DEPARTMENT OF ATOMIC ENERGY

DEMAND NO. 4

Atomic Energy

A. The Budget allocations, net of recoveries, are given below:

(In crores of Rupees)

	Major Head	Budget 2007-2008 Plan	Budget 2007-2008 Non-Plan	Budget 2007-2008 Total	Revised 2007-2008 Plan	Revised 2007-2008 Non-Plan	Revised 2007-2008 Total	Budget 2008-2009 Plan	Budget 2008-2009 Non-Plan	Budget 2008-2009 Total
Revenue		556.63	1187.71	1744.34	448.68	1324.17	1772.85	539.35	1426.50	1965.85
Capital		*1590.22*	*462.29*	*2052.51*	*1237.42*	*492.73*	*1730.15*	*1418.65*	*523.50*	*1942.15*
Total		**2146.85**	**1650.00**	**3796.85**	**1686.10**	**1816.90**	**3503.00**	**1958.00**	**1950.00**	**3908.00**
1. Secretariat-Economic Services	3451	...	16.00	16.00	...	21.49	21.49	...	22.50	22.50
2. Atomic Energy Regulatory Board	3401	1.00	12.62	13.62	1.00	12.72	13.72	1.00	13.79	14.79
	5401	2.00	...	2.00	3.30	...	3.30	2.00	...	2.00
	Total	*3.00*	*12.62*	*15.62*	*4.30*	*12.72*	*17.02*	*3.00*	*13.79*	*16.79*
Atomic Energy Research and Industries										
3. Bhabha Atomic Research Centre, Mumbai (BARC)	2852	...	188.84	188.84	...	222.73	222.73	...	219.78	219.78
	3401	...	411.55	411.55	...	427.70	427.70	...	445.12	445.12
	4861	229.00	5.06	234.06	215.00	10.14	225.14	210.00	12.52	222.52
	5401	400.00	7.70	407.70	400.00	9.61	409.61	420.00	9.43	429.43
Total - BARC		**629.00**	**613.15**	**1242.15**	**615.00**	**670.18**	**1285.18**	**630.00**	**686.85**	**1316.85**
4. Indira Gandhi Centre for Atomic Research, Kalpakkam (IGCAR)	3401	...	102.69	102.69	...	115.40	115.40	...	118.90	118.90
	4861	115.60	...	115.60	74.97	...	74.97	80.00	...	80.00
	5401	70.63	0.31	70.94	68.99	0.40	69.39	89.74	0.60	90.34
Total - IGCAR		**186.23**	**103.00**	**289.23**	**143.96**	**115.80**	**259.76**	**169.74**	**119.50**	**289.24**
5. Raja Ramanna Centre for Advanced Technology, Indore (RRCAT)	3401	...	47.45	47.45	...	54.44	54.44	...	56.00	56.00
	5401	67.07	0.55	67.62	42.70	17.96	60.66	54.00	1.80	55.80
Total - RRCAT		**67.07**	**48.00**	**115.07**	**42.70**	**72.40**	**115.10**	**54.00**	**57.80**	**111.80**
6. Variable Energy Cyclotron Centre, Kolkata (VECC)	3401	...	29.65	29.65	...	34.08	34.08	...	37.00	37.00
	5401	70.08	0.35	70.43	24.52	0.55	25.07	50.00	0.65	50.65
Total -VECC		**70.08**	**30.00**	**100.08**	**24.52**	**34.63**	**59.15**	**50.00**	**37.65**	**87.65**
7. Directorate of Purchase & Stores , Mumbai	3401	...	17.25	17.25	...	18.22	18.22	...	19.86	19.86
8. General Services Organisation, Kalpakkam	3401	...	29.20	29.20	...	33.27	33.27	...	35.00	35.00
9. Autonomous Bodies										
9.01 Tata Institute of Fundamental Research, Mumbai	3401	66.70	92.00	158.70	88.70	107.00	195.70	102.50	112.00	214.50
9.02 Tata Memorial Centre,Mumbai	3401	69.10	74.00	143.10	50.00	80.10	130.10	46.00	85.90	131.90
9.03 Saha Institute of Nuclear Physics, Kolkata	3401	49.50	23.00	72.50	28.80	28.60	57.40	34.25	31.00	65.25
9.04 Institute of Physics, Bhubaneswar.	3401	32.75	7.00	39.75	27.60	8.00	35.60	69.00	9.00	78.00
9.05 Harish-Chandra Research Institute, Allahabad	3401	18.46	8.00	26.46	14.00	10.00	24.00	12.00	11.00	23.00
9.06 Institute of Mathematical Sciences, Chennai.	3401	9.92	10.00	19.92	4.48	12.35	16.83	7.00	13.00	20.00
9.07 Institute for Plasma Research, Gandhinagar	3401	171.64	30.00	201.64	105.00	25.50	130.50	140.00	28.00	168.00
9.08 Atomic Energy Education Society, Mumbai	3401	17.34	15.00	32.34	17.34	17.77	35.11	19.60	20.07	39.67
Total - Autonomous Bodies		**435.41**	**259.00**	**694.41**	**335.92**	**289.32**	**625.24**	**430.35**	**309.97**	**740.32**
10. Assistance to Universities, etc. (Grants to Other Institutions)	3401	90.22	...	90.22	81.76	...	81.76	88.00	...	88.00
11. Directorate of Construction, Services and Estate Management (DCS&EM), Mumbai	3401	...	39.05	39.05	...	42.37	42.37	...	43.91	43.91
12. Housing Projects										
12.01 Projects under DCS&EM	5401	24.83	...	24.83	21.99	0.24	22.23	25.00	0.06	25.06
12.02 Other Housing Projects	5401	17.05	...	17.05	20.38	...	20.38	13.91	...	13.91
Total - Housing Projects		**41.88**	**...**	**41.88**	**42.37**	**0.24**	**42.61**	**38.91**	**0.06**	**38.97**

(In crores of Rupees)

	Major Head	Budget 2007-2008 Plan	Budget 2007-2008 Non-Plan	Budget 2007-2008 Total	Revised 2007-2008 Plan	Revised 2007-2008 Non-Plan	Revised 2007-2008 Total	Budget 2008-2009 Plan	Budget 2008-2009 Non-Plan	Budget 2008-2009 Total
13. Atomic Minerals Directorate for Exploration and Research, Hyderabad (AMDER)	3401	...	60.37	60.37	...	63.42	63.42	...	68.00	68.00
	4861	18.00	...	18.00	18.00	...	18.00	45.00	...	45.00
	5401	35.12	0.42	35.54	35.12	0.42	35.54	49.00	0.50	49.50
Total - AMDER		**53.12**	**60.79**	**113.91**	**53.12**	**63.84**	**116.96**	**94.00**	**68.50**	**162.50**
Nuclear Fuel										
14. Nuclear Fuel Complex (NFC), Hyderabad										
14.01 Fuel Fabrication Facilities:										
Gross	2852	...	559.13	559.13	...	589.90	589.90	...	842.84	842.84
Less-Receipts	0852	...	-687.36	-687.36	...	-722.00	-722.00	...	-922.75	-922.75
	Net	*...*	*-128.23*	*-128.23*	*...*	*-132.10*	*-132.10*	*...*	*-79.91*	*-79.91*
14.02 Common Facilities	2852	...	21.34	21.34	...	21.18	21.18	...	24.03	24.03
14.03 Stainless Steel Tubes Plant	2852	...	21.03	21.03	...	21.92	21.92	...	28.61	28.61
14.04 Capital Outlay on NFC	4861	221.20	...	221.20	101.95	...	101.95	90.00	...	90.00
Total-Nuclear Fuel Complex		**221.20**	**-85.86**	**135.34**	**101.95**	**-89.00**	**12.95**	**90.00**	**-27.27**	**62.73**
Heavy Water										
15. Heavy Water Board										
15.01 Maintenance of Housing Colonies for Heavy Water Plants	2852	...	8.75	8.75	...	8.85	8.85	...	9.50	9.50
15.02 Central Office (Other Heavy Water Plants)	4861	118.31	10.51	128.82	47.94	10.81	58.75	80.00	11.17	91.17
Total-Heavy Water Board		118.31	19.26	137.57	47.94	19.66	67.60	80.00	20.67	100.67
16. Heavy Water Production										
16.01 Heavy Water Plant, Baroda	4861	...	42.07	42.07	...	41.93	41.93	...	42.98	42.98
16.02 Heavy Water Plant, Kota	4861	...	93.93	93.93	...	107.68	107.68	...	106.27	106.27
16.03 Heavy Water Plant, Tuticorin	4861	...	74.98	74.98	...	20.29	20.29	...	20.78	20.78
16.04 Heavy Water Plant, Talcher	4861	...	12.46	12.46	...	11.86	11.86	...	14.37	14.37
16.05 Heavy Water Plant, Thal	4861	...	88.50	88.50	...	80.97	80.97	...	90.36	90.36
16.06 Heavy Water Plant, Hazira	4861	...	79.91	79.91	...	94.06	94.06	...	101.56	101.56
16.07 Heavy Water Plant, Manuguru	4861	...	97.67	97.67	...	157.60	157.60	...	171.29	171.29
	Total	*...*	*489.52*	*489.52*	*...*	*514.39*	*514.39*	*...*	*547.61*	*547.61*
Less- Loss of Heavy Water	4861	...	-52.28	-52.28	...	-71.99	-71.99	...	-60.89	-60.89
	Net	*...*	*437.24*	*437.24*	*...*	*442.40*	*442.40*	*...*	*486.72*	*486.72*
Total - Heavy Water		**118.31**	**456.50**	**574.81**	**47.94**	**462.06**	**510.00**	**80.00**	**507.39**	**587.39**
17. Feed Stock	4861	...	680.00	680.00	...	657.00	657.00	...	687.00	687.00
Less- Heavy Water Production	4861	...	-680.00	-680.00	...	-657.00	-657.00	...	-687.00	-687.00
Total - Feed Stock		**...**	**...**	**...**	**...**	**...**	**...**	**...**	**...**	**...**
18. Board for Radiation and Isotope Technology, Mumbai (BRIT)	2852	...	23.85	23.85	...	23.80	23.80	...	25.00	25.00
	4861	21.84	0.15	21.99	6.61	0.20	6.81	10.00	0.05	10.05
Total - BRIT		**21.84**	**24.00**	**45.84**	**6.61**	**24.00**	**30.61**	**10.00**	**25.05**	**35.05**
19. Other Programmes										
19.01 Management Services Group	2852	...	0.30	0.30	...	0.30	0.30	...	0.34	0.34
19.02 O & M of Thorium Plant, Trombay	2852	...	15.00	15.00	...	34.00	34.00	...	13.00	13.00
19.03 International Atomic Energy Agency	3401	...	6.00	6.00	...	6.16	6.16	...	6.16	6.16
Total-Other Programmes		**...**	**21.30**	**21.30**	**...**	**40.46**	**40.46**	**...**	**19.50**	**19.50**
20. DAE Projects										
20.01 R & D Projects	3401	...	4.00	4.00	...	4.90	4.90	...	4.94	4.94
	5401	1.59	...	1.59	4.42	...	4.42	5.00	...	5.00
	Total	*1.59*	*4.00*	*5.59*	*4.42*	*4.90*	*9.32*	*5.00*	*4.94*	*9.94*
20.02 I & M Projects	2852	20.00	2.00	22.00	20.00	...	20.00	20.00	5.00	25.00
	4861	87.90	...	87.90	22.53	...	22.53	15.00	...	15.00
	Total	107.90	2.00	109.90	42.53	...	42.53	35.00	5.00	40.00
Total - DAE Projects		**109.49**	**6.00**	**115.49**	**46.95**	**4.90**	**51.85**	**40.00**	**9.94**	**49.94**
21. Grants-in-aid to Uranium Corporation of India Ltd.	2852	10.00	...	10.00	10.00	...	10.00	...	...	...

(In crores of Rupees)

	Major Head	Budget 2007-2008 Plan	Non-Plan	Total	Revised 2007-2008 Plan	Non-Plan	Total	Budget 2008-2009 Plan	Non-Plan	Total
22. Investments in Public Enterprises - Uranium Corporation of India Ltd.	4861	90.00	...	90.00	129.00	...	129.00	180.00	...	180.00
Total-Atomic Energy Research and Industries		**2143.85**	**1621.38**	**3765.23**	**1681.80**	**1782.69**	**3464.49**	**1955.00**	**1913.71**	**3868.71**
Grand Total		***2146.85***	***1650.00***	***3796.85***	***1686.10***	***1816.90***	***3503.00***	***1958.00***	***1950.00***	***3908.00***
B. Investment in Public Enterprises	Head of Dev	Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total
1. Electronics Corporation of India Ltd.	12859	...	30.00	30.00	...	30.00	30.00	...	43.00	43.00
2. Uranium Corporation of India Ltd.	12861	90.00	129.29	219.29	129.00	129.00	258.00	180.00	376.00	556.00
3. Indian Rare Earths Ltd	12861	...	136.00	136.00	...	38.12	38.12	...	110.00	110.00
Total		**90.00**	**295.29**	**385.29**	**129.00**	**197.12**	**326.12**	**180.00**	**529.00**	**709.00**
C. Plan Outlay										
1. Telecommunication and Electronics Industries	12859	...	30.00	30.00	...	30.00	30.00	...	43.00	43.00
2. Atomic Energy Industries	12861	931.85	265.29	1197.14	646.00	167.12	813.12	730.00	486.00	1216.00
3. Atomic Energy Research	13401	1215.00	...	1215.00	1040.10	...	1040.10	1228.00	...	1228.00
Total		**2146.85**	**295.29**	**2442.14**	**1686.10**	**197.12**	**1883.22**	**1958.00**	**529.00**	**2487.00**

1. DAE Secretariat - DAE Secretariat is the apex body administering the constituent units, Public Sector Undertakings and aided institutions spread all over the country carrying out the various activites of the Department. There are five R&D units, three industrial units, three service organisations and five PSUs apart from eight aided institutions in the Department of Atomic Energy. It has also a branch secretariat in New Delhi.

2. Atomic Energy Regulatory Board - AERB is an independent body under Atomic Energy Commission and enforces radiological safety stipulations and is assisted by Safety Review Committee for Operating Plants (SARCOP), Safety Review Committee (SRC) for applications for radiation and other committees in carrying out its mandate in prescribing radiological, nuclear and industrial safety regulations.

3. Bhabha Atomic Research Centre - Bhabha Atomic Research Centre a multidisciplinary organisation, pursues comprehensive research and development (R&D) programmes for harnessing nuclear energy and also its utility for the benefit of the society. These R&D efforts are concentrated in the fields of nuclear sciences, engineering & technology, basic sciences and allied fields and geared up for exploitation of atomic energy for power generation and application of radiation technology in the areas of agriculture, health care and industry. The centre is engaged in the research and development of front line technologies. The interaction with academic institutions and international cooperation in related advanced areas of research is being continuously strengthened. BARC continues to give R&D support to all other units of DAE and provide necessary support for national security.

4. Indira Gandhi Centre for Atomic Research - Indira Gandhi Centre for Atomic Research is the second largest R&D centre of the Department and one of the internationally bench marked research centres for nuclear science and technology. The Centre is engaged in design and development of liquid sodium cooled fast breeder reactors in the country, as a part of the Nuclear Power Programme Stage 2, backed by fuel fabrication and reprocessing. Fast Breeder Test Reactor (FBTR), a prelude to the FBR programme, has been in operation with indigenously developed Uranium-Plutonium carbide fuel. It has set an international record, reaching a fuel burn up of 155,400 MWd/t, without any failure. IGCAR designed the 500 MWe Prototype Fast Breeder Reactor (PFBR), the construction of which is progressing well at BHAVINI, Kalpakkam. The Centre has R&D activities, encompassing hydraulic studies and reactor engineering studies of reactor components, sodium instrumentation, material development and characterization. The Unit plan to optimise the design concepts and to provide inputs to design future FBRs. Structural mechanics experiments will be continued to validate innovative design features of future FBRs in the field of high temperature, fatigue, buckling and seismic design.

As a part of laying strong emphasis on basic research in nuclear sciences and allied areas, technology development in the field of nanomaterials and nanotechnology with a focus in the area of gas sensors, Microelectro mechanical systems (MEMS) and hard coatings will be pursued. Development of hardware and computer based systems for Fast Reactor Instrumentation and Control will be actively persued.

5. Raja Ramanna Centre for Advanced Technology - Raja Ramanna Centre for Advanced Technology is engaged in development of particle accelerators and lasers along with their applications, besides carrying out substantial activities in cryogenics and materials research. RRCAT has built Synchrotron Radiation Source (SRS) Indus 2 that was dedicated to the nation by the Prime Minister. In addition, the centre has built smaller accelerators for their irradiation applications and construction of a 10 MeV electron accelerator-based Agricultural Radiation Processing Facility (ARPF) near Mandi in Indore. The unit has built and given Cryo-coolers and turbomolecular pumps to BARC and other labs. Under the laser programme,it has also built new lasers and laser based systems, including that given to Nuclear Power Corporation of India Limited for use in Narora Atomic Power Station. RRCAT contributed to new collaborative activities with CERN which include design of transport line for CLIC Test facility and modulator for LINAC-4 which is the front-end of the SPL (Superconduting Proton Linac) Project.

6. Variable Energy Cyclotron Centre - The Variable Energy Cyclotron Centre at Kolkata is operating the nation's largest and the first indigenously built Cyclotron and has been

delivered first time in India energetic Neon 20 and Argon 40 beams. A series of experimental run were accomplished for a national facility Indian Gamma Ray Array (INGA) by a large nuclear physics community. Radio-active Ion Beam Project (RIB phase II) has achieved 86 keV/u stable ion beam with Radio Frequency Quadrapole (RFQ) designed and developed in-house. This is a unique achievement in the country. A very high speed computing grid interconnected real time with many other laboratories in the world is already operational and its capability is being enhanced to meet the challenges of future experiments in Large Hadron Collider (LHC), CERN, Geneva. Initial work on nano beams for Microelectromechanical systems (MEMS) and Nano electromechanical systems (NEMS) is towards completion in VECC.

7. Directorate of Purchase & Stores - The objective of Directorate of Purchase & Stores (DPS) is to ensure availability of quality material at right time and at right place. In the process, DPS should also ensure that the material is procured at right price. The materials required by the R&D Units of the Department are of developmental in nature. Hence DPS is also entrusted with the work of locating the right sources for manufacturing of complicated precision equipment required for Atomic Energy Programme.

The functions of materials management include frequent interaction with the various user groups to assess the requirement of the material, liaison with agencies like the Department of Customs, Central Excise, Sales Tax and various other agencies of Government and also with Railways, Airways, Shipping, Road Transport and Insurance agencies, etc. for carrying out its activities. Over the years, DPS has also identified large number of suppliers for developmental jobs and in this process helped the DAE to attain self-sufficiency.

8. General Services Organisation - General Services Organisation, Kalpakkam is one of the service organisations under the Department and the Unit is providing services such as residential accommodation, health services under CHSS, transport services, educational facilities and is also responsible for the maintenance of public buildings, roads within the colony, maintenance of water supply, etc. to all the Units located at Kalpakkam such as Indira Gandhi Centre for Atomic Research, Bhabha Atomic Research Centre (Facilities), Nuclear Power Corporation of India Limited, Central Industrial Security Force, etc.

9. Autonomous Bodies :

9.01. ***Tata Institute of Fundamental Research -*** Tata Institute of Fundamental Research(TIFR) is primarily an Institute for basic research, but in this process, it also develops new technologies and creates a pool of scientific and technical manpower. The research activities of the Institute are organized under three Schools: (a) School of Mathematics (b) School of Natural Sciences and (c) School of Technology and Computer Science. The School of Natural Sciences has seven departments at Mumbai (Theoretical Physics, Astronomy & Astrophysics, High Energy Physics, Nuclear & Atomic Physics, Condensed Matter Physics & Material Science, Chemical Sciences and Biological Sciences), and three national Centres: (a) The National Centre for Radio Astrophysics (NCRA) at Pune, with the cylindrical radio telescope at Ootacamund and the Giant Meterwave length Radio Telescope (GMRT) at Khodad (near Pune); (b) The National Centre for Biological Sciences at Bangalore, and (c) The Homi Bhabha Centre for Science Education at Mankhurd, Mumbai. The School has also set up several field stations for various research facilities, which include the National Balloon Facility (in collaboration with ISRO) at Hyderabad, the Gamma Ray Astronomy & High Energy Physics Laboratories at Ootacamund and Pachmarhi and the Gravitational Laboratory at Gauribidnur. TIFR has also been conferred the status of Deemed University by the University Grants Commission.

9.02. ***Tata Memorial Centre -*** Tata Memorial Centre (TMC) comprises Tata Memorial Hospital (TMH) and Advanced Centre for Treatment, Research and Education in Cancer (ACTREC). Tata Memorial Hospital was established in 1941 for treatment and cure of cancer and allied diseases. To facilitate rapid development and expansion of the facilities, the administrative control was transferred from the Ministry of Health to the Dept. of Atomic Energy. TMC has the responsibility to set standards of therapy for treatment modalities and a centre to train doctors, scientists and para-medical staff in the field.

Cancer Research Institute (CRI) established in 1952, is one of the units of TMC and conducts basic, community-based and clinically oriented research on multiple facets of cancer, focusing on the cancers prevalent in India. These include cancers related to oral cavity, cervix, leukemia and lymphomas and tobacco. CRI has now been relocated to Navi Mumbai with the commissioning of Advanced Centre for Treatment, Research and Education in Cancer (ACTREC).

9.03. ***Saha Institute of Nuclear Physics -*** Saha Institute of Nuclear Physics (SINP) has a two-fold objective to carry out basic research in various areas of physical and biophysical sciences and to impart manpower training in these fields.

SINP has been a pioneering institute for over five decades in the area of research and manpower training. Founded in 1949, the first establishment in the country to initiate studies in nuclear physics and other areas. It has the oldest NMR Lab, a working Tokamak, a most sophisticated unit for surface studies and two strong groups for studies in theoretical physics and statistical mechanics. It has offered the world a very important chip (MANAS) to help detect dimuons at CERN. The Post-MSc Teaching Programme introduced since 1952 which is backed by an undergraduate training programme and the CARE project, is the first training programme of the kind in the country and abroad.

9.04. ***Institute of Physics -*** The Institute of Physics(IOP), Bhubaneswar promotes fundamental research in the frontier areas of Physics. Research is carried out in theoretical as well as experimental areas, viz. Condensed Matter Physics, High Energy Physics, Nuclear Physics, and accelerator based sciences. In Experimental Physics, one of the main facilities is the Ion Beam Laboratory (IBL), which has a 3 million volt Pelletron accelerator. This facility is used by scientists from within the Institute, as well as by scientists from other research institutes and universities in India for carrying out research in surface science, implantation studies, accelerator mass spectroscopy, etc. Experimental research is also carried out in the areas of surface studies, clusters and nanomaterials, relativistic heavy – ion collisions, etc.The responsibility of setting up NISER at Bhubaneswar is entrusted to IOP.

9.05. ***Harish-Chandra Research Institute -*** The Institute was established in the year 1975, with the efforts to set up such an Institute devoted to research in the fields of Mathematics and Mathematical Physics were initiated as early as in January 1966 with the help of the Baldeoram Saligram Mehta Trust, Calcutta. The main objective of the Institute is to conduct fundamental research in various fields of mathematics, theoretial physics and allied topics.

9.06. ***Institute of Mathematical Sciences -*** The Institute of Mathematical Sciences (IMSc), which had its inception in 1962, is a National Institute of higher learning with primary objective to foster high quality fundamental research in frontier disciplines of the Mathematical Sciences.

The research output of the Institute has received international recognition and has led to several collaborative research projects with foreign scientists. The research output

disseminated primarily as referred journal articles as well as articles in conference proceedings. Academic members of the Institute participate extensively in large number of National and International Scientific Meetings. The Institute plays host to a large number of short-term and long-term Visitors.

The Institute has an outstanding scientific library, and an excellent computing environment including Teraflops Cluster Computer (KABRU) and a dedicated high speed network. The institute Library has been recognized as Regional Library by the National Board for Higher Mathematics and almost all the leading international journals in the relevant areas of research are being subscribed on regular basis. The Institute has become a part of Homi Bhabha National Institute.

9.07. ***Institute for Plasma Research (IPR) -*** The Institute has a broad charter of objectives to carry out experimental and theoretical research in plasma science with emphasis on the physics of magnetically confined plasmas and certain aspects of non-linear phenomena. The Institute also has a mandate to stimulate plasma research and development activities in the Universities and the Industrial sector. It is also expected to contribute in training of plasma physicists and technologists in the country. Since its inception, the Institute has pursued these goals in an active manner and made effective contribution. India has joined International Thermonuclear Expeimental Reactor (ITER) as one of the seven full partners, the other being China, European Union, Japan, Korea, Russia and USA. ITER is a prestigious international project which will nearly complete the scientific and technological investigations required to build a prototype demonstration reactor (DEMO), based on the Magnetic Confinement Scheme of controlled thermo nuclear fusion. IPR is fully associated with this project.

9.08. ***Atomic Energy Education Society -*** Atomic Energy Education Society (AEES) runs 32 schools and junior colleges at 16 different centres with about 30000 students on its rolls. Society also assists three special schools runs by Charitable Organizations for the handicapped children of DAE employees at Kalpakkam, Mumbai and Indore. The main objectives of AEES are: -

(a) To establish and run educational institutions such as schools, Junior colleges, etc., to educate the children of the employees of the constituent Units, aided institutes and Public Sector Undertaking of DAE, from preparatory to standard XII and vocational education through the media of instruction adopted by the society from time to time.

(b) To assist special schools through charitable organizations for the handicapped children of the employees of the constituent and aided units of DAE.

(c) To promote or engage in any other activities in the attainment of the above objectives.

10. Assistance to Universities, etc. - The research-education linkage has been always nurtured by DAE. Extra-mural funding from DAE to universities/institutions/ national laboratories is channelled through the Board of Research in Nuclear Sciences (BRNS). National Board for Higher Mathematics (NBHM) has initiated several schemes like helping the development of mathematical centres, giving scholarships to research fellows, travel assistance to young mathematicians for attending conferences/seminars, support to libraries, etc. The Department also funds cancer hospitals in the country which support primarily small projects and radiation related equipment for cancer treatment.

To nurture nuclear technology, the Department covers training programme for its scientists/engineers, programme under the inter-university consortium for utilisation of DAE research facility, enrichment of higher science education through intervention of its experts with university system, and training facilities/fellowships extended to countries through IAEA or under the bilateral agreements. As part of human resource development, a number of training courses, seminars, symposia and workshops are regularly conducted by the DAE units.

With the objective to deliver the technologies developed in the DAE laboratories to the people around the nuclear establishments, the Department has initiated the Neighbourhood Welfare Programme. Welfare activities such as eye camps, health check-ups, renovation of primary schools, providing educational facilities, distribution of high yield seeds and arranging plant visits are carried out by the atomic power stations at different sites. It also envisages Management Development Programmes for officers of the Department.

11. Directorate of Construction, Services & Estate Management - Directorate of Construction, Services & Estate Management has been constituted to look after the construction activities of the Department including housing for its employees. This Directorate is also responsible for operation, maintenance and up-gradation of various services of residential flats, shops, public buildings and estate management including allotment and the security for the DAE estate in Mumbai. In addition, Directorate executes construction works for constituent unit like AMD, VECC, Aided Institutions under the administrative control of DAE viz. TIFR, TMC, IOP and also for other departments on deposit basis.

13. Atomic Minerals Directorate for Exploration & Research - Atomic Minerals Directorate for Exploration & Research (AMD) carries out survey, prospecting and exploration of atomic minerals required for the nuclear power programme of the country. The activities include assessment, analysis, evaluation, characterisation and categorisation of atomic minerals, design and fabrication of radiometric instruments and development of ore extraction flow sheets with the aid of state-of-the-art equipment.

14. Nuclear Fuel Complex - Nuclear Fuel Complex (NFC) is responsible for manufacturing zirconium alloy clad, natural and enriched uranium oxide fuel assemblies for all the Pressurised Heavy Water Reactors (PHWRs) and the Boiling Water Reactors (BWRs) zirconium Alloy structural components for these reactors including Calandria and Pressure Tubes for PHWRs and Square Channels for BWRs. In addition, NFC produces Seamless Stainless Steel and Special Alloy Tubes of international standards for Nuclear and Non-Nuclear applications and Special and High Purity Materials for strategic use.

15. Heavy Water Board - Heavy Water Board operates six Heavy Water Plants(HWP) located at Baroda, Tuticorin, Kota, Manuguru, Thal and Hazira. While the four Heavy Water Plants operating at Baroda, Tuticorin, Kota & Manuguru are run departmentally, Heavy Water Plants at Thal and Hazira are operated and maintained by M/s. RCF & M/s. KRIBHCO respectively. HWP (Talcher) main plant is being preserved alongwith diversified activities. A Solvent Extraction Test Facility has been set up at HWP (Talcher) consisting of Laboratory scale, Micro scale and Bench scale Pilot facility to carry out the applications of the solvents.

As a part of diversification activities, Heavy Water Board(HWB) is entrusted with the development and demonstration of technological feasibility of various process and

for installation of production facilities for products required for the Front and Back Ends of the fuel cycle. HWB is setting up a Technology Demonstration Plant (TDP) at RCF, Trombay for recovery and production of rare metal from Wet Phosphoric Acid used by phosphoric fertilizer industry.

All the operating plants have implemented Quality Management System and Environment Management System and got the certificates for ISO-9001 and ISO – 14001.

18. Board for Radiation and Isotope Technology - Board for Radiation and Isotope Technology (BRIT), a constituent unit of the Department of Atomic Energy is responsible for :-

(a) Production and supply of a variety of radioisotope products including radiopharmaceutical and associated products, radio immunoassay kits, radiochemicals, radiolabelled compounds and nucleotides and also sealed radiation sources such as Cobalt-60, Iridium-192, Caesium-137, etc.

(b) Radiation technology equipment such as gamma radiography cameras, blood irradiators and laboratory gamma irradiators, promoting radiation processing technology for use in healthcare, food processing and agriculture and rendering radiation processing services for medical products, spices, condiments and other products.

(c) Propagating radiation technology and providing facilitation services to private entrepreneurs to set up commercial gamma radiation processing plants.

Radioisotopes produced in the research reactors in Bhabha Atomic Research Centre and also in the power reactors of NPCIL are processed and formulated into a variety of products in the laboratories of BRIT and supplied to a large number of institutions in the country as well as abroad for use in industry, healthcare, agriculture and supporting research in life sciences and Bio Sciences.

19. Other Programmes - Management Services Group (MSG) provides information services and computer systems support at the DAE Sectt. The group has set up a Local Area Network which functions on round the clock basis. MSG manages the DAE Internet web server which functions as the global web information portal for the Indian Atomic Energy Programme.

India has been a member of the Board of Governors of the International Atomic Energy Agency (IAEA) since its inception making available the services of the departmental scientists for expert assignments besides participation in international symposia and other fellowship exchange programmes. The provision under IAEA takes care of the contribution made by the Department to the international body.

20. DAE PROJECTS - The Department undertakes a few projects which are jointly executed by the constituent units in different sectors or by the PSUs on behalf of the Department. The projects under R & D Sector are (i) Anunet II and Inter-DAE Grid network, (ii) International Collaboration in mega science projects, (iii) DAE Emergency Response Centre, (iv) DAE Intergrated Informatiion System applications, (v) Enhancement of Annunet and DAE Grid, and under the Industrial/Mineral Sectors are (i) Thorium Retrieval and Restorage Projects (THRUST) is proposed to retrieve thorium concentrate and process the same for recovery of uranium and rare earths, (ii) Safety Environmental Monitoring project is for safety, environment monitoring and radiological protection for existing and expanded operation of IREL plants, (iii) Phosphatic Rare Element Extraction (PREE) Project is for setting up facilities for processing phosphoric acid from fertilizer plants and recover the rare element values, by Heavy Water Board and also propose to set up three industrial scale uranium recovery plants at Tata Chemicals, IFFCO, CFL, Visakhapatnam/FACT, Kochi. IREL also plan to set up PREE project at other locations.

22. Investment in Public Enterprises :

Uranium Corporation of India Ltd. - Uranium Corporation of India Limited was incorporated in 1967. The objectives of the company is to mine and refine uranium ore, produce concentrate and recover by-products at the most economic cost and market them efficiently. It is also engaged in achieving cost effectiveness through better capacity utilization, quality improvement and optimum utilization of human resources. It strives to maximize surplus generation through cost control and other measures and implement on-going projects within the cost and time frame as determined. It is also the responsibility of the company to evaluate new deposits for opening up new mines and process plants.