Abhijit Mukherjee
12.        Shri Ashok Tanwar
- <sup>5</sup>13.      Shri Takam Sanjoy
14.        Dr. Girija Vyas
15.        Shri Dharmendra Yadav

**RAJYA SABHA**

16.        Shri Prasanta Chatterjee
17.        Shri Prakash Javadekar
18.        Shri Satish Chandra Misra
19.        Shri Sukhendu Sekhar Roy
20.        Shri J.D. Seelam
21.        Shri N.K. Singh
22.        Prof. Saif-ud-Din Soz

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| 4. | Shri Deepankar Kamble | - | Committee Officer |

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<sup>4</sup> Elected w.e.f 6<sup>th</sup> December, 2012 *vice* Shri Sarvey Sathyanarayana appointed as Minister on 28<sup>th</sup> October, 2012.

<sup>5</sup> Elected w.e.f 6<sup>th</sup> December, 2012 *vice* Dr. Shashi Tharoor appointed as Minister on 28<sup>th</sup> October, 2012.

## INTRODUCTION

I, the Chairman, Public Accounts Committee, having been authorised by the Committee, do present this Ninetieth Report (Fifteenth Lok Sabha) on "**Activities of Atomic Energy Regulatory Board**" based on C&AG Report No. 9 of 2012-13 relating to Department of Atomic Energy.

2. The Report of Comptroller and Auditor General of India was laid on the Table of the House on 22<sup>nd</sup> August, 2012.

3. The Public Accounts Committee (2012-13) took up the subject for detailed examination and report. The Committee took evidence of the representatives of the Department of Atomic Energy and Atomic Energy Regulatory Board on the subject at their sitting held on 26<sup>th</sup> October, 2012. The subject was subsequently carried forward by the successor Committee (2013-14) for examination. The Committee considered and adopted this Draft Report at their sitting held on 17<sup>th</sup> October, 2013. The Minutes of the Sittings form Appendices to the Report.

4. For facility of reference and convenience, the Observations and Recommendations of the Committee have been printed in thick type and form Part- II of the Report.

5. The Committee thank the predecessor Committee for taking oral evidence of the Department of Atomic Energy and Atomic Energy Regulatory Board and obtaining information on the subject.

6. The Committee would also like to express their thanks to the representatives of the Department of Atomic Energy and Atomic Energy Regulatory Board for tendering evidence before the Committee and furnishing the requisite information to the Committee in connection with the examination of the subject.

7. The Committee place on record their appreciation of the assistance rendered to them in the matter by the office of the Comptroller and Auditor General of India.

NEW DELHI;  
04 November, 2013  
13 Kartika, 1935 (*Saka*)

DR. MURLI MANOHAR JOSHI  
Chairman,  
Public Accounts Committee.

## **REPORT PART- I**

### **I. INTRODUCTORY**

Radiation and radioactive substances which have immense beneficial applications in the arena of power generation, medicine, industry and agriculture simultaneously carry the risk of radiation to the persons engaged in the aforesaid fields as well as to the environment.

2. As the activities of Department of Atomic Energy (DAE) and use of radiation sources in the country were increasing, it was considered essential to establish a separate body to carry out regulatory and safety functions effectively. This resulted in the creation of an Atomic Energy Regulatory Board (AERB) with powers to lay down safety standards and assist DAE in framing rules and regulations for enforcing the regulatory and safety requirements envisaged under the Atomic Energy Act, 1962 (AE Act).

3. The national and international regulatory scenario and the criticality of the issue of radiation risks and safety prompted C&AG to undertake a study of the structure and status of AERB as well as effectiveness of its role as the nuclear regulator of India.

4. The C&AG carried out a Performance Audit reviewing the legal and regulatory framework of AERB and examined the prevailing management controls and administrative procedures connected with licensing, inspection and enforcement activities for the period 2005-06 to 2011-12. The performance audit commenced with a presentation at an entry conference held with the representatives of AERB, DAE and other stake holders to explain the audit objectives and approach. Audit reviewed the functioning of the emergency preparedness in three selected NPPs of Tarapur Atomic Power Station (TAPS) – 1 & 2, Kaiga Generating Station – 1 & 2 and Madras Atomic Power Station and the districts of Boisar, Karwar and Kancheepuram. Audit criteria of the evaluation of performance were derived from the various Acts/Rules/Manuals on the subject viz. The Atomic Energy Act, 1962; Rules framed under the Atomic Energy

Act, 1962; AERB Constitution Order dated 15 November 1983; IAEA Handbook, Safety Guide, Standards, Conventions, Manuals etc. and AERB Safety Codes, Standards, Guides, Manuals, etc. and also from scrutinizing the records relating to issue of consents, authorizations, licenses and regulatory inspections, minutes of the various committee meeting; utility correspondences file; project reports etc. during the period September to November 2010 and September to October 2011 at the offices of AERB, DAE, the Safety Research Institute, Kalpakkam and the Directorate and Radiation Safety, Thrissur. In addition, Audit attempted a comparative study of the systems prevailing in AERB with the best practices available in other countries. The Audit Report was finalised based on the responses received from AERB in February, 2012 and the discussions held during the exit conference on 22.03.2012. The Audit Report was laid in Parliament on 22.08.2012.

5. The main findings of the Audit Report were as under:

**(i) Regulatory framework for nuclear and radiation facilities**

- The legal status of AERB continues to be that of an authority subordinate to the Central Government, with powers delegated to it by the latter despite availability of international commitments, good practices and internal expert committees' recommendations.
- AERB does not have the authority for framing or revising the rules relating to nuclear and radiation safety.
- The maximum amounts of fines are too low to serve as deterrents against offences/contraventions related to nuclear and radiation facilities which involve substantial risks. Further, AERB neither has any role in deciding the quantum of penalties nor any powers with regard to imposition of the same.

**(ii) Development of safety policy, standards, codes and guides**

- AERB failed to prepare a nuclear and radiation safety policy for the country in spite of a specific mandate in its Constitution Order of 1983. The absence of such a policy at a macro- level can hamper micro- level planning of radiation safety in the country.
- AERB had not developed 27 safety documents despite recommendations of the Meckoni Committee in 1987 and the Raja Ramanna Committee in



1997 to expedite development of safety documents. There were significant delays in development of the safety documents test - checked in audit.

**(iii) Consents**

- The consenting process and system for monitoring and renewal were found to be weak in respect of radiation facilities. This led to a substantial number of units of radiation facilities operating without valid licences. Non-availability of basic licence documents in files also indicated deficiencies in the maintenance of important consent files.
- Around 91 per cent of the medical X-ray facilities in the country had not been registered with AERB and, as such, were out of its regulatory control.
- The Supreme Court had directed (2001) the setting up of a Directorate of Radiation Safety (DRS) in each State for regulating the use of medical diagnostic X-rays. However, as on date (July 2012), out of 28 States and seven Union territories, DRS had been set up only in Kerala and Mizoram.
- AERB had not framed any rules to prescribe and fix the fees for recovery of the cost of services rendered for the regulatory and consenting process, as a result of which, it had to bear the cost of the consenting process.

**(iv) Compliance and enforcement of regulatory requirements**

- Frequencies of regulatory inspections had not been prescribed for radiation facilities. In the absence of any benchmarks laid down by AERB, the performance of AERB in carrying out such inspections of radiation facilities was compared with the periodicity (lowest frequency from range) suggested by IAEA-TECDOC (IAEA-Technical Documents) and observed that AERB had not conducted 85 per cent regulatory inspections for both industrial radiography and radiotherapy units, even though these were identified as having a high radiation hazard potential; and there was a shortfall of over 97 per cent in the inspection in the case of diagnostic radiology facilities every year which showed that AERB was not exercising effective regulatory oversight over units related to the health of the public.
- AERB had failed to enforce safety provisions and compliance with its own stipulations even when its attention was specifically drawn to deficiencies in the case of units in Kerala.

**(v) Radiation Protection**

- The functions of monitoring of radiological exposure as well as the responsibility of radiological surveillance of Nuclear Power Plants (NPPs) lay with the operators of NPPs. Consequently, AERB had no direct role in conducting independent assessments and monitoring to ensure radiological protection of workers despite being the nuclear regulator of India.
- AERB did not have a detailed inventory of all radiation sources to ensure effective compliance of regulations for safe disposal of disused sources. There were no proper mechanisms in place to ensure/verify that radioactive waste had actually been disposed off safely after utilization; the sources for which consents for transport of radioactive material for safe disposal had been given, had really been disposed off or not; and the radioactive sources did not get out of regulatory control. The regulatory response mechanism to trace and discover lost and/or orphan radioactive sources in the country was not effective.

**(vi) Emergency preparedness for nuclear and radiation facilities**

- On-site emergency preparedness plans were being put in place by the Plant Managements of NPPs and nuclear fuel cycle facilities were being tested by them. Though actual periodic exercises prescribed, based on various types of emergencies were conducted by them, AERB only reviewed the reports of these exercises and did not directly associate itself in these exercises, even as observers.
- Off-site emergency exercises carried out highlighted inadequate emergency preparedness. Further, AERB was not empowered to secure compliance of corrective measures suggested by it.
- No specific codes on emergency preparedness plans for radiation facilities such as industrial radiography, radiotherapy and gamma chambers etc had been brought out although the hazard potential of these were rated as high.

**(vii) Decommissioning of nuclear and radiation facilities**

- There was no legislative framework in India for decommissioning of nuclear power plants and AERB did not have any mandate except prescribing of codes, guides and safety manuals on decommissioning.
- Even after the lapse of 13 years from the issue of the Safety Manual relating to decommissioning by AERB, none of the NPPs in the country, including those operating for 30 years and those which had been shut down, had a decommissioning plan.

- Neither the Atomic Energy Act, 1962 nor the Rules framed thereunder had any provision for creation of decommissioning reserves by the utilities. Besides, AERB had no role to play in ensuring availability of adequate funds.

**(viii) Maintaining liaisons with international bodies dealing with nuclear regulatory issues**

- Although AERB maintained liaisons with international nuclear organisations, it was slow in adopting international benchmarks and good practices in the areas of nuclear and radiation operation.
- AERB had not yet availed of the opportunity of the peer review and appraisal services of IAEA to get its regulatory framework and its effectiveness reviewed by them.

6. **Examination by the PAC:** Against the above backdrop, the Public Accounts Committee (2012-13) selected the subject for detailed examination and report. The Committee obtained Background material and detailed Advance Information from the Department of Atomic Energy and took oral evidence of the representatives of the Department of Atomic Energy and Atomic Energy Regulatory Board on 26<sup>th</sup> October, 2012. Post Evidence Replies were also obtained from them. Considering the importance of the subject, the successor PAC (2013-14) reselected the subject for examination. Based on the written and oral depositions, the Committee examined the subject in detail. The issues are discussed in the succeeding paragraphs.

**II. REGULATORY FRAMEWORK FOR NUCLEAR AND RADIATION FACILITIES**

**(i) Delay in conferring statutory status with enhanced legal powers to AERB**

7. Audit scrutiny revealed that although international commitments, good practices and internal expert committees' recommendations are available, the legal status of AERB continues to be that of an authority subordinate to the Central Government, with powers delegated to it by the latter.

8. The characteristic features of an independent regulator are that it should be created in law, rather than by a decree, or an executive order, which in turn should

provide clarity on the jurisdiction, powers, duties and responsibilities of the regulator as also the authority to make final decisions on matters within its statutory domain; ability to set standards and make rules for the sector for which it has been provided legal authority; to enforce its decisions, standards, codes and rules and for this; to take recourse to a range of remedies, including penalties, appropriate to the severity of violations; to compel production and provision of information as may be necessary and monitor the performance of the regulated entities.

9. The need for an independent legal status of regulatory bodies has been recognized and the number of Countries which have conferred legal status to them through laws enacted by their legislatures includes Australia, Canada, France, Pakistan and United States. Audit findings also pointed out that the International Atomic Energy Agency (IAEA) has recognized the paramount need for independence for regulating bodies and enumerated the existing independent Regulating Authorities in other Countries which were all established under an Act viz. (i) The Australian Radiation Protection and Nuclear Safety Agency; (ii) Canadian Nuclear Safety Commission; (iii) The Nuclear Safety Authority of France; (iv) Pakistan Nuclear Regulatory Authority and (v) Nuclear Regulatory Commission of USA.

10. In India, the AE Act and the rules framed under it provide the main legislative and regulatory framework pertaining to atomic energy and radiation facilities in the country. The AERB has been constituted under Section 27 of the AE Act, 1962, which provides for exercise of powers by a subordinate office. This Section currently does not provide for constitution of any authority or Board and merely provides for delegation of powers to a subordinate authority. A subordinate office cannot be 'fully autonomous'. For a regulator to be independent it should be able to frame rules, verify compliance to rules and impose penalties as appropriate. It was notable that under the AE Act, 1962 the powers conferred for imposition of penalty vest with the Central Government viz DAE and not the AERB.

11. The Meckoni Committee report, submitted way back in 1981, titled 'Reorganisation of Regulatory and Safety Functions', recommended the creation of an

Atomic Energy Regulatory Board, with powers to lay down safety standards and assist DAE in framing rules and regulations for enforcing the regulatory and safety requirements envisaged under the AE Act. The Committee also recommended that AERB should be a statutory body under the Act to give AERB a legal basis. However, even after a lapse of more than three decades, the fact remains that the AE Act, 1962 is yet to be amended.

12. Audit findings traces out the chronology of events since the Meckoni Committee Report from 1981 till the introduction of the NSRA Bill, 2011, bringing out the protracted delay, DAE stated that the process of improving the existing legal framework for introducing greater clarity in respect of separation of legal responsibilities concerning promotional and regulatory functions, had already been taken up and the Nuclear Safety Regulatory Authority Bill had been tabled in Parliament to give enhanced legal status to the existing AERB. DAE further stated (February 2012) that the Nuclear Safety Regulatory Authority (NSRA) Bill, 2011 introduced in the Lok Sabha envisages consequential amendments to the AE Act, 1962 insofar as radiation safety is concerned, the provisions of which are related to Sections 16, 17, 23, 26 and 30 and that the Atomic Energy (Amendment) Bill, 2011 have since been drafted and circulated with the approval of the Prime Minister as Minister-in-charge, for the comments of the concerned Ministries. A proposal for introduction of the Atomic Energy (Amendment) Bill, 2011 in the Parliament will be submitted shortly for approval of the Cabinet. DAE also stated that delay in bringing out the Atomic Energy (Amendment) Bill, 2011 has occurred due to unforeseen developments and the intent is that such a Bill will be as comprehensive as possible.

13. In his oral testimony, the Secretary, DAE and Chairman, AEC deposed:

"All our nuclear power plants are completely Government owned. It is a public sector undertaking. We also decided that we will not have constitution of an independent regulatory body under the Atomic Energy Act. It has to be a different Act altogether. That is the Bill which has now been put on the Table of Parliament".

14. On a pointed query of the Committee as to whether the lacunae pointed out by Audit have been addressed in the proposed Bill, the representative of DAE explained as under:

"Let me say how exactly this Bill was evolved. The starting point was Dr. Raja Ramanna's Report in 1997. We started working on amendment to Atomic Energy Act to incorporate those recommendations and set up an independent regulatory authority. Several rounds of discussions took place. The Cabinet Note went for some approval, but at the last moment, some changes were proposed. But by the time we could address them, there was a change in the Central Government and we were advised to go through a second round of consultations. That change took place in 2004. We went through the second round of consultation and again made some formulations taking into consideration what has transpired globally in various other countries. We came up with a new Bill. That was around 2007-08. At the same time, since various other developments were taking place, we had to wait for some time. Then, it was around 2010 after Mayapuri incident happened, around that time, the idea came that separate out these two Bills altogether so that Nuclear Safety Regulatory Authority is totally independent. The amendment to the Atomic Energy Act which we had pursued till now, it was split in two different Bills and the Nuclear Safety Regulatory Authority Bill was formulated. This has already been introduced in the Parliament. It has been scrutinized by the Departmentally-Related Standing Committee. Their recommendations we have seen and now we are trying to take into consideration the changes which have been suggested by the Parliamentary Committee. That job is almost complete and a revised Cabinet Note etc – that process will be completed soon. This is with regard to the Nuclear Safety Regulatory Authority Bill, 2011".

15. On being asked as to why the AERB does not have the authority for framing or revising the rules relating to nuclear and radiation safety, the AERB in their written reply stated that as per section 30 of the Atomic Energy Act, 1962, powers to make rules for carrying out the purposes of the Act are given to the Central Government. However, AERB was always involved in consultative process while framing rules/amending rules in so far as it relates to issues connected with nuclear and radiation safety. AERB in exercise of its regulatory powers has, from time to time, framed Codes and Guidelines for regulation of nuclear safety and radiation safety.

16. The Committee sought to know whether AERB feels that they have the necessary legal status, authority, independence and adequate mandate to fulfil the responsibilities expected of a nuclear regulator. The representatives of AERB thereon stated that AERB does have the necessary legal status, authority, independence and

adequate mandate to fulfil the responsibilities of the nuclear safety regulator. AERB was established in exercise of the powers conferred in the Central Government, under section 27 of the Atomic Energy Act, 1962. Further, AERB is mandated to discharge the regulatory functions envisaged under sections 16, 17 and 23 of the Atomic Energy Act, 1962. The sections 16, 17 and 23 of the Act deal with control over radioactive substances (including prohibition and consent), special provisions as to safety (imposing safety requirements, entry and inspection and enforcement of penalties) and administration of Factories Act, 1948 (in relation to facilities of the Central Government, any authority or corporation established by it or a Government Company and engaged in carrying out the purposes of the Act), respectively. AERB also have the powers of the competent authority to enforce the rules and regulations framed under the Atomic Energy Act, 1962, for radiation safety in the country, viz. Atomic Energy (Radiation Protection) Rules, 2004; Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987; Atomic Energy (Factories) Rules, 1996; and Atomic Energy (Working of Mines, Minerals and Handling of Prescribed Substances) Rules, 1984. It was further submitted that the Atomic Energy (Radiation Protection) Rules, 2004, have adequate provisions for all the regulatory functions, including regulatory consenting, safety review and assessment, inspections, enforcement, penalties, prescribing dose limits, issuance of safety codes and standards, provisions with respect to emergency preparedness, etc. It was further stated that in its functioning, AERB has been fully autonomous with regard to its regulatory decision making. AERB has never found its status as to being a body constituted by the Central Government under the Atomic Energy Act, 1962, to be an impediment in the discharge of the assigned responsibilities in an autonomous, professional and effective manner. This is evident from the numerous examples of regulatory enforcement actions taken by AERB with respect to the units of DAE, including nuclear power plants as well non-DAE radiation installations. In extreme situations, AERB has even ordered shutdown of plants or suspension of activities, as demonstrated in the earlier submissions.

17. The Department related Parliamentary Standing Committee on Science and Technology, Environmental and Forests in their 221<sup>st</sup> Report on the Nuclear Safety

Regulatory Authority Bill, 2011 had observed that the current Bill by and large seems to meet three out of the four core values viz. competence, independence, stringency and transparency, but it still lacks somewhat on the count of independence. The Committee found that there are certain Clauses in the Bill viz. Clause 14(1) (Removal of Chairperson and Members of the Authority), Clause 42 (Directions by the Central Government to the Authority) and Clause 48 (power of Central Government to supersede the Authority), which may impinge on functional autonomy of the Authority. The Committee was, therefore, of the view that the Department should explore the possibilities of making the Regulatory Authority more independent and autonomous not only to carry out its functions effectively but also to enjoy credibility among the public and the trust of the people. {Clause 14(1), Clause 42, Clause 48}. It may be pertinent to bring out that on the issue of independence and autonomy, the dissenting minutes submitted by one of the member of the Committee it was pointed out that unless Clause 14, 42 and 48 of the Bill are fully deleted or drastically amended, the NSRA will have no meaningful autonomy.

18. On the action taken by the Department of Atomic Energy on the Parliamentary Standing Committee Report, the representative (AERB) submitted during oral evidence that they were in the process of formulating amendments to accommodate the recommendations of the Standing Committee and were in touch with the Ministry of Law and Justice, as explained under:

"Sir, with regard to the features of Nuclear Safety Regulatory Authority Bill, first, let me say about the status. The status is that the Standing Committee has finished its job. They have given the report. Now, we are in the process of formulating amendments to accommodate the recommendations of the Standing Committee. We are in touch with the Ministry of Law and Justice".

19. On the aspect of independence of AERB, the Secretary, DAE and Chairman AEC himself pointed out during oral evidence before the Committee that the kind of autonomy contemplated did not exist earlier. He submitted that:

"Further on, way back in 1997-98, there was a Raja Ramanna Committee. That committee reviewed in the light of further growth of the programme with more number of facilities and what needs to be done. The Committee gave very



important recommendations in enhancing within the Atomic Energy Act; the statutory part of the AERB itself although even at that time it was not conceived to be completely independent because there was a Committee in which Chairman, AEC as well as Chairman, AERB were supposed to be the members. So that kind of freedom, as it is now being thought by us, did not exist at that time".

**(ii) Regulatory independence and clarity of AERB's role**

20. Article 8 of the Convention on Nuclear Safety of the IAEA, ratified by the Government of India on March 31, 2005, stipulates that each contracting party should take appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy. A regulatory body must be able to exercise its key regulatory functions (standard-setting, authorisation, inspection and enforcement) without pressure or constraint. Audit compared the criteria as laid down by IAEA for and the present positions in India to assess the status of AERB and made point wise observations as tabulated below:

<b>Criteria laid down by IAEA</b>	<b>Present status in India</b>	<b>Audit Observations</b>
Institutional separation of regulatory and non-regulatory functions	DAE is responsible for non-regulatory activities of power generation whereas AERB is responsible for regulatory functions of DAE activities. In the present set-up, AERB as well as DAE are responsible to the Atomic Energy Commission (AEC).	The fact that the Chairman, AEC and the Secretary, DAE are one and the same negates the very essence of institutional separation of regulatory and non-regulatory functions.
Fixed terms for regulatory officials and constraints on removal of regulatory officials on political grounds	The Chairman is to be appointed for a period of three years or until further orders, whichever is earlier, implying that he can be removed before completion of his term of three years. Currently, however there is no fixed term of office of the Chairman, AERB and extensions are granted on a case to case basis. Three Chairmen worked for periods of three years each during 1990-1993, 1993-1996 and 1996-1999, two for a period of five years each during 2000-2005 and 2005-2010 and one for a period of seven years during 1983 to 1990.	Internationally benchmarked practices have not been adopted.
Separate budgetary and employment authority for	As per the Constitution Order of AERB issued in November 1983, DAE provides	As against the best practice of the financing

the regulatory body	administrative support with regard to AERB's budget, parliamentary work and matters relating to establishment and accounts. AERB prepares and submits its budgetary requirement to DAE. DAE allocates the budget under separate account heads of AERB.	mechanism of the regulatory being defined in the legal framework, AERB is dependent on DAE for budgetary and administrative support.
Reporting to an official or the organization without conflicting responsibilities	As per the AERB Constitution Order 1983, the Chairman, AERB reports to the Chairman, AEC.	Chairman AERB reports to Chairman AEC. Chairman AEC is also the Secretary, DAE which is one of the bodies regulated by AERB, resulting in conflict of responsibilities and interest.

Audit, thus, concluded that AERB has no effective independence as per the criteria laid down by IAEA. The Expert Committee headed by Shri Raja Ramanna in 1997 had recommended that the financial powers of Chairman, AERB should be enhanced fully to that of a Secretary of a Department in the Government of India and he should be given full powers to exercise control on the funds allocated under his budget head. However, the Chairman AERB continues to remain subordinate to Secretary DAE in this respect.

21. Audit scrutiny revealed that AERB's independence was circumscribed by the following aspects: (i) there is no institutional separation of regulatory and non regulatory functions; (ii) the tenure of the AERB Chairman was not fixed and he works in a capacity similar to any head of department in DAE; (iii) there was no separate budgetary authority; and (iv) AERB reports to an official/organization whose activities were supposed to be regulated by it i.e. AEC.

22. The Committee sought to know as to what was the status on the adoption of the recommendations of the Raja Ramanna Committee for effective independence of the AERB as per the criteria laid down by IAEA. AERB thereupon stated in their written reply that the Atomic Energy Regulatory Board was effectively separated from the organisations it regulates and was independent in its regulatory decision making and in the case of AERB, the de-facto independence was evident from the safety performance of the nuclear power plant and fuel cycle facilities which were on par with the

international benchmarks. The International Nuclear Safety Advisory Group (INSAG), the most eminent Advisory Group to the IAEA on issues related to Nuclear Safety had recognised that a regulatory body cannot be absolutely independent in all respects of the rest of government: it must function within a national system of laws and under budget constraints, just as other governmental organisations do. However, the issue of de-facto independence of the regulatory body was important from the consideration of the capability of the regulator in ensuring safety. Recognising this aspect, the Convention on Nuclear Safety calls for 'effective separation' of the regulatory body from the organisations involved in promotional aspects. In order to strengthen the existing legal framework governing nuclear regulation, and to further enhance the institutional separation between promotional and regulatory functions under such a legal framework, Government of India has introduced the Nuclear Safety Regulatory Authority (NSRA) Bill, in 2011, in the Parliament.

23. The Committee when pointed out that apparently the tenure of Chairman AERB was not fixed which seemed to indicate that it was not in congruence with internationally benchmarked practices, the AERB submitted that as per 'the present practice, appointments to the post of Chairman, AERB were made for a period of three years, in the first instance by the Appointments Committee of the Cabinet. In case the term of a sitting Chairman was considered for extension, the same was considered for a further term of up to three years. Introduction of fixed terms for appointment of Chairman and Members of the regulatory authority was one of the aspects included in the Nuclear Safety Regulatory Authority Bill, 2011, which was presently under consideration of the Parliament'.

24. The Committee sought to know whether the AERB was dependent on DAE for budgetary and administrative support, in reply there to, the AERB categorically stated that they are not dependent on DAE for its budget and stated that their budget was presented to the Atomic Energy Commission directly for approval and not to DAE. DAE extends only administrative/service support to AERB, which had not compromised the functional independence of the nuclear regulator.

25. During oral evidence, the Committee sought to know whether the Department Related Standing Committee on Science and Technology had proposed any safeguards with regard to the autonomy of AERB, the representative stated as under:

"With regard to what exactly are the features of this Bill, it is to constitute a Council of Nuclear Safety to oversee and review policies relating to radiation and nuclear safety, and to establish statutory regulatory bodies for radiation nuclear safety. Here, I am saying 'bodies' because it is not that we are setting up Nuclear Safety Regulatory Authority, it also provides for setting up of regulatory body for the strategic programme of the country separately. One very good aspect which has been included in the long title of the Bill is 'To establish an authority, etc., based on a scientific approach, operating experience and best practices followed by nuclear industry and to ensure...'. The point that you raised, Sir, as to how the international practices will come in, this is included right in the long title and later on also. The long title, again, I will repeat, '...based on scientific approach, operating experience and best practices followed by nuclear industry'. The long title itself takes care of the point which you are suggesting. I have my full presentation ready which I have made earlier to the other Standing Committee. First, there will be a Council which will be headed by the Prime Minister of India; and several Union Ministers, Cabinet Secretary and eminent experts to be nominated will be members of that Council. The Council shall oversee and review the policies with regard to radiation safety, nuclear safety and it will constitute such committees for the selection of Chairperson and members of the Nuclear Safety Regulatory Authority. It will also constitute appellate authority. This NSRA shall consist of a Chairperson, two whole-time members and not exceeding four part-time members. The Chairman and members will be appointed on the recommendation of the Search Committee. They will hold office for a period of five years".

26. The Committee also sought to know the operational processes and the working of the proposed Council to be headed by the PM and whether the Chairman and Members of NSRA will be reporting to the Council. The representative of DAE replied thereon that:

"No. It will be reporting on the overall policy with regard to nuclear and radiation safety. Overall broad guidelines will be provided by the Council. But all details are left... The report will come only to Parliament".

27. On a pointed query as to whether the report of the NSRA will not be vetted by the Council, the representative replied in the affirmative as under:

"Yes, Sir. Vetting was not provided for. Since it was going to be an independent authority being set up by an Act of Parliament, the report will be coming to Parliament only".

28. On a further specific query as to whether the Department of Atomic Energy is satisfied that all the three basic functions of a Regulatory Body are fully reflected in the proposed Bill, the representative testified:

"..... Section 20 (2) (of the Bill), lists what this authority shall do. The very first provision is, devise and implement policies and programmes for radiation safety and nuclear safety; to ensure that use of atomic energy or radiation in all its application is safe for the health of radiation workers, members of the public and environment. This is within the purview of the regulatory authority. The name is Nuclear Safety Regulatory Authority. The current AERB will translate into that".

29. The Committee asked whether the proposed authority would be an independent regulatory Authority like the SEBI, the representative responded:

"It is independent. It will not report to the Departments; it will be serviced by the DAE".

30. On a pointed query as to whether the report goes to the President of India and through him to the Parliament, the representative submitted during evidence that:

"Yes, Sir. I think it directly comes to the Parliament".

31. The Committee sought to know as to who would chair the proposed Authority and who would be answering the Parliament on behalf of the proposed Authority. The representative thereupon submitted during evidence that:

"There is a provision again in the Bill which says that the Chairperson, Members, Secretary, officers and other employees shall be public servant within the meaning of the section 21 of the Indian Penal Code. So, they are independent but they are public servants. That is very clearly specified. I am reading from clause 43 of the Bill. Secondly, with regard to reporting, it very clearly says in clause 39 that authority shall prepare once every year an Annual Report which shall be forwarded to the Central Government and the copy of this report as received by the Central Government shall be laid, as soon as it is received, before the Houses of Parliament. This is specified again in this Bill".

32. Asked whether the proposed Authority will work under the Department of Atomic Energy, the representative of DAE testified that the Authority will not be working under

but would rather be serviced by the Department of Atomic Energy. He also submitted that the final authority would be the Chairman of the Authority.

**(iii) Absence of powers to make rules and enforcement thereof**

33. Audit scrutiny pointed out that AERB does not have the authority for framing or revising the Rules relating to nuclear and radiation safety. The existing Rules regulating various activities in the field of nuclear and radiation safety viz. Atomic Energy (Working of the Mines, Minerals and Handling of Prescribed Substances) Rules, 1984; Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987; Atomic Energy (Control of Irradiation of Food) Rules, 1996; Atomic Energy (Factories) Rules, 1996; and Atomic Energy (Radiation Protection) Rules, 2004 were all framed by DAE and not by AERB. DAE stated (February 2012) that as per Section 30 of the Atomic Energy Act, 1962, powers to make Rules for carrying out the purposes of the Act were given to the Central Government i.e. DAE. AERB was only involved in the consultative process and framing/amending rules insofar as they related to issues connected with nuclear and radiation safety. Thus, confirming that AERB had no authority to make Rules.

34. Audit findings pointed out that DAE has not been prompt in delegation of powers of the competent authority to AERB. AERB functions as a 'competent authority' in respect of the Atomic Energy (Radiation Protection) Rules, 2004. It was noticed that while AERB was constituted in 1983 as the safety regulator, it was notified as a 'competent authority' only in December 1987. When the Atomic Energy (Radiation Protection) Rules were replaced in 2004, the Chairman, AERB was notified as the 'competent authority' in October 2006. As a consequence of the delay, accountability could not have been fixed in the event of any disaster due to absence of such legal authority during the intervening periods.

35. A regulatory authority should be able to enforce its decisions, standards, codes and rules. Audit noticed instances where the rules were ambiguous. Audit pointed out that Clause 30 of the Atomic Energy (Radiation Protection) Rules, 2004 (RPR 2004) empowers '*any person*', duly authorized under Sub-section (4) of Section 17 of the AE Act to inspect premises, radiation installations and conveyances. While accepting this

observation, DAE assured that a new set of rules would be promulgated on enactment of the NSRA Act, replacing the RPR 2004.

36. Section 30(3) of the AE Act, 1962 provides that Rules made under this Act may provide that a contravention of the rules shall, save as otherwise expressly provided in this Act, be punishable with fine, which may extend to five hundred rupees. Audit pointed out that the penalty provisions are administered by DAE and AERB has no role in deciding the quantum or imposition of penalties. Moreover, the maximum amounts of fines are too low to serve as deterrents against offences/contraventions related to nuclear and radiation facilities which involve substantial risks.

37. On being asked as to how such low amount of fines would act as deterrent against offences related to nuclear and radiation facilities involving substantial risks, the representative submitted before the Committee during evidence that:

"In fact, talking about the entire gamut of violation and not only of X-Rays, I would say that there are cases of non-compliances. When we find a case of non-compliance, first thing we do is that we ask them to correct it and usually it gets corrected. We have a series of graded kind of approach particularly in nuclear power plants. Many times we ask for some augmented systems, we ask for additional things to be put in and in very serious cases we even suspend the operations or activities. In fact, there is a long list of enforcement actions that we take and our Annual Report brings out the enforcement actions that we have taken. I must say that if we curtail the operation of facility even for one week, the economic penalty is huge. The fine amount is insignificant compared to the curtailment of operation resulting in economic penalty".

38. When the Committee further questioned the representatives of AERB whether they impose the fine as well as curtailment of operations simultaneously, the reply of the representatives of AERB was that provision of 'fine' was never used.

39. It was notable in the 50 years of operation of DAE and 29 years of operation of the AERB, the opportunity to invoke the penal provisions under Section 24 or Section 30 (3) of Atomic Energy Act, 1962, never presented itself. In this context, the Committee sought to know whether it was a pointer to the lack of effectiveness of the regulator and whether there was any proposal to amend the existing provisions. The AERB in their written reply stated that AERB has been using enforcement actions,

including suspension/withdrawal of consents as the preferred tool for ensuring compliance to the requirements and these enforcement actions were commensurate with the seriousness of the non-compliances, which range from written warnings to withdrawal/ suspension of the consent. It may be noted that withdrawal of consent by itself was a very severe economic penalty and has the potential of seriously affecting the financial health of the stake holder. Moreover these enforcement actions can be taken promptly, for ensuring quick and effective compliance to the specified requirements. It was further submitted that the existing Act and Rules have adequate penal provisions. Similar penal provisions are also included in the Nuclear Safety Regulatory Authority Bill, 2011.

### **III. DEVELOPMENT OF SAFETY POLICY, STANDARDS, CODES AND GUIDES**

40. Audit scrutiny pointed out that AERB failed to prepare a nuclear and radiation safety policy for the country in spite of a specific mandate in its Constitution Order of 1983. The absence of such a policy at a macro-level can hamper micro-level planning of radiation safety in the country.

41. Subsequent to the Audit findings and suggestion, AERB had agreed that it will be useful to consolidate the policy level statements contained in the various regulatory documents of AERB into a separate document. The work on consolidating the policies was stated to be in progress and the draft document was expected to be available soon.

42. Audit pointed out that it was after a lapse of 18 years of its existence that AERB brought out a Safety Guide only in 2001, specifying a provisional list of safety documents which comprised codes, standards and guides to be prepared by it. AERB identified 148 codes, standards, and guides for development under various thematic areas. On a subsequent re-assessment, it deleted 25 safety documents and added another 45 safety documents in the provisional list, for development. AERB developed 141 of the 168 safety documents that it was expected to develop while 27 safety documents relating to safety codes, standards and guides remained to be developed by AERB. The Meckoni Committee in 1987 and the Raja Ramanna Committee in 1997



had stressed upon the need for hastening the process of development of codes and guides.

43. DAE stated that most of the documents that were being developed in AERB dealt repeatedly with complex, high-end and evolving technology areas as well as related management and regulatory processes. AERB ensured that the views of the relevant stakeholders, experts and the regulators were appropriately considered during the development of regulatory documents. There had been some instances where resolution of contradictory views from the experts and stakeholders on critical issues had taken substantial time, requiring extensive consultations, analytical work and procedural changes in the relevant management and regulatory areas.

44. Audit further pointed out that while the average period of publication of safety was prescribed to be three to four years, only six out of the 25 cases were developed within that time frame and in three cases it took as long as 8 to 12 years to develop. AERB stated that the delays were due to various factors such as non-availability of expertise, need for consensus among stakeholders, multiple technical support organizations involved, limited operating experience, feedback from experts, national and international developments, etc.

45. In their written submissions to the Committee, DAE stated that all the aspects of safety regulation by AERB are guided by several high level documents which enshrine elements of nuclear and radiation safety policies and principles/policy objectives in the areas of the codes on siting, design, operation of nuclear power plants, etc. DAE also claimed that AERB has been able to deliver an adequate regulatory regime for nuclear and radiological safety.

46. Asked to about the lessons drawn from the Fukushima nuclear disaster, the AERB submitted that the Post Fukushima review conducted by AERB-appointed high level committee has acknowledged the inherent strengths in Indian regulatory and safety review system. In fact, there has been a strong tradition of robust safety reviews right from early days of nuclear power programme. This was in contrast to the aspects

brought out in the Japanese Independent Commission which investigated the Fukushima nuclear accident. Further, the Atomic Energy Commission appointed a high level expert committee for review of institutional aspects in India and to draw lessons from the Japanese experience as well as the report of the Independent Investigation Commission. The report of this high level expert committee was presently being finalised. The report would be forwarded after it was issued by the Committee.

47. On being asked about the action taken following the recommendation of high level Committee constituted after the Fukushima Nuclear Disaster, the Chairman AERB deposed:

"After Fukushima incident, AERB set up a high level committee and the utilities also set up their own committees for investigations. As a culmination of various reviews done by the Utilities and by the regulator, a list of recommendations has emanated. The first finding was that we have several strengths through which we can withstand the kind of situations that Fukushima had created. To add further to the safety, additional measures have been recommended – probably I need not go into the technical details of those – basically to be able to withstand an extended period of power failure, extended period of renewed availability of cooling water and so on. The recommendations that have come from that have been categorised into immediate ones, intermediate ones and long term ones. In fact, we are one of the few countries in the world where some implementation measures have already taken place on ground. In fact, recently there was a kind of peer review of all the countries on the Fukushima related work that we have done. It was evident that we are among the earlier ones who have already started implementation. Many countries are still in the review process and coming to decisions of what should be done and so on. Things like emergency provision of water supplies, emergency connection of mobile power packs into the power plant and all that – those things are already placed in our plants. Implementation-wise, it is being followed up. In fact, we have a long history and tradition of safety upgrades in our nuclear power plants because any lessons we learnt – there was Chernobyl and so many small things happening – from operating experience feed back. From those, the intensive reviews that took place in AERB need to be seen by outsiders to be believed. The recommendations come from there. Their implementation is followed up on a very regular basis. We have a system of periodic safety review of our nuclear power plants apart from the day-to-day safety reviews. In fact, we give license to our nuclear power plants for five years at a time. At the end of those five years for renewal of licence, the entire operating performance history has to be seen, what are the pending items, have they been implemented, what are their status, that has to be seen. Every tenth year we have to review the plant against the current safety standards; not the original standards based on which it was made;

against today's standards; and what are the non-performances and how they can be taken care of. I think the system for nuclear power plants is extremely satisfactory."

48. The Committee sought to know whether AERB's failed to prepare a comprehensive nuclear and radiation safety policy document, the AERB submitted as under:

"One of the mandates given to AERB as per its Constitution has been to "Develop Safety Codes, Guides and Standards for siting, design, construction, commissioning, operation and decommissioning of the different types of plants, keeping in view the international recommendations and local requirements and develop safety policies in both radiation and industrial safety areas. Towards fulfilment of this mandate that AERB has been involved in formulation and issuance of the Atomic Energy (Radiation Protection) Rules, 2004 (earlier there was the Radiation Protection Rules, 1971), Atomic Energy (Factories) Rules, 1996; and the 141 safety and regulatory documents of AERB, which include 20 codes and 14 standards, which deal with the mandatory safety and regulatory requirements. During the course of the CAG Audit and in the subsequent submissions/responses, AERB has taken pains to explain that AERB has developed adequate policies with respect to radiation safety, industrial safety and nuclear safety and their regulation. These policies are in line with the requirements of IAEA and the Factories Act, 1948 (with respect to Industrial Safety). These policies and the relevant statements can be seen in the above Rules, Codes and Standards issued by AERB. The regulatory activities of AERB and the specific safety requirements stipulated in the rules and the regulatory documents of AERB are in line with these policies. In the regulatory activities, AERB has also been careful with respect to optimal and effective use of its resources and manpower. As the organisation has been growing in its capacity, AERB has been expanding the regulatory control activities to enhance the coverage in the areas having lower hazard potential."

49. It was further assured that:

"While it should not be construed that AERB has not developed the safety policies as it was mandated, AERB has however agreed to the suggestion of the CAG that it would be useful to consolidate the policy level statements contained in the various regulatory documents of AERB into a separate policy document, as it would be useful from the point view of openness and in reducing the communication gaps while interacting with the outside agencies. The work on

consolidating the policies is currently in progress and the draft document is expected to be available soon."

50. The AERB further submitted that they have developed adequate policies and in the absence of appropriate safety policies, AERB could not have been instrumental in regulating and achieving the safety record on par with the international standards, in the facilities and activities it was regulating. In the area of implementation and enforcement of those policies, AERB had been following a graded approach, so as not to be overtly restrictive in areas/activities that have lower radiation hazards and larger societal benefits such as the diagnostic X-ray facilities.

51. Noting that even after 15 years of the recommendations of the Raja Ramanna Committee, AERB has not been able to identify external agencies for development of codes and guides, the Committee sought the comments of the DAE in the matter. The AERB reiterated their earlier submission as under:

"The process of document preparation, review and incorporation/disposition of stakeholder views are done through a multi-tier system of expert committees. This system has the Advisory Committee on Nuclear Safety (ACNS) at the apex level with area-specific committees such as ACCGORN (Regulatory Policies), ACRDS (Siting), ACS (Security), ACRS (Radiological Safety), ACCGD (Design of NPPs), ACCGASSO (NPP-Operation), ACCGQA (Quality Assurance), ACRDCSE (Civil & Structural Engineering Safety), ACIFS (Industrial & Fire Safety), ACSDRW (Radioactive Waste Management), and numerous working groups of experts under them for preparation of the drafts. The experts serving in all of these committees are drawn from the National R&D Centres, Industries, Academic Institutes and Government Organisations, apart from retired specialists having experience in the related fields, available in the public domain. Most of the AERB documents deal with very specialized and advanced technology areas. There are experts in the related areas, available across external agencies in the country, whose services are utilized by AERB, but the number of such experts is limited."

52. When the Committee sought to know about the process of consolidating the documents pertaining to the AERB's mission objectives and principles brought out in various policy status, codes and guides as a separate policy document, AERB reiterated that it has adequate policies for radiation safety, nuclear safety and industrial safety and their regulation, in the facilities / installations coming under its jurisdiction and

these policies form part of the already existing high level documents of AERB, namely the codes, standards.

#### **IV. CONSENTS**

53. Audit findings pointed out that the consenting process and system for monitoring and renewal are weak in respect of radiation facilities. This has led to a substantial number of units of radiation facilities operating without valid licences. Non-availability of basic licence documents in files also indicated deficiencies in the maintenance of important consent files.

54. The Code for 'Regulation of Nuclear and Radiation Facilities' of AERB defines 'consent' as a written permission issued to an applicant by the regulatory body to perform specified activities related to nuclear and radiation facilities. The objective of regulatory consent was to secure an effective assurance that the safety of the workers employed and the public at large, of the environment and of plant and equipment was not at risk and that all activities were being carried out in accordance with the prescribed processes and systems, ensuring safety of all. As per Rule 3 (3) of the RPR 2004, the facilities deploying radiation and/or radioactive sources need consents in the form of licences, authorizations and registrations from the competent authority. While licences are applicable to sources with the highest radiation potential such as Nuclear Power Plants, particle accelerators, radiotherapy, industrial radiography; authorisation are required for medium hazard potential such as gamma chambers, nuclear medicine facilities, production facilities of nucleonic gauges; and registration are required for low hazard potential such as Medical X-ray units, research institutes, etc.

55. The regulator has the responsibility of bringing not only all persons, organisations, equipment or facilities concerned with the atomic energy sector under its regulatory ambit by appropriate consent but also of ensuring that all processes and systems prescribed for securing safety are being followed by the consentees on a continuous and regular basis by adequate and effective regulatory supervision and

monitoring. AERB, being the competent authority, was mandated to grant regulatory consents under RPR 2004.

56. As per RPR, 2004, consents are necessary for radiation activities viz. siting, designing, constructing, commissioning and decommissioning of a radiation installation; Procurement of sealed sources, radiation generating equipment and equipment containing radioactive sources, for the purposes of manufacture and supply; Package designing for transport of radioactive material; Shipment approval for radioactive consignments; and Procurement of such other source or adoption of such practice as may be notified by the competent authority, from time to time.

57. The Nuclear Projects Safety Division (NPSD) of AERB processes applications for consents for siting, constructing and commissioning of nuclear projects and carries out required safety reviews and assessments as per the established process for issuance of consents. NPSD had issued 87 consents for siting, designing, constructing and commissioning of nuclear power plants and research reactors. Audit findings pointed out that the Radiation Safety Division (RSD) had issued 23,440 consents for various facilities under its purview during the period 2005- 06 to 2011- 12. DAE stated that siting reviews involved several complex issues and required investigation of many site-specific issues.

#### **(i) Licences**

58. Licences are permissions granted by AERB which are related to the operations of nuclear fuel cycle facilities and certain categories of radiation facilities. RPR 2004 stipulates that no person shall establish or decommission a radiation-generating installation without a licence. The audit observed that there were no major deviations from the laid down procedure, except that some units did not submit their applications to AERB within the prescribed time limit of at least 90 days before the expiry of the existing licence.

59. Audit pointed out that it was evident that the licencing process for radiation facilities was adequate only in respect of Gamma irradiators and medical cyclotrons. In

all other types of units, the licensing and renewal process was unsatisfactory, including units relating to research accelerators, industrial radiography and radiotherapy, all of which were categorized as having '*high*' radiation potential hazards. Further, the non-availability of basic licence documents in files and the failure of AERB to monitor the renewal of licences indicates deficiencies in the maintenance of important files relating to licences. As a result, a substantial number of units of radiation installations with high radiation hazard potential, were operating without valid licences. The RPR 2004 envisaged that AERB would issue licences/authorizations to users of radiation sources. Audit highlighted that AERB was, however, slow in bringing all the radiation users in the country under its regulatory control for the last eight years. This indicates lack of sufficient manpower and laxity on the part of AERB in institutionalizing the processes and enforcing regulatory control on radiation users.

60. With respect to radiation facilities like research accelerators and industrial radiography units, in the past, prior to the promulgation of the Atomic Energy (Radiation Protection) Rules, 2004, the granting of formal "Licenses" was not in practice. After the Atomic Energy (Radiation Protection) Rules, 2004 came into being, AERB had started the process of issuing formal Licenses duly signed by the Competent Authority, to these radiation facilities from 2006 onwards. Audit scrutiny pointed out that while AERB had been able to issue formal licenses to all facilities that came after 2006, difficulties were faced with the older ones. DAE stated that it began the process of issue of formal licences only in 2006. It further stated that although formal documents are not being issued as licences, various regulatory clearances in a graded approach were being issued to the user institutions at various stages and it ensured that user institutions had all pre-requisites prior to commencement of commissioning of the facilities. It added that with the significant increase in its manpower, it was expected to complete the backlog of issue of licences by February 2012.

61. The Committee sought to know specifically whether it was mandatory to bring to kind of licensing regime. The Chairman AERB during oral evidence submitted that:

"The regulations require that you cannot operate a machine without registration. If it happens, they are violating the law. What I am saying is that we are trying to

bring them to conform (to) that requirement. We have to have some infrastructure which we are trying to bring in. One is this Directorate at the State level and second is the system of registration whereby they get a kind of motivation to get registered with the Atomic Energy Regulatory Board. On both counts, we have been working".

62. The Committee was informed that even though formal licenses were not available for some of the facilities, all these facilities were subjected to safety reviews and regulatory supervision, including regulatory inspections by AERB. In principle, the license to operate the units with high radiation potential after expiry of the license period stands cancelled. However, this situation does not normally arise as the renewals of licenses were obtained within the time frame by such institutes, AERB follow-up with reminders and directives. With respect to the industrial radiography units, AERB has now made a stringent provision by issuing circulars to the source suppliers for not providing fresh sources to the facilities not having valid license. AERB has not specified penal action proposed to be taken against such units. Even though AERB had issued circulars to Industrial radiotherapy units, applications were still awaited. In view of this AERB was now planning to take stronger enforcement measures. Circulars had already been issued to them to the effect that beyond a cut-off period, permission for replenishment of sources will only be issued after they obtain formal licenses as per current norms. This reinforces the weakness of AERB as a regulator to effectively ensure compliance against breach of basic regulatory requirements viz. operating without license.

63. The Committee was further informed that AERB had not taken any penal action against the research accelerators, which were being operated by educational institutions and Central Government institution which have not renewed the licenses even after considerable expired time. AERB was now issuing show cause notices to these institutions. With respect to the Industrial Radiography Units, it may be noted that these were considered to be of high radiation hazard potential, some of them are not possessing formal licenses, all facilities were under safety review and regulatory coverage of AERB as claimed. AERB has steadily initiated stronger enforcement measures to prevent them from obtaining fresh sources without having a valid license.



64. According to Section 30 of the AE Act, the Central Government has been empowered to make rules to levy fees for issue of licences. The Ministry of Finance had issued instructions to levy or revise the fees towards the recovery of cost of services rendered for the consenting process. AERB, in the capacity of being the competent authority under RPR 2004 has been authorized to prescribe fees.

65. On a specific query of the Committee on the current status of the delays in the cases of citing consents of three nuclear power plants, (NPPs) namely PFBR, RAPP-6 and RAPP-5 where delay has been attributed to the issuance of siting consents, the AERB stated that the siting consent for PFBR was issued on 9<sup>th</sup> October 2000 and for RAPP-5&6 on 26<sup>th</sup> November, 2005. The NPPs at RAPP-5&6 became operational in 2010, and PFBR was currently in an advanced stage of construction. AERB also mentioned that there had been no delays attributable to regulatory review of these NPPs towards issue of siting consents, considering the mandate of AERB with regard to NPP safety. The review processes, including requirements of review were well established in AERB. If the submittals from the applicant for review did not conform to the review requirements, additional data/information/investigation had to be submitted so that the safety review was conducted appropriately prior to the issue of consent. If the submittals conformed to all requirements of content, quality and time schedule specified in the AERB regulatory documents for review process, then the specified minimum lead time for review could be achieved. Any iterations during review process due to lack of data/information from the applicant added to the time taken for review.

66. What action could AERB take if units did not submit their applications within the prescribed time limit of 90 days before the expiry of the existing license, AERB submitted that in such cases, they would issue necessary directive to the plant to stop its operation and maintain a safe configuration. In the case of NPPs and Fuel cycle facilities, AERB would continue with its process of safety supervision and inspections, for ensuring that the facility was complying with the necessary safety measures. In case of radiation facilities the license to operate after expiry of the license period stood

cancelled. In cases where the renewals were not obtained within the time frame by such institutes, AERB followed-up with reminders and directives.

67. The AERB also replied that it was taking a number of steps to strengthen the systems for monitoring and renewal of consents to the radiation facilities as well as the related regulatory activities. These included development of an e-licensing system for filing of applications and issue/renewal of consents, increased inspection coverage for radiation facilities, conduct of awareness programmes and establishment of Regional Regulatory Centres (RRC).

68. On the issue of renewal of licenses, AERB replied that till date (19<sup>th</sup> June, 2013), all radiation units bearing higher hazard potential (such as Category 1&2 sources, accelerators) had renewed their licences. As regards the penal provisions, it was submitted that the AERB had the powers to take enforcement measures with these facilities, which ranged from issuing written directives to comply with the requirements, directives to discontinue operation, and suspension/withdrawal of the license/authorisation. Further, AERB also stated that section 24 and section 26 of Atomic Energy Act 1962 had provisions for imposing penalties. The enforcement measures against the diagnostic x-ray facilities are commensurate with the degree of non compliance and its impact on safety.

## **(ii) Authorisation**

69. Authorization is a type of consent granted by AERB for activities relating to the use of radioactive material and radiation-generating equipment. As per RPR 2004, an authorization is necessary for sources and practices associated with the medium radiation-generating facilities. Audit scrutiny revealed that the authorization documents in respect of 12 units were not available in the relevant files, while the remaining 18 units did not renew their authorisations, indicating that there was no system in place for monitoring the expiry of authorizations and their renewals. The renewals of these 18 units were due for periods ranging from 1988 to 2009. The problem of protracted delays in renewal of authorisations, for periods as long as 24 years, needed to be urgently addressed. However even after issue of the circular by AERB in August 2010, there

was only a slight improvement in the issue of authorizations and alarmingly 70 out of 135 Gamma chamber units, continued to function without valid authorizations. A regulatory body has the responsibility of verifying compliance with safety regulations.

70. Audit scrutiny revealed that DAE started the process of issuing formal authorizations for operation of gamma chambers only from 2006, i.e. after the Atomic Energy (Radiation Protection) Rules, 2004 came into being and although formal authorization exists only for some of them, some Gamma chambers have been allowed to operate without formal authorization in spite of provisions in this regard in the RPR 2004. AERB had not taken enforcement action against these units.

71. Queried about the number of gamma chamber operating without valid authorizations, the Chairman, AERB deposed:

"What I am saying is that we have brought them in our data base but the formal licensing applications in respect of some of them have not yet come. Today, there are 131 gamma chambers in the country. Out of those, 43 have formal authorisation from AERB, 28 have formally applied to us for decommissioning. That means, they are no longer in use. Some of them have obtained the permission to decommission; some of them have applied and we are in the process of giving them the permission and so on. The gamma chamber situation is like this. While, all of them still do not have formal authorisation and they are all under our radar. Some are formally authorised and others are in the process of getting authorisation. As I said, we are working on that".

72. On being asked to explain as to how gamma chambers have been allowed to operate without formal authorisations, AERB stated that presently all the gamma chambers were under regulatory coverage including formal authorizations. It was further submitted that the design and construction of gamma chambers incorporate certain built-in-design features that give them a high level of inherent safety as the source was inaccessible. This feature in addition to standard operating procedures, offers a high level of safety, as long as the equipment was not manhandled. Thus, the safety concerns associated with this equipment were very small. However the Mayapuri incident has been an eye opener and AERB had subsequently taken many steps to ensure that the operational gamma chambers were under close regulatory monitoring and the non-operational ones are safely disposed of within a reasonable timeframe.

73. On the aspect of laxity on the part of AERB to issue licenses/authorizations as envisaged in RPR 2004, the Committee sought to know what steps were being taken up by AERB to institutionalize the process and enforce regulatory control on radiation users, AERB in their written reply stated that it had an institutionalised process for issuance of licenses/authorisations for use of radiation sources. The issues that were faced with respect to the renewals were users not submitting the applications for renewal of the licenses/authorisations. Further, AERB stated that it had taken additional efforts to induce a very high level of compliance with respect to issuance of licenses/authorisations to the facilities having higher radiation potential such as issuance of circulars and advertisements to ask all utilities to obtain the requisite licenses, accreditation of laboratories; liaison with DGFT, steel ministry, ministries of coal and power; awareness programmes; Use of enforcement measures like non-issue of NOC to the users not having valid license/authorisations for procuring sources and instructing the source suppliers for not issuing sources to the users not processing valid license/authorizations; increased inspection coverage, etc.; Establishment of ELORA (E-Licensing of Radiation Application) system with capabilities of securing tighter compliance with regulations; increased coverage of inspections as per the frequency specified in the Draft AERB Manual on Regulatory Inspection of Radiation Facilities; and Updated inventory of radiation sources.

74. The AERB further submitted that with the above measures the current level of issuance of licenses/authorisations was as under:

- Gamma Irradiators: Number of Gamma Radiation Processing Facilities: 17 and Licence issued to all facilities
- Industrial Radiography: No. of Industrial Radiography institutions having valid Licence as on 08-05-2013: 463 out of 472; No licence has been issued by AERB for 6 Nos. of industrial radiography institutions of Defence & BARC, DAE since they are not under the regulatory ambit of AERB; and remaining 3 No. of industrial radiography institutions are under review and necessary action.
- Radiotherapy: Total number of radiotherapy facilities - 337, out of which licenses have already been issued to 327 facilities; and license has

not been issued to 10 radiotherapy facilities as they are non-functional and are in the process of decommissioning.

- Gamma Chambers: No. of institutions for gamma chambers: 112; no. of Authorizations issued for operation till date: 72; 29 institutions possessing disused gamma chambers would not be issued authorisations. AERB is taking steps to expedite safe disposal of these disused gamma chambers, with the owners and suppliers of gamma chambers; and remaining 11 institutions are under review and necessary actions.

### **(iii) Registrations**

75. AERB grants registrations for equipments related to research and medical facilities, whose radiation hazard potential was low. As per RPR 2004, a registration is necessary for sources and practices associated with the operation of the low radiation generating facilities. Recognising the challenges in regulation of medical X-ray units in the country, AERB set up a specialist committee in 1985, to prepare a comprehensive report on the implementation of radiological safety requirements in respect of medical X-ray equipment and installations. Based on the report of this committee, AERB decided that certain regulatory controls were necessary to ensure safety in the design, manufacture, installation and use of medical X-ray equipment. AERB released codes intended to govern radiation safety in design, installation and operation of X-ray generating equipment for medical diagnostic purposes, which were revised in 2001. The Supreme Court had directed in 2001, the setting up of a Directorate of Radiation Safety (DRS) in each State for regulating the use of medical diagnostic X-rays. Audit, however, observed that DRS had been set up only in Kerala and Mizoram and 52,173 medical X-ray units, 1771 nucleonic gauge units, 231 radioimmunoassay (RIA) units and 180 research institutions were functioning without valid registrations.

76. Audit examination of the efficiency of registration of medical X-ray units in the country by AERB and the related directions of the Supreme Court revealed that there were 57,443 medical X-ray facilities operating in the country and of these, only 5,270 units had been registered and were under the regulatory control of AERB. AERB had faced difficulties in regulatory control of these, on account of the large number of units spread across the country. The balance 52,173 units, constituting 90.82 per cent of the

total units were functioning without AERB registrations and were, therefore, out of their regulatory control.

77. When the Committee pointed out that apparently the regulatory mechanism concerning X-ray units was a total failure, Chairman AERB submitted in the affirmative during oral evidence and stated that:

"With regard to x-ray facilities, I will agree with you, we have failed so far. As I mentioned, central agency with 300 engineers and scientists cannot control 50 odd thousand x-ray machines. We admit that and we have tried various measures. One was, as I mentioned earlier, the Directorate of Radiation Safety (DRS) and State level and then further things. Now, we have taken new initiatives and the new initiatives, which we hope will succeed, are web-based registration system of x-ray facilities which will kind of induce and motivate x-ray units to come forward. Once they start coming forward, then we intend to publicize the need for registering and educating the public that it is in their own interest and they should go to only registered facilities. We cannot start some proceeding against 50,000 violators, but if a smaller number is there then we can start proceeding against. Then, there is one more point. As I said, the real safety in x-ray machines is design. Operation does not make that much difference and the design-related control is already quite well established through the regulation of manufacturing facilities in the country".

78. On the aspect of monitoring of X-ray units, the representative of DAE exuded the Department's helplessness during oral evidence by stating that:

"How do we know that there are 50,000 x-ray units? We do not really know. We do not have counts. If we have counted we would have known where they exist. The basic difficulty with them is with the x-ray units and with the small nucleonic gadgets. With other big units, there is no problem because they have isotopes which decay over a period of time; they have to change them periodically; for changing, they have to get new isotopes; for that, they have to come to them. So, these are all very well known. So, there is no problem. The research facilities, etc. are all under the umbrella. It requires authorization and licensing; this requires a particular protocol to be followed. It is not that they are not already doing the consenting part. But the licensing part requires them to abide by certain rules which will be coming as a part of the 2004 Radiation Protection; they are assessed according to that and then, they are given licenses. They are already in the umbrella. The most difficult part, which has been repeatedly asked by all the Members and we have not been able to give a completely convincing answer is the overwhelming number of smaller units like x-rays, etc".

79. On regulation of X-ray units, the Secretary DAE further submitted during oral evidence as under:

"With regard to lower level of hazard potential because of x-ray machines in very large numbers, AERB with its centralised work force of 300 odd people, it is simply not possible to individually regulate them. I was talking to some of our colleagues from AERB who are here, they have said that they have tried to find out some years ago through the sale of the films which go to these x-ray units. But, what we have been doing with the resources available is to focus on the design of these facilities. It is because the number of manufacturers is limited and we can access them more easily. Major hazards from x-ray, whatever hazard is there, can be controlled from the design, that is, if it is well-shielded and it has all the interlocks and so on. That we control by doing type approval or design approval. Only type approval machines are allowed to come into the market".

80. The Chairman AERB while briefing the Committee about the registration process of the X-ray machines stated that:

"Basically, the main thing is to get them to register and when they are registered, they have to prove to us that they have all the paraphernalia, radiation monitoring system and all that. Once they have that system and they apply, only then they get the registration. We are taking some additional initiatives apart from this. We have taken the initiative that we are developing a system of web page registration – a computerised webpage system – so that, once they meet our requirements, they can log in and get registered. We are simplifying and rationalising the regulations also so that more people may come in. Once we have that system in place, we intend to publicise the need for registration and tell the public that you please go only to register facilities for your own health. Through that, we believe that majority of them will come forward voluntarily to get registered and when minority of them remains unregistered, we can be stringent with them. Today we cannot be stringent with 50000 of those people. So, to bring them on board, we have this roadmap apart from the Directorate of Radiation Safety".

81. The Secretary DAE sought to down play the hazardous potential of X-rays by stating that:

"The next lower level is not including any radiation from an isotope but it is a source which is coming from x-ray. Here, it is an electrical machine which is producing x-ray, once you turn it off it is safe as anything else but if you turn it on, radiation is caused. Radiation is supposed to be moved in a particular direction because of the design of the machine. On other directions, one has to provide lead shielding. So, the design can very easily be confirmed that it is meeting the requirement because it should not allow people in the corridor or outside to get irradiated instead of the patient. That is the one important difference between the rests of it. There are no particles that are required to prevent spread of

radiation to the neighbourhood or to the people who are sitting outside. It is the machine design which takes care of that. In terms of hazards, this is the least as compared to what is reactor. AERB has followed a graded policy".

82. The Committee sought to know as to why AERB was soft on regulating X-ray units, AERB stated that their approach was primarily to ensure safety built into the design of the equipment over operational safety. The regulatory control was exercised on the suppliers/manufacturers to ensure maintenance of quality assurance during manufacturing/sale of such units to give satisfactory performance during use at the place of end users which was in line with the approach followed across the world.

83. Audit Report pointed out that Kerala had established a DRS in 1998, the set-up of which was delegated with powers to register all radiation installations and equipment in the State. However, this power was withdrawn and the duties of the DRS were restricted to carrying out inspections of medical diagnostic X-ray installations in the State.

84. When the Committee enquired about the non-starting of DRS' in States other than Kerala and Mizoram, the Secretary DAE stated as under:

"We have got Inspectors at the State level so that we can curb the malpractice and punish the wrong doers. That is the way it has to be implemented and that is the intention of the Directorate of Radiation Safety at the State level. But, till now only two States have shown their interest in this type of regulation. It is really sad to note that we have not really got that kind of a support so far from most of the State Governments. That mechanism has to be put in place. However, in recent past, about half a dozen States have at least signed MoU with us in this regard".

85. However, in a written reply the Committee was informed that as on May 31, 2013 AERB has signed MoU's with the Government of Madhya Pradesh, Tamil Nadu, Punjab, Chhattisgarh, Gujarat, Himachal Pradesh, Maharashtra and Odisha. Follow up meetings with other States are in progress.

86. On being asked as to whether, in the absence of DRS in states, there was any coordination with Ministry of Health on issues relating to public health, AERB replied in the negative and stated that presently there was no structured mechanism for



coordination between AERB and the Ministry of Health on issues related to public health.

87. The Committee also sought to know as to what was being done to bring 91% of the medical X-ray facilities into its regulatory control. AERB thereupon stated that it has already prepared a roadmap and initiated several actions, to bring the medical x-ray facilities under its regulatory control. The actions in hand in this respect included *viz.* steps to enhance awareness levels regarding the regulatory requirements related to diagnostic x-ray facilities, through advertisements in the newspapers, awareness programmes and information provided in AERB website; simplification of regulatory requirements for the end-users of diagnostic x-ray facilities; regulatory control on manufacturers/suppliers, through type approval of the equipment and arrangements for sharing information on the purchasers/users of x-ray equipment; development of an easy and approachable interface for the users to facilitate on-line filing of application for obtaining Registration, using the new web based interactive system (e-LORA i.e. e-licensing of radiation applications); establishment of an accreditation programme for the agencies involved in providing quality assurance services; and decentralisation of regulatory functions with the establishment of Regional Regulatory Centres (RRCs) and Directorates of Radiation Safety (DRS). With these actions in progress, AERB envisaged that majority of the x-ray facilities can be brought under the regulatory purview of AERB.

88. Audit pointed out that AERB had not framed any rules to prescribe and fix the fees for recovery of the cost of services rendered for the regulatory and consenting process, as a result of which, it had to bear the cost of the consenting process. While accepting that the fees are not being levied, AERB stated that it was fully funded by the Central Government in the discharge of its regulatory functions. On a pointed query as to whether AERB was in the process of framing rules to prescribe and fix the fees for revamp of the sort of services rendered for the regulatory and consenting process, the AERB stated that the existing rules *viz.* Rule No. 4 of Atomic Energy (Radiation Protection) Rules, 2004 provides for levying of license fees and AERB was already working out the details for establishing a system of levying fees for licenses/consents.

## **V. COMPLIANCE AND ENFORCEMENT OF REGULATORY REQUIREMENTS**

89. Audit findings pointed out that AERB had not conducted 85 per cent of regulatory inspections for both industrial radiography and radiotherapy units even though these were identified as having a high radiation hazard potential. Shortfall of over 97 per cent regulatory inspection in the case of diagnostic radiology facilities every year shows that AERB is not exercising effective regulatory oversight over units related to the health of the public. AERB has also not laid down the periodicity of conducting regulatory inspections of such facilities in spite of the availability of international benchmarks in this regard. According to IAEA Standards, each Government should expressly assign the prime responsibility for safety to an entity and make it responsible for compliance with regulatory requirements. The standards also provide that the regulatory body should carry out inspections of facilities and activities to verify that the authorized parties are in compliance with the regulatory requirements and the conditions specified in the authorisations. Inspections of facilities and activities are to include both announced and unannounced visits. As per the AERB Safety Code on regulation of nuclear and radiation facilities, the objective of regulatory inspections was to ensure that the operating personnel satisfy prescribed qualifications and are certified, wherever applicable; the quality and performance of structures, systems and components are maintained as required for safe operations; all prescribed surveillance procedures, codes, standards and rules are complied with by the consentees; facilities are operated as per approved technical specifications and as per the conditions stipulated in the consents; and deficiencies as noted in the earlier inspections have been rectified.

90. Audit findings pointed out that while the process of RIs in respect of nuclear fuel cycle facilities including NPP was being followed as prescribed by AERB, there were significant shortfalls in RIs in the case of radiation facilities. It was observed that no frequencies of RIs had been prescribed for radiation facilities. Audit reviewed the RI process of the major categories of radiation facilities i.e. industrial radiography and radiotherapy, where annual RIs had been suggested by the IAEA-TECDOC. In the case of both industrial radiography and radiotherapy units, the radiation hazard potential

had been rated as 'High'. It was seen that the shortfall in RIs was over 85 per cent for both industrial radiography and radiotherapy during the seven-year period 2005-06 to 2011-12. DAE stated that IAEA had not made any recommendations regarding the frequency and scope of RIs to be conducted in respect of radiation facilities. It further stated that different countries have adopted different approaches in carrying out regulatory control of radiation facilities in their countries, including inspections. AERB had steadily improved the RIs carried out. The shortfall in the number of RIs was due to rapid growth in the number of radiation facilities and inadequate infrastructure. In spite of this, AERB continues to monitor these facilities through the safety status reports mechanism. Only sample checks of radiation facilities could be carried out. With augmented manpower, AERB was giving priority towards completion of RIs of these facilities.

91. Audit reviewed the RI process of the minor category of radiation facilities i.e. nuclear medicine, nucleonic gauges and diagnostic radiology (X-ray equipment). Audit assessed the adequacy of RIs for nuclear medicine, nucleonic gauges and diagnostic radiology (X-ray equipments) with reference to the minimum frequency of RIs prescribed in IAEA-TECDOC with the data relating to RIs for the same conducted for the period 2005-06 to 2011-12. Audit findings pointed out that in the case of nucleonic gauges and diagnostic radiology (X-ray equipments), there had hardly been any inspection at all.

92. As regards the regulating inspections, the Chairman AERB submitted during oral evidence that :

"You have asked about the regulatory inspections. The manual, as I said, is in the advanced stage of development which spells out the frequency of regulatory inspections. It has to go through several committees; it is waiting for the final committee to give the clearance. After that, it will be issued; so, it is perhaps a matter of couple of months, when the meeting of the high level committee takes place. It says that 85 per cent were not done, where does this 85 per cent come from? What has happened is that it looks like the auditors have looked at the IAEA's TECDOC and compared it with that. It is not a kind of stipulating the regulatory inspections. It is giving some kind of indicative numbers which various countries are following. So, they took the most stringent one, and compared it

with that. That is how this number looks a little vague that 85 per cent is not done. We have to see it in that context".

93. The representative of DAE further supplemented as under:

"I would like to add one more point to this. IAEA does this process of review at two levels – one is the review of the regulatory body which the Chairman, AERB explained, that it may take next year and the second is the review of the plant safety itself; that goes through OSAT missions and we have already requested the IAEA for one such mission. If my memory serves me right, this mission for our two reactors in Rajasthan is starting on 29<sup>th</sup> of this month".

94. On an affirmative assertion by the Committee during oral evidence that it was the minimum frequency and not the maximum frequency of the RI prescribed that the assessment of adequacy for nuclear medicine, nucleonic gadgets and diagnostic radiology, X-ray equipments were made in reference to, the Chairman AERB finally submitted that:

"Okay. I correct myself. But these are not recommended; TECDOC is just a compilation of what various countries are doing. Different countries have different practices. We have practice. We have a different norm".

95. The Committee further sought to know what that different norm was the Chairman, AERB responded as under:

"Following a graded approach, the facilities with the higher potential, their regulatory inspection's frequency is once a year, whereas for lower ones, it goes down like once in five years, and so on.....we have prescribed something in our manual which is getting issued may be in the next two months".

96. On a pointed query as to what steps did AERB take as different countries adopted different approaches regarding the frequency and scope of regulating inspection to be conducted in respect of radiation facilities, AERB submitted that a draft Safety Manual titled "Regulatory Inspection and Enforcement for Radiation Facilities" has been prepared. This document provides procedures relating to the inspection methodology, frequencies and enforcement actions. Presently, with the recent augmentation in its manpower, and the projected expansion in the future, AERB has planned to enhance the inspection coverage of the radiation facilities, in accordance with the frequency of inspections as per this manual.

97. On the aspect of regulating control measures, DAE stated that with regard to nuclear medicine and nucleonic gauges, the low hazard potential of the sources and the availability of periodic safety status reports for review were considered while deciding the regulatory control measures and targeted inspections were undertaken based on these inputs. With regard to the issue of RIs for all types of radiation facilities, DAE stated that as a part of enhancing the regulatory control for radiation facilities, AERB had undertaken the preparation of a Safety Manual titled '*Regulatory Inspection and Enforcement for Radiation Facilities*' which was in the final stage of production. Audit pointed out that this confirmed the lack of commitment and laxity in addressing the issue for over 29 years since the creation of AERB.

98. Safety Review Committee for Operating Plants (SARCOP) monitors and enforces safety regulations in NPPs and other radiation facilities identified by the Central Government. Audit found that although SARCOP was meant to enforce safety regulations in NPPs and other radiation facilities, it could not ensure compliance of its recommendations which are pending for several years. As a nuclear safety regulator, AERB should have prescribed timelines for implementation of its recommendations. There was also a need to review all recommendations pending for more than certain threshold periods.

99. When the Committee sought to know the status of SARCOP recommendations to fast track the implementation process so that enforcement in safety regulations wasn't compromised, the AERB clarified that SARCOP recommendations could not be equated to the safety regulations. SARCOP was a platform where the experts on nuclear safety came together and discussed the experience and issues related to safety, in the context of Indian plants as well as the overseas experience and developments. In this forum, the problems and issues were discussed in an open and frank manner. The recommendations arising out of these discussions were mainly aimed at adopting the best practices. Most of these were far beyond the realm of statutory requirements and "safety regulations", which were the minimum requirements specified by the regulatory bodies, for compliance. Therefore, the perception that enforcement of safety

regulations was being compromised because of apparent delays in implementation of some of the SARCOP recommendations was not correct.

## **VI. RADIATION PROTECTION**

100. According to the IAEA Safety Guide, exposure to radiation can occur as a result of various human activities, including work associated with different stages of the nuclear fuel cycle, the use of radioactive sources and radiation in medicine, research, agriculture and industry. Exposure in excess of the limits prescribed based on medical research, has serious health implications for all living organisms and environment. Radiation protection is thus intended to ensure that the amount of radiation absorbed by an organism does not have negative consequences. According to the IAEA Handbook, nuclear law must establish a legislative framework for the safe management of all sources and types of ionizing radiation. It should, in particular, ensure that individuals, society and the environment are adequately protected against radiological hazards. Finally, it should impose restrictions on the dose that an individual may incur so that no person is subject to an unacceptable risk attributable to radiation exposure. As per the provisions of the Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987, the responsibility for safe disposal of radioactive waste is placed on the licencees and AERB has the mandate of ensuring that the licencees perform their responsibilities, suggesting an abdication of regulatory responsibility by the regulator. RPR 2004 also specifies the responsibilities of various parties, viz. the employers, licencees, Radiological Safety Officers and workers, with respect to radiation protection. The Rules also specify the powers of AERB with respect to specifying requirements in respect of safety, health surveillance of workers, radiation surveillance and records to be maintained; issuing directives; inspections and enforcement actions.

101. As regards radiological protection of workers in Nuclear Power Plants, each NPP had a Health Physics Unit (HPU) which was entrusted with the responsibility of providing radiological surveillance and safety support functions; monitoring of areas, personnel, systems and effluents, as well as exposure control and exposure investigations. These HPUs were initially part of the BARC and were independent of the NPPs, with direct channels of communication with the top plant Management of the

Nuclear Power Corporation of India Ltd (NPCIL) in enforcing the radiation protection programme. The HPUs in all NPPs were transferred from BARC to NPCIL in May 2009 by DAE. This means that the function of monitoring of radiological exposure as well as the responsibility of radiological surveillance of NPPs now lay with NPCIL which was an operator of NPPs.

102. The Secretary, DAE apprised the Committee about the setting up of Health Physics Unit by stating as under:

"Like all other countries in the world, they have started with the health physics programme in the research institutions because that is where the knowledge resided about the effects of radiation on the health, how to measure it, how to control it. In all the institutions, health physics activity is started from BARC which was a repository in this. There was a Directorate of Radiation Protection which was fully under Government Control".

103. AERB reported that during the period from 2005 to 2010, the effective dose to the public was far less than the prescribed annual limit of one Milli Sievert (mSv)<sup>6</sup> in all the sites.

**(i) Radiological Protection of Environment**

104. On the issue of radiological protection of environment, audit pointed out that the Environmental Survey Laboratories (ESLs) of the Health, Safety and Environment Group, BARC carry out environmental surveillance over an area of 30 km radius around the nuclear reactors at all the operating NPP sites and provide AERB with periodic reports on radiological conditions of the NPPs and the results of environmental surveillance but they are not per se under the direct control of AERB. For monitoring the performance of the regulated entity, the independent regulator should have direct authority on the monitoring agencies. Accordingly, it should strengthen its role with adequate infrastructure and manpower to conduct independent surveillance of exposure control and exposure investigations.

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<sup>6</sup> Milli Sievert being the derived unit of dose equivalent radiation which attempts to quantitatively evaluate the biological effects of ionizing radiation.

105. The Chairman AERB while deposing before the Committee reiterated that Bhabha Atomic Research Centre is the technical support center to AERB for surveillance of environment.

106. The Committee enquired whether steps were being taken to bring the Environmental Survey Laboratories (ESL) under the direct authority of AERB for better performance monitoring of the regulated entities, AERB explained that the present arrangement had been satisfactory from the regulatory control stand point and effectiveness. AERB also conducted regulatory inspection of these ESL units at all NPPs once a year, with respect to ensuring compliance to the issues connected to environmental surveillance.

107. As per RPR 2004, AERB has the responsibility for ensuring radiation protection by prescribing collective dose budgets, reviewing excess exposure cases, conducting regulatory inspections and reviewing radiological safety aspects of radiation facilities, mainly based on the prescribed reports submitted by the Radiological Safety Officers (RSO) of the facilities. Audit pointed out that there were 89 cases of excess exposure, i.e. exceeding 30-mSv at radiation facilities during the period from 2005 to 2010. Out of this, the exposure was more than 50 mSv in 41 cases. This indicated that wrong work practices were prevalent among radiation workers and the excess exposures will have negative consequences and adverse effects on the health of workers in the short as well as long term.

108. Insofar as the verification of exposure to workers in a radiological facility is concerned, the RPR, 2004 envisages that the RSO should be responsible for radiological surveillance, including those relating to personnel and to furnish periodic reports on safety status to AERB.

109. DAE stated that in case the limit of 30 mSv is exceeded for a worker, he is engaged in non-radiation areas for the remaining period to keep the five yearly total dose within the limit of 100 mSv. For investigation of cases of overexposure, AERB took the help of RSOs appointed in the radiation facilities. Reports of the preliminary



investigations carried out by the RSOs were first scrutinized and reviewed by AERB. AERB carried out further inspections and undertook investigations for the cases as necessary. Based on these investigations, improvements in the working conditions and safety culture at the facilities were considered. DAE further stated that the number of overexposures had been less than 0.1 per cent of the total number of radiation workers in the last five years. The stated facts of DAE addressed post-exposure measures rather than preventive action. Shortage of RSOs and inadequacy in respect of RI of radiation facilities impacted independent verification and review of radiological safety aspects in respect of a large number of radiation facilities available in the country and there was need for increased efforts to prevent even a single case of over-exposure which could impair the health of the people in the affected areas. Further, insofar as the responsibility of reporting by RSOs was concerned, there was an acute shortage of such officers, particularly in the case of diagnostic radiology and nucleonic gauges, both of which are radiation facilities.

110. Clarifying the issue on the radiation doses, the Secretary DAE stated during oral evidence that:

"It is true that today the international regulatory system is bound by what is prescribed by ICRP, International Council for Radiation Protection Guidelines as to what is safe. There, the prescription is what they call linear no threshold hypothesis. Any small amount of radiation today, tomorrow is all collecting finally leading to some figure that is not considered acceptable. This is a hypothesis and not a fact. Now, what is the fact? It was started in a decade where nothing was known."

111. Setting aside any apprehension of genetic impact of radiation, the Secretary DAE, submitted that:

"After Hiroshima and Nagasaki bombings, a generation of people, who were exposed, went through their life-cycles starting from womb to the end point. It was found out that there is no genetic effect of radiation. If the parent and mother have been exposed or even child as a young has been exposed to that huge amount of radiation, they have not gone to genetic mutation. That was the fundamental fear which came out of the experiments on fruit-flies. Since the low level creatures have not evolved fully, they get damaged by certain kinds of radiation, but not human-beings or larger animals. So, that theory is disproved. Second, some of them will undergo cancer. This has been conclusively decided based on this database covering lakhs of people that below a radiation level of

10R, that is, 100 millisieverts, nobody who was exposed has got cancer in their whole life-time.

112. The representative further deposed about the general apprehension about radiation:

"We are actually far too conservative. To cause damage instantly or major damage immediately, we require a dose of 100R. People who have got 10R and less have not had any effect. What is prescribed by regulators is 100<sup>th</sup> of that at the nuclear power plant boundary. What the nuclear plant people are able to achieve is 100<sup>th</sup> of what the regulator has prescribed. So, we have a got a margin of almost 10,000 on what can really cause harm, even a remote possibility of cancer. Since we have all along been very comfortable living within that one per cent guideline given, nobody questioned this. But it does not mean that in case of an accident, that same guideline must be pursued because it would be a different situation. Sir, this is science behind it. That is why, in the Department of Atomic Energy and also many other labs outside, we are now questioning that hypothesis through only statistical data because there is enormous statistical database. Even in our Kerala monazite beach sand areas, the levels of radiation are almost 70 times higher than what is considered acceptable by the regulator for exposure coming through nuclear power plant. Now, those people have been living there for generations. We have examined some four lakh people throughout their life-cycles".

## **(ii) Radioactive Waste Management**

113. As per the IAEA Handbook, when a sealed radiation source reaches the end of its useful life, it should be disposed of or returned to the manufacturer for recycling. However, at times, disused sources are often discarded and may give rise to accidents. It is, therefore, essential that the regulatory body be provided with the means necessary for effectively controlling all major sources in the country. It is also essential that the regulatory body maintains effective communication with the holders of licences for these sources.

114. The Committee sought to know how secure and safe the monitoring process was in terms of radioactive waste management, the AERB Chairman responded during oral evidence as under:

"Coming to radioactive waste, a comment was made that we have difficulty in controls. If the question relates to nuclear power plant and the fuel cycle facilities, I think the control is impeccable. There is no problem with the controls there. The radioactive waste management, in fact, the part of licensing of

nuclear power plants requires that wastes be managed safely, viz., liquid discharges have to meet very stringent requirements. They are monitored. The actual performance data from the nuclear power plants shows that the actual discharges through air and through water route are a fraction of what is stipulated by AERB and which is in line with the international practice. For solid radioactive wastes at nuclear power plants again there are provisions and those provisions are part of our regulatory requirements. There are codes and guides which we follow and those codes require that the nuclear power plant cannot be licensed unless they have satisfactory solid radioactive waste storage which can be stored safely. The other dimension of radioactive waste is what is spent fuel. I think that is another question and, in fact, that is related to the philosophy of the nuclear programme. Ours is the closed cycle".

**(iii) Absence of Detailed Inventory of Radiation Sources and Proper Mechanism for Safe Disposal of Disused Sources**

115. While the systems and procedures for the disposal of disused sources in respect of NPPs and other nuclear fuel facilities are in place, the same are not so in the case of other radiation facilities due to inadequate monitoring on account of shortfalls in RIs and inadequate strength of RSOs in these facilities.

116. The University of Delhi procured radiation equipment containing a gamma cell in 1970, which was operated till 1985. AERB stated that this unused equipment containing the gamma cell was sold to a local scrap dealer in a public auction. Thereafter, the equipment was dismantled and the source assembly was handled by persons with bare hands. This resulted in serious radiation injuries to these persons, including in the death of a person. These casualties occurred due to unsafe and unauthorized disposal of radiation equipment at Mayapuri, New Delhi in April 2010. The nature of the incident was classified as level 4. It was apparent that the accident was the result of ignorance about practices for safe disposal of radioactive waste. While confirming that Delhi University was not aware of the provisions of the Atomic Energy (RP) Rules, 2004 and the Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987. AERB stated that the incident occurred primarily due to violations by Delhi University of the clear and unambiguous requirements specified in the applicable rules, about safe disposal practices of radioactive wastes. Audit pointed out that the sources mixed with scrap metal used for subsequent recycling could lead to contamination of industrial plants and the environment resulting in serious consequences.

117. In the context of Mayapuri incident, the Committee asked what was being done to prevent such incidents in the future. The Chairman, AERB replied during oral evidence that:

"Now, if we are talking about radiation facilities, Mayapuri is an example that also is a radioactive waste gone wrong. Now, after Mayapuri incident, we did a very, very intensive work to strengthen our system of management of disused sources. That was a legacy source which was in existence before regulatory regime came into being and it was just out of that system. When the regulatory regime came, the tracking of radiation sources from cradle to grave is no problem. They are all in place. Now, for older legacy sources what we did was, we contacted the suppliers of radiation sources world-wide which were known suppliers. They were able to give us historically what they supplied to this country like that Gamma Chamber in the Delhi University and beyond that; through the Ministry of Steel, we wrote to their utilities, their various organizations where could be radiation sources. We did very extensive surveys and we have updated our data base on radiation sources. We believe that radiation sources of higher category are all now in our data base".

118. Further supplementing on this issue, the Chairman AERB stated that:

"Mayapuri situation is radiation sources and radiation source is something that AERB regulates. The AERB is responsible for regulation and the problem in Mayapuri was that gamma chamber was a legacy source. It was not on the radar of AERB. As I mentioned earlier, after this, we have done a very extensive survey. Now all the gamma chambers in the country are in our data base. They have all been looked at".

119. The Committee also found that AERB does not have a detailed inventory of all radiation sources to ensure effective compliance of regulations for safe disposal of disused sources. No proper mechanism was in place to ensure that waste radioactive sources have actually been disposed of safely after utilization. In terms of the IAEA Handbook, a regulatory body was to be provided with the means necessary for effectively controlling all major sources in the country. It was also essential that the regulatory body maintains effective communication with the holders of licences for these sources. Prior to the establishment of AERB, radiation facilities were under the regulatory control of BARC. AERB did not obtain sufficient data relating to radiation facilities operating in the country when the regulatory work was assigned to it.

120. AERB stated that following the Mayapuri incident in April 2010, it has undertaken a vigorous campaign to establish and maintain an inventory of all the radiation sources used in the country and to improve their regulatory control. The measures taken as part of this include *inter-alia* sensitizing all academic, medical and R&D institutions to prepare inventories of radiation sources under their possession and review their existing safety procedures; asking all the suppliers/manufacturers for details of the sources supplied by them till date; and strengthening the AERB data base on source inventory by identifying and bringing on record, the legacy sources. AERB had also initiated a process of developing an advanced web-based interactive system for managing the regulation of radiation sources and facilities. Audit, however, concluded that AERB still does not have an effective system in place to ensure continuous collection and updating of its inventory of all radiation sources, to ensure effective compliance of regulations for safe disposal of disused sources.

121. Audit further pointed out that during the period 2005-06 to 2011-12, AERB had reported the following instances: forty eight cases of loss, theft or misplacement of radioactive sources since 2000, in which radioactive material found its way into the environment and 15 cases where the source was never found; several incidents of radioactive packages remaining uncollected at airports, including 67 unclaimed packages found at Chennai, Delhi, Kolkata and Mumbai airports in 2001; and the mistaken handing over of a radioactive package containing 6.539 GBq (Gigabecquerel) Y-90 (Yttriga - 90) to a waste disposal agency in 2004-2005, by the staff at Mumbai airport.

122. AERB stated that the radioactive sources in use in the country were large in number and were regulated through a graded approach, commensurate with their hazard potential. AERB dealt with cases of loss, theft and misplacement of sources through regulatory action, awareness programmes and help from the police and IG security (DAE). The reported cases of loss and theft of sources were mainly from radiation facilities having low hazard potential. AERB ensures that all the licencees immediately report any incident of loss and theft or misplacement of sources to enable prompt action for tracing and recovering the sources. If the cases of loss, theft or

misplacement of the sources were known to be due to negligence from the side of the licencees, appropriate regulatory action was initiated against them.

123. When the Committee sought to know as to what were the penal actions available with AERB ensuring safe keeping of radiation sources, AERB stated that the enforcement of regulatory actions such as suspension on use of radiation sources, withdrawal of licence prohibits all activities involving use of any radiation sources by the concerned user/facility which was itself a very severe penalty and generally led to heavy financial losses as well as loss of credibility to the radiation facility concerned. In this context, even a warning letter serves as effective deterrent to the owners of the sources, in order to prevent recurrence of such incidents.

124. AERB further stated that due to the increased awareness regarding radiation safety amongst airport Managements, Customs officials, importers and exporters, AERB got information on time and took prompt action to resolve the issues. AERB has been undertaking many campaigns through various awareness programmes about the safety and security of radioactive sources used in the country. In view of this, such incidents were expected to come down in the near future with proper monitoring of the sources with the help of the advanced web-based active system.

125. The Committee also sought to know the periodicity of the updation of the inventory of all the radiation sources available in the country. AERB therupon replied that it was an on-going process and the records of source inventory were updated as and when the source receipt information was received from the stakeholders.

**(iv) Acute Shortage of Trained Manpower including Radiological Safety Officers**

126. According to Rule 7 of RPR 2004, no licence to handle radioactive material or to operate radiation generating equipment should be issued to a person unless, in the opinion of the competent authority, an RSO is designated in accordance with Rule 19 of RPR, 2004. The duties and functions of an RSO are defined in Rule 22 of RPR, 2004 and Rule 13 of Safe Disposal of Radioactive Waste Rules, 1987. Audit observed that

RSOs have been assigned enormous responsibilities under these rules for radiation protection and safe disposal of radioactive waste and they are vital links between the licencees and the regulator in securing compliance of the rules for radiation protection and safe disposal of radioactive waste. The regulator was mainly dependent on the RSOs in ensuring the compliance of various provisions under these rules. It was also pointed out that there was an acute shortage of qualified RSOs in comparison to the total number of registered units, indicating that most of the units of radiation facilities were working without RSOs.

127. The Committee sought to know whether in the absence of competent RSOs, was AERB in the process of issuing licenses to units to handle radioactive material to operate radiation generating equipment. AERB replied that licences were issued only after confirming the availability of competent RSOs as per the provisions of AE (RP) Rules, 2004.

128. On a pointed query during the oral evidence as to whether manpower in AERB was sufficient, the Chairman, AERB replied in the negative.

129. The Secretary, DAE and Chairman, AEC further supplemented on this issue on shortage of trained manpower and totally agreed to the Committee's opinion of the need for linkage with younger group of students in universities as under:

"Exactly. We will try to put that into focus – what we are discussing just now. The first is, where are they and how many are they? This is the first question to be answered and then, the next level would be on what they are doing, whether that is acceptable today or not. These are two things at the lower level. At higher levels, everything is on the agenda generally. The Chairman, AERB has already mentioned. To be able to do that, we need to implement that at the State level, about which also we discussed quite a lot. We need to convince the State Governments to set up the Directorate; then, it would be a very good recommendation coming from this Committee to help them. In that case, manpower will be required. But manpower inspection and visiting x-ray clinics is not highly qualified. I understand that that this requirement would be only low level – a few months training would be good enough for them to identify – whether it is there, at what level the radiation is located and where, etc. At the higher level, I agree with you; at the moment, we are primarily giving manpower from the training school system at the highest level which is there in the

Department of Atomic Energy's all the units; AERB is included in that; but of late now, we are also having an option available to take scientists and engineers from outside which you call technical officers. Even without training, they can join".

130. The Committee pointed out the imperative need for changing mindsets and for encouraging more nuclear research by the universities. The representative of DAE responded during oral evidence as under:

"I will try to tell you about recent initiatives in this area. First of all, to ensure that we are able to take advantage of the strengths in other institutions to help us, we started – I will name them now – a programme, which was started in the year 2000; we call it DAE Graduate Fellowship Scheme. The idea was that if any student has taken admission in any of the IITs for M.Tech programme and if he is interested in a career in DAE, we provide him higher fellowship and then, he does the course work in the IIT in which he has joined; and the project work, on a topic of interest to the DAE's mission; and he has, for this purpose, two supervisors – one from the DAE system and the other from the IIT system. This scheme was started as a pilot scheme in IIT, Kanpur; subsequently we have extended to all the old IITs where the M.Tech system is well established, that is, IIT, Mumbai, Chennai, Kanpur, Kharagpur and Roorkee. Recently, BHU, IT, has shown interest; we are talking to them also. I am not aware of the latest status of that. So, this scheme has been running with a pilot scheme, in 2000, which is now extended to all the places. This is one, where we are trying to make use of the entire system".

## **VII. EMERGENCY PREPAREDNESS FOR NUCLEAR AND RADIATION FACILITIES**

131. Preparedness and responses to emergencies were important responsibilities of an operating organisation, which had to establish and maintain the necessary emergency plans and procedures for all emergencies by having an on-site emergency preparedness plan and an off-site emergency preparedness plan. While the off-site emergency plan was the combined responsibility of the operator, the district authorities and other associated authorities such as NDMA, the CMG of DAE, etc., the other emergency plans fall within the domain of responsibility of the operator. AERB has the responsibility to ensure that these emergency preparedness plans were submitted by the operators to it for approval, review and updation.



132. On-site emergency preparedness plans are put in place by the plant Managements of NPPs and nuclear fuel cycle facilities. These emergency preparedness plans are tested by actual periodic exercises prescribed, based on the types of emergencies, by the plant Managements of NPPs. Plant Emergency Exercises (PEE) are conducted once in a quarter, while Site Emergency Exercises (SEE) are conducted once a year. AERB only reviews the reports of these exercises conducted by the plant Managements and does not directly associate itself in these exercises, even as observers of PEE and SEE. Audit pointed out that AERB as the nuclear safety regulator should associate itself as an observer in these exercises on selection basis to exercise adequate regulatory supervision in these exercises and accordingly AERB was now contemplating deputing observers during on-site exercises on a sample basis.

133. Statedly, AERB has a role with respect to on-site emergency exercises, which include review and approval of on-site emergency preparedness and response plans, specifying the frequency and requirements of conduct of exercises, ensure that the plants are conducting the exercises at specified periodicity and review of reports on on-site emergency exercises. A basic principle in safety management was that the owner/operator have the prime responsibility for safety. As part of regular operations, the operator carries out a large number of tests, surveillances, in-service inspections, drills and exercises. In line with the principle of graded regulation, the regulator carries out direct observation of selected important activities, while for others, it resorts to review of reports or sample inspections. The role of AERB with respect to emergency response and preparedness at nuclear facilities varies with the type of emergency.

134. AERB stated that presently, it was not mandated to take follow-up action with the district/State authorities on deficiencies in emergency preparedness pointed out by it. However, it was considering asking the plant Managements to obtain and submit information on the status of corrective measures taken subsequent to the OSEEs (Off-site Emergency Exercises) by the local authorities. Audit observed that this confirms the weakness in the regulatory regime since AERB has no authority to enforce rules in the instances of malpractices and departures from the approved plans.

135. The Committee enquired about AERB's mandate *vis-a-vis* follow up action with the District/State authorities on emergency preparedness. AERB thereupon stated that emergency response in the public domain by the District/State Authorities was a subject coming under the National Disaster Management Act, 2005. Within the ambit of the current regulations, AERB has sufficient mandate to take follow up actions with the plant managements that were its licensees. AERB has mechanisms to review/monitor the status of off-site emergency preparedness with respect to each NPP. In case of any deficiency or inadequacy, which can lead to inability for taking response action, AERB was empowered to take enforcement measures, including stoppage of NPP operation and suspension of its operating licence.

### **VIII. DECOMMISSIONING OF NUCLEAR AND RADIATION FACILITIES**

136. Audit scrutiny pointed out that there was no legislature framework in India for decommissioning of nuclear power plants and AERB does not have any mandate except prescribing of codes, guides and safety manuals on decommissioning. At the end of the life of any NPP, nuclear fuel cycle facility or radiation facility, it needs to be decommissioned, decontaminated and demolished so that the site was made available for other uses. The decommissioning activity for a NPP may be divided into three phases *viz.* initial activities; major decommissioning; and storage and licence termination activities.

137. The Atomic Energy Act, 1962 was for all aspects of handling, use and disposal of radioactive substances, which encompasses decommissioning also and the broad scope of decommissioning was already covered in various codes and guides of AERB. However, AERB does not have a role in deciding or stipulating the time frame for decommissioning. When the Committee specifically asked whether the Department considered bringing about legislation for decommissioning of nuclear power plants, DAE stated that the existing rules under Atomic Energy Act, 1962, *viz.* Atomic Energy (Radiation Protection) Rules, 2004 and Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987, have requirements with respect to decommissioning. Rule 3 (1) (b) of Atomic Energy (Radiation Protection) Rules, 2004, specifies, "*No person shall,*

*without a license, decommission a radiation installation".* Rule 34 of Atomic Energy (Radiation Protection) Rules, 2004 provides for decommissioning of radiation installation viz. when a radiation installation or radiation generating equipment ceases to be in use, the employer shall ensure its decommissioning; no employer shall decommission a radiation installation without the prior approval of the competent authority; the decommissioning plan shall take due cognizance of disposal of radioactive wastes, recycling of materials, and reuse of equipment and premises; and the license shall comply with such directive as may be issued by the competent authority to ensure adequate protection of the persons in and around the decommissioned installation. Also, Rule 3 (a) of Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987, specifies, "No person shall dispose of radioactive waste, unless he has obtained an authorization from the competent authority under these Rules". In order to meet the financial resources that will be required in future for decommissioning of NPPs, a decommissioning levy at the rate of 2 paise per unit was being collected by the utility. These provisions along with a regulatory mechanism for ensuring safety aspects provide adequate mechanism for addressing the issues with respect to decommissioning.

138. On being asked as to whether there was specific provision in the laws defining the responsibility of decommissioning activity, the AERB stated that presently, as per the provisions of the Atomic Energy Act, 1962, NPPs can be owned and operated only by the Government either by itself or through any authority or corporation established by it, or by a Government Company. The Atomic Energy (Radiation Protection) Rules, 2004 prohibits anyone from establishing such a facility without a valid license from the competent authority. The Atomic Energy (Radiation Protection) Rules, 2004 also have provisions for ensuring that the facilities are decommissioned, as well as the necessary regulatory control of the same. As per the provisions of Atomic Energy (Radiation Protection) Rules, 2004, the responsibility for decommissioning was on the '*employer*'.

139. The AERB safety manual on decommissioning of NPPs published in March 1998 states that facilities which were already in operation should prepare preliminary decommissioning plan and submit them to AERB within five years of publication of the

manual and new facilities should do the same before construction/operation licenses were issued. However, none of the NPPs operating in the country have decommissioning plans. Audit findings pointed out that of the 20 units of NPPs operating in the country at present, 10 plants came into operation before the publication of the AERB Safety Manual on '*Decommissioning of Nuclear Facilities*'. None of these 10 plants have prepared preliminary decommissioning plans so far indicating that licences for operation were issued without AERB insisting upon the submission of decommissioning plans resulting in all NPPs in the country operating without any decommissioning plans.

140. Audit further observed that even after the lapse of 13 years from the issue of the Manual, NPCIL, the agency responsible for drawing up decommissioning plans for nuclear power plants, had not submitted decommissioning plans for any of its plants despite the fact that Tarapur Atomic Power Station (TAPS)-1 and 2 has already completed over 30 years of operation and the Rajasthan Atomic Power Station (RAPS)-1 is under shutdown condition since 2004 resulting in none of the NPPs undergoing decommissioning as of date. AERB replied that the Manual published by it is advisory and neither mandatory nor recommendatory in nature. It further stated that NPCIL has submitted notes on decommissioning aspects for TAPS-3 & 4, Kaiga-3 & 4, Rajasthan Atomic Power Project (RAPP)-5 & 6, Kakrapar Atomic Power Project (KAPP)-3 & 4 during the design review stage itself to AERB. As regards RAPS-1, the techno-economic feasibility of further operations was under review. As and when a decision was taken for decommissioning, detailed plans will be submitted to it for approval.

141. The Committee sought to know as to why there was no decommissioning plan for the Nuclear Power Plants including those operating for over 30 years and those that have been shut down. DAE thereupon stated that decommissioning of NPPs were well known and documented. These were submitted by the utility for individual plants, at the time of design reviews. Aspects related to management and disposal of solid radioactive wastes arising from decommissioning were considered during the initial licensing. The detailed procedures for decommissioning were best prepared at the time of need, for the following reasons viz. actual decommissioning activities, beyond

removal of nuclear fuel, etc. are usually carried out after a lapse of several years, for the short lived radioactivity to die down; the plans need to be taken into account other existing facilities existing at the site, at the time of decommissioning; and state-of-art of available technologies, which would be existing, need to be considered at the time of decommissioning. For example, today, laser cutting techniques and robotic technologies were available, which were not available earlier. Indeed, this technology has been extensively used in the large scale removal of coolant tubes, prior to their replacement, by NPCIL, in six reactors. Removal of coolant tubes will also be a major step in the eventual decommissioning of Pressurised Heavy Water Reactors. For any facility, which was not operational, for which a decommissioning application had not been submitted, AERB was ensuring safety surveillance, treating the facility as an operational facility, with consideration of the safety implications posed by the facility in the given state, following a graded approach.

142. A notification was issued in December 1988 by the NPCIL to levy a decommissioning charge of 1.25 paise per KWH energy sold from the nuclear power stations in the Country. The NPCIL revised the levy of decommissioning charges to 2 paise per KWH energy sold in October, 1991. The notification stipulated that the receipts on account of decommissioning charges should be credited to a separate fund to be known as the '*Decommissioning Fund*', to be maintained by NPCIL.

143. On a pointed query by the Committee whether this levy was already functional, the Secretary, DAE submitted during oral evidence as under:

"The NPCIL does levy a decommissioning charge of about 2 paisa per unit. In fact, I must tell that decommissioning means that you remove the spent nuclear fuel from the core. It is part of life every year. From the Tarapur reactor, for example, 1/3<sup>rd</sup> of the fuel is removed and it is replaced, and in nuclear power plant, Pressurised Heavy Water Reactor (PHWR), we remove even the pressure tubes, which contain nuclear fuel. All the 306 channels of the six reactors -- namely, Rajasthan Unit I; Madras Unit I & II; Narora I & II and Kakrapar I -- have been removed by a process of cutting and removal of entire channel, which contains the nuclear fuel. The most highly radioactive systems have already been handled in this manner. So, that technology is existing here. Now, with this levy and the technology already generally understood, we are confident that

when the time comes for decommissioning, it can be done in the technological manner and AERB will handle this task in the manner, which has been prescribed by one of their guide for decommissioning".

144. Asked to explain the technical meaning of decommissioning in the context of extension of 20 years to the Tarapur NPP which originally had a life of 40 years, the Secretary, DAE explained:

"A reactor (core) sits in the middle of a reactor and that contains the highest radioactivity. It is the nuclear fuel and the structures that you are seeing are neutron, which gets radioactive. Firstly, you remove the nuclear fuel, which is being done in any case. Then you remove the components, which are having the highest level of radioactivity in PHWR – six reactors. We have already done similar exercises. Whatever further remains will be material, which has not been so highly radioactive, but may still have some radioactivity. So, we have to cut them into pieces and deposit them in repository, which will be able to accommodate it. The outside building and all that are not actually activated. They are like any other structural building and they can be taken care of. Some of the pipelines may be radioactive, but that also simply we have to manage. We can send cutters through the pipe and cut it out and remove it. In fact, similar work has been done in the Cirus reactor. Cirus reactor was set up in 1960. We have done a lot of removal of the old systems and replacement with the new between 2000 and 2004".

145. On being asked whether the cost of decommissioning a Nuclear Power Plant exceeds that of the total cost of setting it up, the Secretary, DAE replied in the negative.

146. Audit observed, while reviewing the adequacy of the decommissioning reserve, which the Organisation for Economic Co-operation and Development (OECD) had published a study of decommissioning of nuclear plants, in which decommissioning cost estimates by various member countries such as Belgium, Germany, Italy, and USA, etc has been indicated. Considering the span of the decommissioning periods, the cost of decommissioning can exceed the cost of construction of such facilities, after providing for inflation. Audit pointed out that AERB had not worked out the decommissioning cost formula in any of its documents.

147. Audit pointed out that NPCIL was collecting the levy amounts for decommissioning of power plants on behalf of the Government and these were being credited to the Decommissioning Fund account which accumulated ₹ 920.22 as on

March, 2011. An expert committee had been constituted by the Government to judge the adequacy of the Decommissioning Fund, among its other responsibilities and the Expert Committee had, in its recommendations of June 2009, expressed inability to accurately estimate the decommissioning levy since the calculations were very sensitive to the assumptions regarding the escalation rate and the interest rate. The Expert Committee, therefore, had recommended retention of the levy of 2 paise/kWh and had recommended that a review should be undertaken in future when better estimates were available for future expenditure on decommissioning at the end of reactor lives. However, Audit pointed out that no further action on the same had been taken since 2009.

#### **IX. MAINTAINING LIAISONS WITH INTERNATIONAL BODIES DEALING WITH NUCLEAR REGULATORY ISSUES**

148. IAEA, set up as the world's 'Atoms for Peace' organization in 1957, had played a central role in international nuclear safety. India has been one of the member States of the agency since 1957. Article 2 of the statute of IAEA provides that it shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity, throughout the world.

149. Audit further observed that AERB was associated with the following International agencies/fora related to nuclear and radiation safety viz. international Atomic Energy Agency; forum for the Canada Deuterium Uranium Senior Regulators for exchange of information on issues specifically related to safety of Pressurised Heavy Water Reactors; United States Nuclear Regulatory Commission; Directorate General for Nuclear Safety and Radiation Protection, France; and Radiation Safety Authority, Russia. Audit, however, observed that though AERB maintained liaisons with international nuclear organisations, it was slow in adopting international benchmarks and good practices.

150. DAE and AERB were involved in IAEA's activities related to enhancement of nuclear and radiation safety. The knowledge and experience brought back by the Indian experts, who participated in the IAEA activities had a significant impact in

shaping AERB's regulatory approach and framework. India had also presented its national report under the convention, for peer reviews in 2008 and 2011, wherein member states have accepted the safety record of the Indian NPPs and the efforts and initiatives of AERB, its technical support organizations and the plants for achieving the international benchmarks on safety. AERB stated that it was the first regulatory body to adopt the recommendations of the International Commission of Radiation Protection (ICRP). Audit pointed out that on key issues of regulatory independence, underpinned by the enactment of comprehensive regulations, the verification of compliance of regulation and enforcement of regulations, which were the key characteristics for an independent nuclear regulator, the AERB had, however, been found to be sharply out of alignment with its international peers. Audit, also pointed out that in contravention of the IAEA Safety Standards, AERB had not yet developed a radiation safety policy even after nearly three decades of being entrusted with this function.

151. The Committee sought to know as to what action was being proposed by DAE/AERB to establish the structured process of self assessment of its regulatory framework, AERB stated that it had already initiated a self-assessment of its processes and systems in 2010. A Committee constituted by AERB and a number of working groups under it have been carrying out this work. The assessment include comparison of AERB's systems vis-à-vis the IAEA Standards to see how the intent of the IAEA standards are incorporated in AERB's processes. The assessment was intended to identify the strengths of the practices being followed and the need for any additional enhancements. This self-assessment was 'presently in an advanced stage'. However, AERB had not indicated a specific time period by which the self assessment exercise will be completed.

152. IAEA's safety review and appraisal services, called the Integrated Regulatory Review Service (IRRS) aims to strengthen and enhance the effectiveness of the State's regulatory infrastructure in nuclear, radiation, radioactive waste and transport safety, whilst recognizing the ultimate responsibility of each State to ensure the safety of nuclear facilities, protection against ionizing radiation, safety and security of radioactive sources, safe management of radioactive waste and safe transport of radioactive



material; to carry out comparisons against IAEA regulatory safety standards with consideration of regulatory technical and policy issues and to provide an opportunity for a balance between technical and policy discussions among senior regulators; sharing of regulatory experiences; harmonization of regulatory approaches among member States and mutual learning opportunities among regulators. IAEA offers external peer review services either of a specific regulatory activity or of the performance of a regulatory body as a whole.

153. Audit pointed out that through the IRRS, the IAEA assists its member States in strengthening an effective and sustainable national regulatory infrastructure, thus contributing towards achieving a strong and effective global nuclear safety and security regime. Sixteen countries including Canada, China, France, Pakistan, UK and USA have availed of the opportunity of benefits of IRRS missions as of 2010. Audit, however, observed that AERB had not availed of the opportunity of the peer review services of IRRS to get its regulatory framework and effectiveness reviewed so far. AERB had not even conducted any self-assessment regarding its regulatory practices against the IAEA safety standards.

154. DAE stated that the Government of India had already committed to host an IRRS mission of IAEA for peer review of AERB in the near future. AERB had initiated a self-assessment exercise in 2010 in preparation of the peer review and the self-assessment was presently at an advanced stage of its regulatory framework. However, Audit pointed out the Committee constituted by AERB in November 2010 for internal assessment of the preparedness of AERB for IRRS had not yet submitted their report till date. Also, India had fallen behind many countries in availing of the opportunities of peer review of its regulatory framework by IRRS.

155. When the Committee enquired about the time frame within which AERB will be peer reviewed by IAEA, the DAE replied that the Government of India has already committed to host an Integrated Regulatory Review Services (IRRS) mission of IAEA, for peer review of AERB in near future. AERB has not yet hosted the Integrated Regulatory Review Services of IAEA for peer review. AERB as well as the Government

was committed to hosting the IRRS Mission. However, that AERB has not indicated a time frame in which its peer review will be done.

156. On the issue of implementation of international standard on Nuclear safety, another representative supplemented during oral evidence as under:

"In so far as international cooperation is concerned, being a member of the International Atomic Energy Agency, the only platform that is available to us for information exchange, particularly in the area of safety this platform has already been available and now we are signatories to the Convention on Nuclear Safety which has membership coming from all the member countries of IAEA generally, and we have been presenting our systems and safety related activities which we are performing which has received the international acclaim there. In addition, in a bilateral mode, particularly you mentioned US, we have been having bilateral relationship with some of the other regulators also like US Nuclear Regulatory Commission and our Atomic Energy Regulatory Board. We have periodic interactions. On the safety related platform there are some interactions going on. But it does not mean that these interactions have in any way suffered any deficiencies or breached anything because we have interacted with others. We have no deficiencies so far. In fact, many other countries have faced one or the other problem.

157. Referring to the culture of safety, the representative further deposed:

"But, because of our grooming culture, we have never been lacking in implementation of any of the international standards which should have been followed in many countries. We have come out of even difficult situations in terms of technology by adopting measures which have not led to degenerate into unsafe situations. This way, I can say that internationally we stand at par with every other regulator. When we buy imported reactors, the essential requirement is that the reactor must be licensable in the country of origin and before it comes here our regulator also must certify that it meets our country's regulatory requirements".

158. Whether there was a regime of sanctions of technology denials between 1998 and 2008, the representative of DAE testified:

"I will start from 1974 when the first set of embargo started. Yes, there was a period when we were isolated and that was the period when the only major cooperation which continued was with Germany under the Indo-German agreement. That started papering off as the programme in Germany started

papering off; but otherwise it continued throughout all these years. Subsequent to 1998, there was an intense effort on our part also to try to see if we can cooperate on R&D front with various other countries. In this regard, cooperation with France was the first to be started after 1998. It was in 2000 in the form of an intense Indo-French dialogue and that particular dialogue turned down to joint agreement under which Indo-French R&D Committee was set up which meets periodically and joint projects have been going on right from 2000 onwards and that intense cooperation continues. We have been having relationship with Russia for a long time, beginning, I think, from late 80s under the ILTP Programme. That continued and now specifically between the Atomic Energy, there is an agreement on cooperation in R&D which has been signed with Russia as a result of this on-going dialogue. Again, topics have been identified and we are moving on with Russia as well. As a result of these dialogues which we have with various countries, India could become a full partner for the Project. That is a project which is being set up in the South of France near Marseille on fusion reactor and India is a full partner where we are contributing ten per cent of the cost in kind and then we attend meetings. There is no hidden sort of thing there. All the drawings, all the analysis is open. In every respect, we are able to share knowledge with various other countries. The other partners in this venture are USA, Russia, Japan, South Korea, China and EU – EU as an entire block. So, there we are partner and we are working on. With USA also, apart from the agreements on reactors etc., commercial negotiations are going on, but there is a separate agreement – Indo-Nuclear Civil Working Group for cooperation in R&D. There we have had several meetings. I think the first meeting was in January, 2006 and subsequently we had four more meetings. While we have been having discussions, but on ground things have not started proceeding as yet – maybe we have to have more dialogue before things start proceeding on ground. Sir, you raised a specific issue about visa. 'Yes', visa in case of USA, it continues to be an issue. Sometimes it is delayed whenever our people have to go for conferences, there is a delay there. Another issue you raised is whether we are invited to various meetings or not. The answer is 'Yes'. We are now getting invitations for all the meetings. Even in the nuclear energy agency for OECD, there again we have taken membership of some of the groups".

159. On specifically being asked whether it was post 2008 after the India-US Nuclear Deal Agreement, the representative supplemented as under:

"It is after that only. This nuclear energy agency is very recent. As Secretary Shri Sinha, just indicated, our regulatory board is a part of many meetings – many such initiatives which take place amongst essentially OECD countries where they are getting invited. We are setting up a global centre for nuclear energy partnership specifically for cooperation with other countries and specifically with regard to that, MoUs have been signed with France, Russia, U.K and some dialogues with USA also in that area is going on".

160. On the issue of peer review by IAEA, the Chairman AERB submitted during oral evidence as under:

"Starting with peer review of AERB by International Atomic Energy Agency, in fact, this is a voluntary service and many countries have availed of this, that is, getting their regulatory bodies peer reviewed by an international team. In fact, India has requested and they have made a commitment that they will also formally come to them for this review. We plan to do this very soon, may be in the next year 2013, we will get the peer review done for our nuclear power plant facilities. We are planning to get it done for our regulatory system for nuclear power plants. In fact, we have made a commitment to the IAEA that we would get it done soon. It will happen"

161. On a pointed query as to whether any sort of peer review would affect the NSRA Bill, 2011 which was introduced in Lok Sabha on 7 September 2011, AERB stated that based on the understanding that the Bill was the property of the House, it was felt that it may be advisable to host the IRRS Mission for peer review after completion of the legislative process. AERB otherwise had no difficulty in proceeding ahead with the IRRS Mission.

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## **PART – II**

### **OBSERVATIONS & RECOMMENDATIONS**

1. **Introduction:** The Committee note that radiation and radioactive substances have many beneficial applications, ranging from power generation to uses in medicine, industries and agriculture but the risks that may arise from these applications to the people working in these fields, the general public and the environment are enormous and hence, there is an imperative need for their accurate assessment and effective control. The criticality of the issue of radiation risks and safety compounded by the fact that such risks can transcend national borders, necessitated international co operation to promote and enhance global safety by exchanging experiences as well as by improving capabilities for controlling hazards, preventing accidents, responding to emergencies and mitigating harmful consequences. The Atomic Energy Regulatory Board (AERB) was set up in 1983 under the provisions of Section 27 of the Atomic Energy Act, 1962 (AE Act) which allowed the Central Government to delegate any power conferred or any duty imposed on it by this Act to any officer or authority subordinate to the Central or State Governments. The mandate of AERB was to carry out certain regulatory and safety functions envisaged under Sections 16, 17 and 23 of the AE Act. Against this background, the C&AG conducted a performance audit on the activities of AERB by studying the structure and status of AERB and the effectiveness of its role as the nuclear regulator of India. The performance audit of AERB, conducted through examination of management controls and administrative procedures with licensing, inspection and enforcement activities for the period 2005-06 to 2011-12 and review of the functioning of emergency preparedness in related nuclear power plants and districts pointed out glaring weaknesses in the regulatory framework and several failures on the part of AERB in carrying out its mandate. The Committee's subsequent examination of the subject and their recommendations for systemic improvement are contained in the succeeding paragraphs.

2. **Grant of Independent Status to AERB:** The Committee are surprised to find that while Countries such as Australia, Canada, France, United States of America, etc. have already conferred legal status to their nuclear regulating bodies by enacting appropriate laws in recognition of the paramount need for independent and empowered regulatory bodies as stressed by the International Atomic Energy Agency (IAEA), the legal status of AERB of India remained that of a mere subordinate Authority with powers delegated to it by the Central Government. The Committee observe that the failure to have an autonomous and independent regulator is clearly fraught with grave risks as brought out poignantly in the report of the Fukushima Nuclear Accident Independent Investigation Commission. The Committee are dismayed to find protracted delays in the DAE's efforts to confer statutory status with enhanced legal powers to AERB. The Committee also note that under the AE Act, 1962, the powers conferred for imposition of penalty vests with the Central Government and not with the AERB. Moreover, the process of enforcement as available under penal Sections 24 and 30 (3) of the Act were also available with the DAE and not with AERB. Mindful of the fact that an independent regulator should have adequate powers to frame rules, enforce compliance and impose appropriate penalties, the Committee observe that such systemic lacunae in the legislative framework stands in the way of AERB being truly an independent and effective regulator. The Committee further note with profound concern that even after a lapse of more than three decades after the Meckoni Committee Report of 1981 which recommended creation of AERB with statutory status and powers to lay down safety standards, the matter continues to hang in the balance. Admittedly, while AERB never found its present status to be an impediment in the discharge of its assigned responsibilities in an autonomous, professional and effective manner as was evident from the numerous regulatory enforcement actions taken by it with respect to nuclear power plants and radiation installation with even shutdown orders of plants or suspension of their activities, the Nuclear Safety Regulatory Authority Bill (NSRA), 2011 which seeks to confer statutory status to

the regulator was introduced in Lok Sabha on 7 September, 2011. The Department related Parliamentary Standing Committee (DRSC) on Science and Technology in their 221<sup>st</sup> Report on the NSRA Bill, 2011 observed that the Bill by and large seems to meet three out of the four core values viz. competence, independence, stringency and transparency, but it still lacks somewhat on the count of independence. The dissenting minute appended to the said report of the Standing Committee points out categorically, that unless clauses 14, 42 and 48 of the Bill are fully deleted or drastically amended, the NSRA will have no meaningful autonomy. The Committee were assured that the Department of Atomic Energy have initiated the process of formulating amendments to accommodate the recommendations of the Standing Committee in consultation with the Ministry of Law and Justice. Taking note of the grave structural lacunae and weaknesses in the legislative framework intended to avert nuclear accidents, the Committee concur with the recommendation of the Standing Committee on Science and Technology that the Regulating Authority should be more independent and autonomous so that it functions effectively, builds greater credibility and inspires public trust. The Committee, therefore, recommend that the DAE should seriously re-examine the provisions of the Bill and take necessary steps urgently so as to ensure that the nuclear regulator becomes an independent and credible body at par with similar regulators in other Countries. The Committee may be apprised of action taken in the matter within six months of the presentation of this report to Parliament.

3. Discharge of Regulatory Functions: Notably, a regulatory body must be equipped to exercise its key regulatory functions viz. standard-setting, authorization, inspection and enforcement without preserve or constraint. Moreover, Article 8 of the Convention on Nuclear Safety of the IAEA, ratified by the Government of India stipulates effective separation between the functions of the regulatory body from those of others. The representative of DAE laboured to convince the Committee that the de-facto independence of AERB was evident from impeccable safety performance of Nuclear Power Plants and Fuel Cycle

Facilities which were on par with international benchmarks and that the functional independence of AERB was not compromised as the DAE extends only administrative/service support to AERB which submits its budget to AEC. The representative further submitted that enhancement and strengthening of the existing legal framework was under process with the introduction of the NSRA Bill, 2011 pending in Parliament. The Committee, however, find that AERB's independence is circumscribed by certain aspects viz. absence of institutional separation of regulatory and non-regulatory functions with the Chairman, AEC and Secretary, DAE being embodied in one person thereby negating the very essence of such a separation; absence of a fixed term of office of Chairman, AERB with extension granted on case to case basis; dependence of AERB on DAE for budgetary and administrative support; and apparent conflict of responsibilities and interest with Chairman, AERB reporting to Chairman, AEC who is also Secretary, DAE. The Committee do note that the NSRA Bill seeks to constitute an empowered and independent Council of Nuclear Safety headed by the Prime Minister and serviced by DAE to report on overall policy with regard to nuclear and radiation safety with the Report of this Council envisaged to be presented to Parliament. The Committee hope that the enactment of the NSRA Bill in the form as recommended, help establish a truly autonomous regulatory body with independent decision making powers to perform three basic functions viz. enact a set of appropriate, comprehensive and sound regulations, verify compliance to such regulations and enforce established regulations by imposing appropriate corrective measures in the form of penalties, punishments in the event of departure from licensing conditions, malpractice or wrongdoing by persons, organizations under regulatory oversight. The Committee would like to be apprised of the action taken in the matter within six months of the presentation of this Report.

4. Nuclear and Radiation Safety Rules: The Committee are concerned to note that AERB did not have any authority for framing rules relating to nuclear and radiation safety as the rule-making power under Section 30 of the AE Act, 1962



vests with the Central Government, that is, with the DAE and the AERB is involved in the consultative process. The Committee also note delay by the DAE in designating AERB as the Competent Authority in respect of the Atomic Energy (Radiation Protection) Rules, 2004 leaving gaps in the accountability regime during the intervening period. The Committee further note the ambiguity in the Atomic Energy (Radiation Protection) Rules, 2004 wherein the word '*any person*' in Rule 30 left the definition of competent authority to inspect premises, radiation installation and conveyances rather vague and unspecific. In terms of the oft-repeated recommendation of the Committee on Subordinate Legislation, Lok Sabha (COSL) provisions in rules should not be vague or ambiguous capable of tolerating different interpretations. The Committee hope that as assured by DAE, a new set of rules devoid of such lacunae would be promulgated on enactment of the NSRA Bill, replacing the RPR, 2004. Keeping in view that rules are the real teeth that enable enforcement of provisions made in Acts of Parliament, the Committee desire that the DAE take appropriate steps to review and scrutinize all their existing rules and regulations and confer necessary powers on the AERB so that all such lacunae are cured expeditiously.

5. Need for a Deterrent Fine: The Committee note with deep concern that in terms of Section 30 (3) of AE Act, 1963, the penalty for contravention of the provisions of the Act and Rules made thereunder remained abysmally low at a maximum fine of ₹ 500. Obviously, such undetering penalties for contraventions related to nuclear and radiation facilities involving substantial risks only points to the systemic weakness in the legal framework of the Country's nuclear regulatory oversight mechanism. Surprisingly, the Committee find that in 50 years of operation of DAE and 29 years of existence of AERB, the penal provisions under Section 24 or 30 (3) of AE Act, 1962 were never invoked, rendering the penal provision virtually a dead letter. The Committee were informed that AERB had been using far more effective enforcement actions such as suspension/withdrawal of consents and curtailment of operations as the preferred tool for ensuring compliance, the economic penalty of which was huge

with potential of seriously affecting the financial health of stakeholders. Apparently, such a contention of AERB makes the penal provision relating to fine redundant compared to the economic penalty. The Committee, therefore, recommend that the penal provisions in the NSRA Bill, 2011 may be relooked so that the proposed new law contains a sound provision to act as an effective deterrent against the violators. The Committee further desire that such provisions should be adequately published and made known to all concerned including Institutes, Academicians, Facilities as well as the public in general.

6. Formulation of Nuclear Radiation Safety Policy: The Committee note that even after nearly three decades of its existence, AERB is yet to formulate a nuclear and radiation safety policy for the Country in spite of a specific mandate in its Constitution Order of 1983. The Committee observe that the absence of such a policy at a macro-level can hamper micro-level planning of radiation safety in the Country. Intriguingly, though the need for hastening the process of development of safety documents viz. codes, standards, guides and manuals was stressed since the Meckoni Committee Report way back in 1987 and the Raja Ramanna Committee in 1997, AERB is yet to bring out 27 required codes and guides relating to nuclear and radiation safety. Admittedly, AERB has developed adequate policies for radiation, industrial and nuclear safety and their regulations and the 27 documents pointed out by Audit have since been identified by AERB and are at various stages of development and expected to be published progressively by December, 2014. Keeping in view the fact that a comprehensive nuclear and radiation safety policy is the essential first step towards a more effective regulation, the Committee desire that the consolidated Safety Policy Document, statedly under preparation, may be brought out expeditiously as also the other safety documents under various stages of development within a stipulated time frame and the Committee apprised.

7. Development of Safety Codes and Guides: The Committee are happy to note that subsequent to the Fukushima nuclear incident, AERB had set up a high level Committee on Nuclear Safety, the recommendations of which were statedly

under implementation. As regards non-identification of external agencies for development of safety codes and guides despite the recommendations of the Raja Ramanna Committee, it was submitted that the process of document preparation, review and incorporation/disposition of stakeholder views were done through a multi-tier system of expert Committees and since AERB documents deal with very specialized and advanced technology areas, experts in related areas though utilized by AERB are limited in number. Mindful of the fact that standard setting being an essential part of the function of a regulatory Authority and reiterating the imperative to set up minimum benchmarks and safeguards to provide full assurance for safety in nuclear and radiation facilities, the Committee hardly need to undertake the urgent need for development of requisite safety codes and guides. Reposing immense faith in the technological capabilities and the potential power of our science and scientists, technocrats as well as experts, the Committee exhort the DAE to explore the possibility of putting in place a suitable mechanism for adequate linkages with renowned Universities and Institutions like IITs, etc. so that preparation of such important safety codes and guides is undertaken and constantly updated keeping pace with the frontiers of science and emerging technologies.

8. Gaps in Regulatory Regime for Want of Human Resource: The Committee note that regulatory consents in the form of licenses, authorizations and registrations from the Competent Authority secure an effective assurance that the safety of the workers employed, the public at large, of the environment as well as of plant and equipment was not at risk and that all activities were carried out in accordance with prescribed processes and systems. AERB, being the competent authority is mandated to grant such regulatory consents under RPR, 2004. The Committee are surprised to find not only instances of delays in submission of applications for renewal of licenses but an overall unsatisfactory licensing and renewal process for even high radiation potential hazard units such as research accelerators, industrial radiography and radiotherapy. The Committee observe that AERB's painfully slow progress in bringing radiation users in the country

under its regulatory control indicated lack of sufficient manpower. Admittedly, it was only from the year 2006 subsequent to the enforcement of the Atomic Energy (Radiation Protection) Rules, 2004 that AERB had been able to issue formal licenses and the backlog was expected to be completed with significant increase in manpower. The Committee were apprised that in addition, AERB initiated a number of measures to strengthen the system for monitoring and renewal of consents to radiation facilities as well as related regulatory activities viz. e-licensing system for filing of applications and issue/renewal of consents; increased inspection coverage for radiation facilities; conduct of awareness programmes and establishment of Regional Regulatory Centres (RRC). Needless to say, the huge manpower shortage has left a large gap in the regulating and monitoring regime. Taking note of the fact that capacity building is crucial for effective monitoring, the Committee hardly need to emphasize that the AERB need to augment their manpower requirement at various levels through appropriate recruitment and training policies based on periodic cadre review. The Committee further observe that a robust regulatory inspection regime with built in provisions for mandated periodic as well as surprise checks remains the key requirement for stringent enforcement of safety regulation. The Committee would like to be apprised of the definitive measures in this behalf.

9. Monitoring and Authorizations: The Committee are anguished to note that there was no system in place for monitoring the expiry of authorizations and their renewals with instances of protracted delays for periods as long as 24 years. Alarming, 70 out of 135 Gamma Chamber units continued to function without valid authorizations. The Committee find that subsequent to the Mayapuri incident, AERB has taken steps to ensure that operational gamma chambers are subjected to close regulatory monitoring and non-operational ones are safely disposed of within a reasonable timeframe. Reportedly, measures have been taken to revamp the regulation of radiation facilities viz. updating the inventory of radiation sources; introduction of E-Licensing of Radiation Applications for filing of applications and issue of consents, for effectively managing the regulation of

radiation sources and facilities; increased inspection coverage for radiation facilities; conduct of awareness programmes; and establishment of Regional Regulatory Centres (RRC) to cater to the requirements of regulatory inspections at the Eastern and Southern zones in India. The Committee would like to be apprised of the outcomes of such measures.

10. **Monitoring of Medical X-ray Units:** The Committee are deeply concerned to note that the regulatory mechanism concerning X-ray units was virtually non-existent. Out of a total of 57,443 medical X-ray facilities operating in the Country, only 5270 units had been registered and were under the regulatory control of AERB, leaving the balance 52,173 units constituting almost 91% of the total units without registrations. The representatives of AERB admitted that with its centralized workforce of 300 engineers and scientists, it was impossible to regulate 57,443 odd X-ray machines. The marked accelerated growth of ionising radiation such as medical X-rays used as an essential diagnostic tool pose risks to health of workers and the public in the vicinity of these facilities. Surprisingly, even after the Supreme Court directive for setting up a Directorate of Radiation Safety (DRS) in each State for regulating the use of medical diagnostic X-rays, the Committee find that out of 28 States and 7 Union Territories, DRS have been set up only in Kerala and Mizoram. The Committee were however, assured that the roadmap to bring medical X-ray facilities under AERB's regulatory control includes inter-alia steps to enhance awareness levels on regulatory requirements related to diagnostic x-ray facilities, through advertisements in the newspapers, awareness programmes and information provided in AERB website; simplification of regulatory requirements for the end-users of diagnostic x-ray facilities; regulatory control on manufacturers/suppliers, through type approval of the equipment and arrangements for sharing information on the purchasers/users of x-ray equipment; development of an easy and approachable interface for the users to facilitate on-line filing of application for obtaining Registration, using the new web based interactive system (e-LORA i.e. e-licensing of radiation applications); establishment of an accreditation programme for the agencies

involved in providing quality assurance services; decentralisation of regulatory functions with the establishment of Regional Regulatory Centres (RRCs) and State level Directorates of Radiation Safety (DRS); rationalization and simplification of the existing regulations for users in diagnostic x-ray practice, by way of amendments of AERB Safety Code; enhancing regulatory control on manufacturers/suppliers as well as users; etc. The Committee hope that the AERB's roadmap for regulating control of Medical X-ray units, hitherto effectively out of their ambit would fructify in the near future. The Committee also urge that the process of setting up Directorates of Radiation Safety in all the States as per the Supreme Court directive may be expedited. Taking note of lack of proper linkage between AERB and the Ministry of Health on issues related to Public Health due to radiation, the Committee desire that appropriate institutional mechanism be set up providing for healthy exchange of information and the Committee apprised.

11. Framing of Rules Prescribing Fee for Cost of Services: The Committee are concerned to note that AERB has not yet framed any rules to prescribe and fix fee for recovery of the cost of services rendered for the regulating and consenting process as a result of which it had to bear such costs despite clear provision in Section 30 of the AE Act read with the RPR, 2004 framed thereunder. The Committee impress upon the AERB not to undermine the importance of revenue generation through recovery of requisite cost of services and urge the AERB to frame requisite rules for levying suitable fees for recovering the cost of the consenting process for licenses with appropriate provision for periodic review and revision.

12. Inspection of Units: The Committee note that as per IAEA standards, each Government should expressly assign the prime responsibility for safety to an entity and make it responsible for compliance through stringent inspection of facilities and verification of requisite specifications. The Committee are, however, dismayed to find that AERB has not conducted 85 per cent of

regulating inspections during the seven year period 2005-06 to 2011-12 for both industrial radiography and radiotherapy units identified as having high radiation hazard potential. Alarming, there was shortfall of over 97 per cent regulatory inspection in case of diagnostic radiological facilities every year. Worse, AERB has not even fixed any frequency for Regulatory Inspections (RI) of such facilities inspite of the availability of international benchmarks in this regard. Instances of non-submission as well as delays in submission to responses to RI reports only confirmed the weaknesses in the regulatory oversight. Admittedly, the shortfall in the number of RIs was due to rapid growth in the number of radiation facilities and inadequate infrastructure with the result that only sample checks of radiation facilities could be carried out and an advanced web-based interactive system was being developed to minimize the time lags. The Committee find the contention of AERB that enforcement of safety regulations does not appear to be compromised consequent to delay in implementation of SARCOP (Safety Review Committee for Operating Plants) far from tenable. Also, keeping in view the onerous mandate of SARCOP to monitor and enforce safety regulations in NPPs and other radiation facilities identified by the Central Government and the revelation that it could not ensure compliance of its recommendation pending for several years, the Committee recommend that the DAE take appropriate measures to implement the recommendation of SARCOP in right earnest based on their relative importance.

13. Protection Against Radiation: The Committee note that radiation protection is intended to ensure that the amount of radiation absorbed by an organism does not have negative consequences and the nuclear law must establish a legislative framework for the safe management of all sources and types of ionizing radiation. While AERB is entrusted with the function of prescribing acceptable limits of radiation exposure to occupational workers and members of the public, the actual task of radiological protection of workers in Nuclear Power Plants is carried out by the Health Physics Unit (HPU). The Committee note that with the transfer of HPUs in all NPPs to NPCIL in May 2009, the responsibility of AERB to monitor radiation protection in NPPs stands diluted.

As regards radiological protection of the public, the Committee are pleased to note that during the period from 2005-2010, the effective dose to the public was far less than the prescribed annual limit of one mSv (Milli Sievert) in all the nuclear facilities site. The Committee note that the Health, Safety and Environment Group of the Bhabha Atomic Research Centre (BARC) carries out environmental surveillance through its Environmental Survey Laboratories (ESLs) and thus functions as a technical support center to AERB. The Committee observe that the absence of any direct role of AERB in verification of compliance with regard to environmental surveillance issue apparently weakens its authority to monitor the performance of the regulated entity though AERB consider the present arrangement satisfactory as ESLs have to share survey data with AERB. Further, as per AERB guidelines, the annual dose limit for occupational exposure to radiation is 30 mSv (Mili Sievert) with the condition that it should not exceed 100 mSv in a span of five years. However, Audit findings pointed out 89 cases of excess exposure exceeding 30 mSv at radiation facilities during the period from 2005-2010, out of which the exposure was more than 50 mSv in 41 cases. Admittedly, the number of over exposure had been less than 0.1 per cent of the total number of radiation workers in the last five years. The Committee note that the discharge of radioactive waste from radiation installation in India was governed by the Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987 which mandated that for every radiation installation, authorization from AERB was required for disposal of radioactive waste. The Committee are, however, dismayed to observe the confirmation given by AERB that a renowned and prestigious institution like the Delhi University was totally ignorant of the rule pertaining to safe disposal of radioactive wastes, which unfortunately resulted in the tragic Mayapuri incident. The Committee are dismayed to observe that such an important aspect of safe handling and disposal of radioactive waste by institutes/facilities was neglected to the grave peril of the public and the environment. The representative of DAE admitted that Mayapuri incident was an example of radioactive waste gone wrong and a case of a legacy source, in existence before the regulating regime came into being. While emphasizing that



the radioactive waste control management in so far as it relates to nuclear power plant and fuel cycle facilities has impeccable record in the Country, the representatives further submitted that AERB did intensive work subsequent to the incident to strengthen the system of management of disused sources by conducting extensive surveys and updating the database on radioactive sources. The Committee are happy to note the impeccable radioactive waste management control mechanism in existence in nuclear power plants and fuel cycle facilities and hope that the same is maintained scrupulously. In view of the aforesaid observations and candid admissions made by the representatives of DAE and the AERB, the Committee recommend that:

- (i) The AERB should have independent assessment and monitoring of HPU's so as to ensure radiological protection of workers in NPPs;
- (ii) The AERB may be entrusted with the responsibility of environmental surveillance with the close cooperation of ESLs;
- (iii) Though the number of over exposure has been less than 0.1 per cent of the total number of radiation workers, AERB should make vigorous efforts to augment preventive action in addition to the remedial action post-exposure to safeguard their health;
- (iv) Comprehensive inventory may be prepared and constantly updated of all radioactive radiation sources across the Country indicating the suppliers/manufacturers and suitable awareness created for safe handling and disposal of radioactive waste to prevent Mayapuri like incidents in future;
- (v) Suitable institutional mechanism be evolved and put in place by establishing suitable and regular linkages with the schools and colleges and community for disseminating greater awareness about the advantages of atomic energy and the safeguards provided against radiation and radioactive substances; and
- (vi) Further, an appropriate curriculum be included in NCERT/CBSE syllabi for enhanced sensitization of the impressionable young minds of students towards the lurking dangers of radiation over-exposure as also to their potential application with adequate safeguards. Vocational courses on radiological safety may also be introduced.

The Committee should like to be apprised of all prophylactic and preventive measures taken in this regard.

14. Shortage of RSOs: The Committee are concerned to note that there is an acute shortage of Radiological Safety Officers, who are required to be designated for all radiation units in accordance with the provisions in Rule 22 of RPR, 2004 and Rule 13 of Safe Disposal of Radioactive Waste Rules, 1987. Having regard to the fact that RSOs are assigned enormous responsibilities for radioactive protection and safe disposal of radioactive waste and also function as vital links between the licencees and the regulator in securing compliance, the Committee observe that effectiveness of safety procedures remains deeply compromised due to their acute shortage. The Committee are concerned to find that there was acute shortage of not only RSOs but also of trained manpower in general in AERB. The Committee, therefore, recommend that (i) the DAE should take proactive measures for augmentation of RSOs and other requisite trained human resource at all levels of recruitment at various levels; (ii) impart appropriate training and also launch talent search to attract students from Universities for their appropriate orientation for posts in AERB; and (iii) considering the fact that fundamental science of today is the technology of tomorrow, the DAE should incentivize nuclear research by having appropriate linkages with the Universities/IITs.

15. Preparation of Emergency Responses: The Committee note with profound concern that off-site emergency exercises carried out highlighted inadequate emergency preparedness even for situations where the radiological effects of an emergency originating from NPP are likely to extend beyond the site and affect the people around. Article 16 of the Convention on Nuclear Safety of IAEA, ratified by the Government of India in 2005, stipulates development of emergency response plans in conformity with international practices so that any eventuality with a potential to result in undue radiological risks to plant, personnel and the public, is handled effectively. The Committee find that while emergency preparedness plans are to be approved by AERB, it has no authority

to enforce rules in instances of malpractices and departures from approved plans. The Committee also find that as regards off-site emergency response plans, the responsibility rests with district authorities under the overall coordination of the National Disaster Management Authority (NDMA). Notably, the cardinal principle in safety management is that the operator has the prime responsibility for safety. Having regard to the fact that the number of radiation applications in various areas have grown continuously and high strength radioactive sources are being used extensively in industry, hospitals and other irradiation facilities, the Committee recommend that the AERB need to:

- (i) Strengthen the regulating aspect of emergency preparedness in the area of other radiation facilities as well which is almost non-existent;
- (ii) Prescribe mandatory safety codes/procedures and emergency preparedness plan based on strict assessment of risk factors; and
- (iii) Put in place effective control mechanism for securing compliance to the prescribed safety codes.

16. Preparation of Decommissioning Plans: The Committee are concerned to note that there is no legislative framework in India for decommissioning of nuclear power plants (NPPs) and AERB's mandate extends to that of only prescription of codes, guides and safety manuals on decommissioning. Notably, it is imperative that at the end of life of any NPP, nuclear fuel cycle facility, it needs to be decommissioned, decontaminated and demolished. Moreover, decommissioning can extend over lengthy periods of time requiring stringent regulating supervision and control during the period. The Committee also find that in India as per the provision of the Atomic Energy (Radioactive Protection) Rules, 2004, the responsibility for decommissioning is on the 'employer' while in countries like USA, UK, Canada, Spain, France, etc, designated competent authority, often the nuclear regulator, plays a major role. The Committee observe that in view of such gaping weaknesses and also stipulations by IAEA in this regard, the role of AERB with reference to decommissioning needs to be strengthened urgently. The Committee also note with profound concern that all

the NPPs in the Country including those operating for more than 30 years, were operating without any decommissioning plans. The Committee further observe that AERB, as a regulator was not in a position to secure compliance with the provision of its Safety Manual on 'Decommissioning of Nuclear Facilities' even after a lapse of 13 years from its issue on the plea that the absence of decommissioning plans does not affect safety of operating units. Admittedly, AERB ensures safety surveillance on a graded approach and while the broad conceptual approaches for decommissioning of NPPs were already prepared, it did not have any role in stipulating time frames for decommissioning. The Committee recognize the need to set clear timelines for decommissioning plans as also specific provisions in rules defining the authority to enforce stringent supervision and regulation during the decommissioning period. The Committee are further dismayed to find that neither the Atomic Energy Act, 1962 nor the Rules framed thereunder have any provision for creation of decommissioning reserves by the utilities. Worse, while decommissioning charges have not been revised since 1991, AERB has no defined role for ensuring availability of adequate funds. The Committee observe that as per IAEA stipulations, clear and specific provision must be made in the rules for covering the aspect of financial arrangements for decommissioning. The Committee find that NPCIL had accumulated ₹ 920.22 crore in the Decommissioning Fund as of March, 2011 through levy of decommissioning charge of 2 paisa per KWH energy sold and while an expert Committee had recommended review of the levy for future expenditure on decommissioning, no action has yet been taken so far on this aspect. The Committee feel that considering the span of decommissioning period, the cost of decommissioning can even exceed cost of establishment of Nuclear facilities and therefore recommend a more robust system of financial arrangement and timeline for decommissioning and desire that the DAE should initiate requisite steps for putting in such a system and also for periodic review of levy charges so that the 'Decommissioning Fund' is adequately funded.

17. **Adoption of International Benchmarks and Peer Review:** The Committee note that although AERB maintains liaison with international nuclear organization, it has been slow in adopting international benchmarks and good practices in the areas of nuclear and radiation operation. The role of AERB in relation to implementing international legal commitments has not been specifically defined in its Constitution Order. Further, the AERB has not yet availed of the opportunity of peer review and appraisal services of IAEA to get its regulatory framework and its effectiveness reviewed by them. The Committee find that though AERB has initiated a structured process of self-assessment of its regulating framework, processes and systems, which was statedly in an advanced stage, it has not yet hosted the Integrated Regulatory Review Services (IRRS) of IAEA for peer review though committed to the mission. Admittedly, AERB was awaiting the completion of the legislative process of the NSRA Bill, presently in Parliament, to host the IRRS Mission for peer review. The Committee hope that once the law is enacted, the AERB will start peer review and appraisal services of IAEA to help make the nuclear regulatory infrastructure effective, sustainable and more creditable. The Committee also desire that loopholes in the existence legal framework may be addressed appropriately for speedy and effective implementation of the international legal commitments.

18. **Conclusion:** In fine, the Committee's examination revealed *inter-alia*, diminished legal status of AERB which remained a mere subordinate authority lacking due autonomy of an empowered and independent regulator as existent in many other Countries; failure of AERB to develop safety policy, standards, codes and guides; weak consenting process and monitoring system resulting in substantial number of radiation facilities units operating without valid licenses as evident by the non-registration of 91 per cent of medical X-ray facilities in the Country which therefore, remained out of the ambit of the regulating control of AERB; absence of rules to prescribe fees for recovery of the cost of services for regulating and consenting process; failure to enforce safety provisions and compliance to frequency of regulatory inspections for both industrial radiography

and radiotherapy units and shortfall of over 97 per cent inspection in case of diagnostic radiology facilities; absence of a detailed inventory of all radiation sources to ensure effective compliance of regulation for safe disposal of disused sources; inadequate emergency preparedness for nuclear and radiation facilities; absence of a legislative framework for decommissioning of Nuclear Power Plants; and total absence of peer review and appraisal services of IAEA. Although, as submitted by the representative of AERB, because of its grooming culture, India has never been lacking in international standards and by adopting measures, unsafe situations have been avoided. The Committee, however, reiterate the need for granting independent and autonomous status of AERB given the thrust on tapping atomic energy to surmount the rising energy need of the Country. Also, considering the paramount right of the nation to be safe from nuclear accidents, the Committee strongly recommend that the deficiencies noticed in the realm of nuclear regulatory oversight framework must be addressed with a sense of urgency as recommended herein above within six months of the presentation of the report and the Committee apprised.

NEW DELHI;  
04 November, 2013  
13 Kartika, 1935 (*Saka*)

DR. MURLI MANOHAR JOSHI  
Chairman,  
Public Accounts Committee.

**MINUTES OF THE EIGHTEENTH SITTING OF THE PUBLIC ACCOUNTS  
COMMITTEE (2012-13)**

The Committee sat on Friday, the 26<sup>th</sup> October, 2012 from 1500 hrs. to 1740 hrs.  
in Room No. '62', Parliament House, New Delhi.

**PRESENT**

**Dr. Murli Manohar Joshi**

-

**Chairman**

**Members**

**LOK SABHA**

2. Shri Bhartruhari Mahtab
3. Shri Sanjay Nirupam
4. Shri Ashok Tanwar
5. Shri Sandeep Dikshit
6. Shri T.K.S Elangovan
7. Dr. Baliram
8. Dr. Shashi Tharoor
9. Dr. M. Thambidurai

**RAJYA SABHA**

10. Shri Prasanta Chatterjee
11. Shri Sukhendu Sekhar Roy
12. Shri N.K. Singh
13. Prof. Saif-ud-Din-Soz

**LOK SABHA SECRETARIAT**

- |    |                     |   |                     |
|----|---------------------|---|---------------------|
| 1. | Shri Devender Singh | - | Joint Secretary     |
| 2. | Shri Abhijit Kumar  | - | Director            |
| 3. | Shri H.R. Kamboj    | - | Additional Director |

**REPRESENTATIVES OF THE OFFICE OF THE COMPTROLLER AND AUDITOR  
GENERAL OF INDIA**

- |    |                   |   |                                  |
|----|-------------------|---|----------------------------------|
| 1. | Shri Jayant Sinha | - | Principal Director               |
| 2. | Shri A.M. Bajaj   | - | Principal Director of Audit (SD) |

- |    |                     |   |                 |
|----|---------------------|---|-----------------|
| 3. | Shri Dharam Singh   | - | Director        |
| 4. | Shri Gurpreet Walia | - | Deputy Director |

**REPRESENTATIVES OF THE DEPARTMENT OF ATOMIC ENERGY**

- |    |                        |   |                                |
|----|------------------------|---|--------------------------------|
| 1. | Dr. R.K. Sinha         | - | Secretary, DAE & Chairman, AEC |
| 2. | Shri S.S. Bajaj        | - | Chairman, AERB                 |
| 3. | Dr. R.B. Grover        | - | Principal Adviser, DAE         |
| 4. | Shri R. Bhattacharya   | - | Secretary, AERB                |
| 5. | Shri Rahul Kulshreshth | - | Joint Secretary (ER), DAE      |

2. At the outset, the Chairman, welcomed the Members, the representatives of the Office of the Comptroller & Auditor General of India and the representatives of the Department of Atomic Energy to the sitting of the Committee convened for briefing on the subject 'Activities of Atomic energy Regulatory Board' based on C&AG Report No. 9 of 2012-13 (Performance Audit). Thereafter, the Chairman impressed upon the witnesses to keep the deliberations of the sitting confidential until the report on the subject was presented to the House.

3. Thereafter, the representatives of the Department of Atomic Energy explained the legal status and regulatory framework of Atomic Energy Regulatory Board; the existing management controls and administrative procedures connected with licensing and enforcement activities. The representatives of the Department responded to some of the questions and concerns of the Members regarding nuclear safety and radiation safety policy; licensing and registration mechanism; formation of Directorates of Radiation Safety in the States; shortage of Radiological Safety officers in different types of radiation facilities; and the measures being taken to strengthen the surveillance of exposure control; preparation of inventory of all radiation sources to ensure safe disposal of disused sources as per norms.

4. The Chairman, then thanked the representatives of the Department of Atomic Energy for appearing before the Committee and furnishing information desired in connection with examination of the subject. He also directed them to furnish written replies to questions, which they could not reply or replied partly, within a fortnight.

The witnesses then withdrew.



*A copy of the verbatim proceedings of the sitting was kept on record.*

*The Committee, then, adjourned.*

**MINUTES OF THE FOURTEENTH SITTING OF THE PUBLIC ACCOUNTS  
COMMITTEE (2013-14) HELD ON 17<sup>TH</sup> OCTOBER, 2013**

The Committee sat on Thursday, the 17<sup>th</sup> October, 2013 from 1130 hrs. to 1235 hrs. in Committee Room 'E', Parliament House Annexe, New Delhi.

**PRESENT**

**Dr. Murli Manohar Joshi** - **Chairman**

**LOK SABHA**

2. Shri Anandrao Vithoba Adsul
3. Shri Ramen Deka
4. Shri Bhartruhari Mahtab
5. Dr. Sanjay Jaiswal
6. Shri Abhijit Mukherjee
7. Dr. Baliram

**RAJYA SABHA**

8. Shri Prakash Javadekar
9. Shri N.K. Singh
10. Smt. Ambika Soni

**LOK SABHA SECRETARIAT**

1. Shri Devender Singh - Joint Secretary
2. Shri M.L.K. Raja - Deputy Secretary
3. Smt. A. Jyothirmayi - Deputy Secretary
4. Ms. Miranda Ingudam - Under Secretary
5. Shri A.K. Yadav - Under Secretary

**REPRESENTATIVES OF THE OFFICE OF THE COMPTROLLER AND  
AUDITOR GENERAL OF INDIA**

1. Shri Jayant Sinha - Principal Director of Audit (RC)
2. Ms. Gurveen Sidhu - Principal Director of Audit (SD)
3. Shri Purushotam Tiwary - Principal Director of Audit (PAC)

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|----|-----|-----|-----|
| 4. | xxx | xxx | xxx |
| 5. | xxx | xxx | xxx |

2. At the outset, the Chairman welcomed the Members and the representatives of the Office of the C&AG of India to the Committee. The Chairman then apprised the Members that the meeting had been convened to consider and adopt three Draft Reports.

3. The Committee, thereafter, took up the following Draft Reports for consideration:

- |       |                                                                                                                                                       |     |     |      |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------|
| (i)   | xxx                                                                                                                                                   | xxx | xxx | xxx; |
| (ii)  | Draft Report on “ <b>Activities of Atomic Energy Regulatory Board</b> ”<br>(Department of Atomic Energy) based on C&AG Report No.9 of 2012-13;<br>and |     |     |      |
| (iii) | xxx                                                                                                                                                   | xxx | xxx | xxx. |

4. After some discussions, the Committee adopted the above Draft Reports with some modifications/amendments. The Committee, then, authorized the Chairman to finalise the three Reports adopted by them, in light of their suggestions and the factual verifications received from the Audit and present the same to the House on a date convenient to him.

6. The Chairman thanked then the Members for their valuable suggestions on the consideration of the Draft Reports.

**The Committee, then, adjourned.**