

Chapter - IV

Project Implementation

In accordance with the provisions of supplement to the Inter-Governmental Agreement (IGA), NPCIL and ASE entered (November 2001) into a General Framework Agreement (GFA). The GFA was signed to record the principal terms of understanding arrived at in relation to the Project, indicating the scope of obligations of ASE and NPCIL respectively. As per GFA, the total project base cost was USD 2,587 million {excluding the cost of Detailed Project Report (DPR), Interest during Construction (IDC) and fuel}. The GFA also contained details and price ceilings of contracts to be entered with ASE for fulfillment of Russian scope amounting to USD 1,535 million and for third countries supplies amounting to USD 220 million. The details are given as under:

Table 4.1 Cost of works under scope of India, Russia and third countries

Sl. No	Component	Price submitted in the Initial TCO – July 2001		Price after negotiation and agreed in GFA – November 2001	
		(Million USD)	(₹ in crore)	(Million USD)	(₹ in crore)
1	Russian scope of supplies and services	2,293	10,777	1,535	7,217
2	Supplies and services from the third countries	220	1,034	220	1,034
Sub total		2,513	11,811	1,755	8,251
3	Indian scope of works with transportation	867	4,075	832	3,910
Total base cost		3,380	15,886	2,587	12,161

GoI accorded (December 2001) financial sanction for a total project cost of USD 2,804 million (including cost of DPR of USD 57 million and IDC on Russian credit of USD 160 million). The financial sanction in Indian currency comes to ₹ 13,171 crore.

Russian Scope of Work

The Russian scope included project engineering and design, supply of equipment, special materials/spare parts from Russian Federation, procurement of some equipment from third countries, training of operations/maintenance personnel of Indian side, associated services like project management activities, quality assurance / quality control (QA/QC) activities, designer's supervision at all stages of project implementation etc. Following were the contracts agreed under Russian scope as agreed under the GFA:

Table 4.2: Contracts agreed by NPCIL with ASE under Russian Scope of Work**(In million USD)**

Sl. No.	Name of the Contract	Cost
1	Elaboration of the working documentation	122
2	Delivery of equipment with long manufacturing cycle and first priority equipment and materials	538
3	Equipment and materials to be supplied from Russian federation	755
4	Training of NPCIL's operation and Maintenance personnel	15
5	Deputation of contract specialists to KKNPP site	105
Total		1,535

Indian Scope of work

The Indian scope was to include civil construction works, preparation of detailed erection procedures, erection of all mechanical, electrical and Instrumentation & Control (I&C) system equipment/ components, participation in procurement of equipment from third countries, commissioning of the plant under technical assistance of ASE's personnel and operation of the nuclear power station (NPS) units. NPCIL was also to carry out the overall Project Management including the implementation of planning and monitoring procedures by the parties and their sub-contractors under technical assistance of the ASE. Following works were under the Indian scope as agreed under the GFA:

Table 4.3: Cost break up for Indian scope of work in KKNPP**(₹ in crore)**

Sl. No.	Details of work	Original sanction December 2001
1	Main plant civil building (Material and construction), cooling water intake and outfall system (Material and construction), breakwater dykes, shore reinforcement	1,554
2	Erection and Commissioning of Nuclear system auxiliaries, Turbine Generator auxiliaries, miscellaneous mechanical erection, transportation and transportation insurance, water desalination plant	440
3	Employees salary and overheads	724
4	Working capital margin	237
5	Site improvement, communication and computer facilities, maintenance, contingencies and insurance etc.	955
Total		3,910

Third Country Contracts

As per TCO and negotiations carried out, the third country supply of materials was included partly in Indian Scope and partly in Russian Scope. The total value of supplies under third country contracts was limited to USD 220 million. All the third country contracts were entered in by the Russian side (ASE).

4.1 Time and cost overrun

4.1.1 Delay in achievement of milestones

Annexure IV of the GFA dated 6 November 2001 provided milestones for various stages of KKNPP Units I and II, as agreed between NPCIL and ASE. The scheduled completion of KKNPP Unit I and II and actual achievement are as under:

Table 4.4: Delay in commercial operation in respect of Units I and II

Final milestone	Scheduled Date	Actual Date	Delay
Start of Commercial operation (Unit I)	30.10.2007	31.12.2014	86 months
Start of Commercial operation (Unit II)	30.10.2008	31.03.2017	101 months

The finally achieved milestones against schedule dates of completion of various stages under KKNPP Units I and II are indicated in the *Annexure II*.

An analysis of scheduled dates of completion and actual dates of completion of various stages in Unit I of KKNPP revealed that delays ranging from 202 days to 2,619 days took place, for Unit I, in the following activities:

Table 4.5: Delays in completion of various stages in Unit I

Sl. No.	Activity	Scheduled completion	Actual completion	Delay in days
1.	Construction of primary containment of Reactor Building walls upto 43.9 metre	31.10.2004	21.05.2005	202
2.	Construction of turbine building up to 36.5 metre including crane beam	31.12.2004	31.08.2005	243
3.	Commissioning of polar crane	31.03.2005	April 2007	730
4.	Erection of Nuclear Steam Supply System equipment and pipelines	30.06.2006	29.07.2008	760
5.	Erection of Turbine Generator	30.06.2006	30.09.2008	824
6.	Commissioning of 220 KV Gas Installed Switchgear	31.01.2005	14.11.2008	1,384
7.	Pre-stressing of Reactor Building Inner Containment Dome	30.09.2005	18.11.2009	1,449
8.	Commissioning of Compressors	31.12.2005	December 2010	1,795
9.	Attainment of first criticality	30.04.2007	13.07.2013	2,266
10.	Start of commercial operation	30.10.2007	31.12.2014	2,619

Similarly, delays ranging between 95 and 3,083 days were noticed in case of Unit II. These are depicted as under:

Table 4.6: Delays in completion of various stages in Unit II

Sl. No.	Item of work	Scheduled completion	Actual completion	Delay in days
1.	First pour of concrete	31.03.2002	04.07.2002	95
2.	Construction of turbine building	31.12.2005	31.01.2007	396
3.	Construction of emergency power supply and control Building	30.04.2006	30.09.2008	884
4.	Charging of Reserve Power Supply System	31.05.2005	01.09.2011	2,284
5.	Attainment of first criticality	31.01.2008	10.07.2016	3,083
6.	Start of commercial operations	30.10.2008	31.03.2017	3,076

Scrutiny of major contracts entered by NPCIL under Indian scope of works/contracts with ASE showed major reasons for delays were as follows:

- **Delay in supply**-Non-sequential supplies and interfacing problems with the manufacturers led to delays in the construction and erection works.
- **Design changes**- Engineering changes/ modifications suggested by the Russian designers needed reworking in many areas which also affected the schedule.
- **Delays due to extra /additional works**- the initial bill of quantities of Kudankulam Units I and II provided by the Russian side was based on the Russian reference plant data. However, during elaboration of the Indian specific design several additional safety features were incorporated and the bills of quantities underwent upward revision, increasing the scope of the supplies/ works.
- **Erection delays**- Delays in execution of work in 62 cases out of selected 106 works involving civil, mechanical, electrical and instrumentation works which were ancillary to the main project.

The delays ranged from 7 to 2,041 days in supply of materials, from 11 to 387 days in change in design by the Russian Federation, and from 8 to 1,564 days in mismatch of material with the drawing specification supplied by the Russian Federation/execution of additional work due to improper assessment at preliminary stage.

The Management in its reply (28 June 2017) stated that major delays were due to delay in supply of materials, working documents, change in design etc. by ASE. Delays contributed by

NPCIL were due to delay in providing inputs for finalization of design and agitation by local people for some period of time.

The Management acknowledged the reasons for delay. However, no efforts were made by NPCIL to revise the repayment schedule in consonance with the revised date of commissioning even though the Russian side contributed significantly to the delays in commercialization of the plant (as already discussed in Chapter-2). These not only delayed commercial operations of the KKNPP but also increased the cost of the project as discussed in succeeding paragraph.

Audit Recommendation No. 6	DAE's reply to the Audit Recommendation
Future delays should be avoided by sequencing the supplies with the various stages of production.	DAE noted and accepted the recommendation.

4.1.2 Increase in cost due to delay in completion and non-recovery from Atomstroyexport (ASE)

In order to complete the commissioning of the project within the target date, it was necessary to ensure timely completion of all the ancillary works which were associated with the main project. However, during execution of work, the cost underwent significant upward revision, the details of which are given as under:

Table 4.7: Increase in cost of work in respect of Units I and II

(₹ in crore)

Sl. No.	Components	Original cost (December 2001)	Revised cost (August 2014)	Increase in cost
1	Russian Scope of work	8,508	9,692	1,184
2	Indian Scope of work	3,910	7,734	3,824
3	Interest During Construction	753	3,286	2,533
4	Foreign Exchange rate variation	-	1,750	1,750
Total		13,171	22,462	9,291

a) Analysis of the increase in the cost of the project indicated that while the Russian scope of work was increased by ₹ 1,184 crore (14 per cent), Indian scope of work was increased by ₹ 3,824 crore (98 per cent). Moreover, increase in IDC due to delays were to the extent of 336 per cent (₹ 2,533 crore) and foreign exchange variation amounted to ₹ 1,750 crore further adding to the cost of the project. The increase in Russian scope was mainly attributable to additional manpower requirement at the plant site and increase in supplies from Russian side. The major contributor for the increase in Indian scope of work was salary of employees and administrative overheads. Further, there was an increase in erection and commissioning expenses of Nuclear Steam Supply System (NSSS) and Turbine Generator (TG) due to shifting of scope from Russian side to Indian side. The other factors responsible for cost escalation were execution of additional works, payment of escalation/ under-utilisation charges to the Indian contractors etc. The details of increase in cost under Indian scope of work are given in **Annexure III**.

b) Audit noticed delays in execution of work in 62 (valuing ₹ 1,422.79 crore) out of 106 works (valuing ₹ 1,511.73 crore) (94 per cent) test checked, involving civil, mechanical, electrical and Instrumentation work which were ancillary to the main project. This led to consequential delays such as non-providing of work front by NPCIL in time to the contractors²⁵. Consequently NPCIL was compelled to incur additional expenditure towards the payment of escalation charges amounting to ₹ 184.40 crore to the contractors. Further, under-utilization charges amounting to ₹ 39.34 crore were claimed by the contractors due to delay in work for reasons such as supply of material/ work front/ design specification. Moreover, additional expenses were incurred during the extended period on Service tax, insurance premium, bank guarantee commission and additional expenditure on Plant & Machinery, Staff & site etc. amounting to ₹ 41.05 crore.

As per Clause 1.10.2 of Technical and Commercial Offer and Article 12 of General conditions of the contract, in case the delay in project schedule was due to ASE, it would bear the responsibility for consequences of delays, such as all additional expenses caused by the delay, including direct costs proved to be reasonably incurred by the Customer due to such delay as mutually agreed upon. However, no claim was initiated by NPCIL on ASE for recovery of the additional amount of ₹ 264.79 crore (₹ 184.40 crore + ₹ 39.34 crore + ₹ 41.05 crore).

²⁵ *Bharat Heavy Electricals Ltd, Larsen & Toubro Ltd, Hindustan Construction Corporation etc.*

The Management replied (28 June 2017) that since all works related to Erection and Commissioning were undertaken by Indian side, ASE was reduced to the role of supplier only. Application of Article 12 of GCC would have been tantamount to recovery of consequential losses which was not the intention of the parties as per IGA since it not likely to be sustained as per international contract conditions.

The reply of the Management is untenable as the delay in supply of equipments/materials and working documents by ASE had resulted in consequential delays in completion of linked works by the Indian contractors. Hence the additional expenditure incurred by NPCIL on account of additional payments by the Indian contractors from NPCIL is to be covered under the said general conditions of contracts clause and has to be recovered from ASE.

Audit observations on Russian scope, Indian scope and Third Countries contracts are given in subsequent paragraphs.

4.2 Russian Scope of work

4.2.1 Undue benefit extended to ASE in contract for supply of equipment at higher value – ₹ 99.47 crore

As per GFA of November 2001, five contracts²⁶ were agreed to be entered between NPCIL and ASE for implementing the Russian scope of work for USD 1,535 million. In addition, there was an arrangement agreed between ASE and NPCIL for supplying equipment and services from third countries to the tune of USD 220 million.

However, after NPCIL observed that some of the equipment to be supplied by third countries could be procured within the Russian scope and that part of the obligations related with the deputation of the Russian Contract Specialists in India could also be carried out within the Russian Federation (RF), it signed (August 2002) a memorandum of understanding with ASE for a new contract valuing USD 94 million. This was done by reorganizing two contracts, viz., ‘Deputation of contract specialists to KKNPP site – USD 105 million’ and ‘supplying other equipment by third countries – USD 220 million’ as indicated below:

²⁶ *Elaboration of the working documentation, delivery of equipment with long manufacturing cycle, equipment and materials to be supplied from Russian Federation, training of NPCIL’s operation and maintenance personnel and deputation of Contract Specialists to Kudankulam site.*

Table 4.8: Contract wise revision in cost**(In million USD)**

Sl. No.	Name of the Contract	Cost before organisation	Revised Cost	Increase(+)/ Decrease(-)
1	Contract for supply of equipment from third countries	220	191	(-) 29
2	Contract for deputation of Russian specialists to KKNPP site	105	40	(-) 65
3	Contract for supplies from Commonwealth Independent States (CIS) countries and functions to be performed by the Contractor for off-shore supplies (new contract from Commonwealth Independent States)	Not applicable	94*	+ 94
Total		325	325	

* USD 50.91 million for supplies and USD 43.09 million for services.

It could be seen from the Table 4.8 that the procurement of equipment from third countries was revised to USD 191 million against its pre-revised value of USD 220 million. Therefore, the value of supply of the equipment that was to be bought from CIS countries in the new contract, by ASE, should have been only USD 29 million (USD 220 million less USD 191 million). However, Audit observed that the cost of the same equipment in the new contract was USD 50.91 million (₹ 231.13 crore) which was higher by USD 21.91 million (₹ 99.47 crore) over and above the original cost of USD 29 million (₹ 131.66 crore). The reasons for this increase in the value of supply of equipment by ASE were not found on the records of NPCIL. The Management stated that the equipment included in the new contract were same as in the earlier contract for supplies from third countries. This shows that an amount of USD 50.91 million was paid for the very same equipment- when bought by ASE from CIS countries as against originally agreed at USD 29 million in the pre-revised arrangement.

The Management replied (28 June 2017) that agreed value of Russian scope of work was fixed to USD 1,812 million including cost of third country contracts of USD 220 million and cost of detailed project report (DPR) of USD 57 million. Price of the contracts agreed was a notional price and amount could have been adjusted within the limit specified as per General Framework Agreement (GFA). The price of USD 220 million could have been revised only if some of the contracts for supplies from Third Countries were to be directly entered by NPCIL with Third Country suppliers. The contract for supplies from CIS Countries at contract value of USD 94 million had not affected the contract structure between NPCIL and ASE but had resulted in saving for NPCIL since 85 per cent of the value of this contract (USD 94 million)

could have been financed from soft loan available under Russian State credit which otherwise would have entirely been paid from internal resources of NPCIL.

The reply of the Management is not acceptable as it was only the Russian scope of work valuing USD 1,535 million which was fixed as per GFA. The agreed price of USD 220 million for supplies from third countries was infact the upper limit. By procuring supplies valued at USD 29 million (old contract) at USD 50.91 million in the new contract, ASE breached the upper limit of USD 220 million of supplies as these amounted to USD 241.91 million and NPCIL extended undue benefit to ASE by making payment without raising an objection for the same. The Management's reply regarding availability of soft loan at the rate of four *per cent* is not tenable as ultimately NPCIL had to borrow at higher interest rates ranging from 7.94 *per cent* to 10.69 *per cent* to repay the Russian credit.

Audit Recommendation No. 7	DAE's reply to the Audit Recommendation
Interest of NPCIL should be protected in all contract renegotiations by ascertaining the quantitative benefits flowing out of such negotiations.	DAE noted and accepted the recommendation

4.2.2 Improper planning in utilisation of Russian specialists

Audit observations on payment for Russian manpower are given as under:

a) An onshore service contract (23 August 2002) was entered between NPCIL and ASE for USD 40 million for deputation of specialists (6,053 man months²⁷) at site for Technical Assistance and guidance during construction, erection and commissioning of the plant. This price was full and final consideration for the provisions and fulfillment of the services and was not to be subject to any variation, whatsoever. As per Article 2.1 of the *ibid* contract, the year-wise break up of manpower deployment which was to be utilized during the period 2002-03 to 2008-09 could undergo adjustment depending upon the progress of work and schedule of completion within the overall limits of manpower input and agreed provisions.

The contract provided for 5,213 man-months on the basis of annual protocols and 840 man-months for commissioning and operation of the plant totaling 6,053 man-months. However, these 6,053 man-months were utilized in the ninth year (2010-11) itself notwithstanding the

²⁷ One man month is equal to deployment of one specialist (man) multiplied by one month.

fact that the commissioning of the Unit I and Unit II took place in December 2014 and March 2017 respectively.

Further scrutiny of records revealed that though the onshore service contract was a fixed price contract but due to deployment of extra manpower irrespective of the stage of construction of the plant, NPCIL had to increase the man-months utilized from 6,053 to 11,567 with subsequent increase in contract price from USD 40 million to USD 76.44 million. This was done by signing supplementary agreements with ASE between February 2010 and March 2016.

As the scheduled completion of the project was delayed, NPCIL should have taken timely action to rearrange the schedule of deputation of Russian Specialist as per the actual progress of work.

The Management replied (28 June 2017) that the requirement for deputation of manpower of ASE increased due to prolongation of project implementation period. Although deployment was always done judiciously, yet due to specialized nature of work, the overlapping activities that could have been carried out simultaneously got spread over due to prolongation of the project duration, resulting in increase in the manpower.

The Management's reply is not tenable because Article 2.1 of the contract clearly provided for adjustment in the deployment schedule depending upon the progress of work and schedule of completion. This option of re-organization of deployment schedule was not considered by the Management when the delays were evident in the attainment of major milestones of construction work. Moreover, since this was a fixed price contract, NPCIL should have utilized the man-months with prudence in accordance with the progress of work to avoid idling of manpower in the initial years rather than later having to resort to signing of supplementary agreements, by incurring additional cost, to complete the delayed work.

b) As per the GFA entered into between NPCIL and ASE, the work of erection and commissioning of KKNPP Units I and II was under the scope of NPCIL. As NPCIL did not have technical expertise for the work of commissioning of the primary system, specialized work including supply & erection of propriety equipment, devices, sensor/ instruments etc, it entered into contracts with ASE for deputation of technical specialists at site.

NPCIL awarded a fixed price contract to ASE (2 November 2010) at USD 1.02 million for engagement of specialists at site for 91 man-months at Unit I for commissioning of the primary system and specialized work including erection.

Scrutiny of records revealed that out of 91 man-months provided in the contract, only 39.1 man-months were utilized. However, full payment of USD 1.02 million was made to ASE. As there was no provision in the *ibid* contract for redeployment of Russian personnel from Unit I to Unit II, therefore, the remaining man months (valuing USD 0.58 million²⁸) could not be made use of, by NPCIL for Unit II related works.

The Management replied (28 June 2017) that the Commissioning Measurement System (CMS) being a specialized commissioning activity required field and office/ desktop activities that were to be carried out by highly specialized Russian manpower including manpower from scientific institutions. Since price of the contract was fixed on completion basis, the contractor in order to optimize his own costs performed desktop activities in Russian Federation and there was a considerable reduction in man month deployed at Site. Therefore although estimation was on man month basis, the actual work was on lump sum basis at a fixed price.

The reply of the Management indicates that NPCIL did not have a consistent policy on payments towards contracts for engagement of Russian personnel. Whereas, in the first case the Russian side was made additional payment for completing the work on the ground that the original man months have been exhausted while on the other hand in the second case even when lesser man months were used, full payment was made even for the man months not utilized by stating that it was a fixed price contract. As both the contracts were fixed price, adopting different yardsticks for the two contracts eventually ended up benefitting ASE at the cost of increased expenditure by NPCIL. This was a control weakness whereby two different contracts for similar works were not compared to protect the financial interests of NPCIL.

4.2.3 Avoidable expenditure of ₹ 12.76 crore on repair of damaged Turbine under warranty period and consequential loss of revenue of ₹ 53.73 crore

As a part of Russian scope of work, HP Turbine rotor and stationary blades in the Unit I of KKNPP were supplied by M/s LMZ-Power machines, Russia and erected by NPCIL under the supervision of ASE. During operation of the plant (Unit I) in the month of September – October 2014, the HP Turbine experienced high thrust bearing temperature when the power

²⁸ $USD\ 0.58\ Million = 1.02/91 * 51.9$

was raised above 800 MW. As a result, the machine was stopped and inspection of turbine internals revealed damages to diaphragms and moving blades of rotor of first two stages on both the front and rear ends. It was declared as damaged on 11 October 2014. The damage was caused by impingement of metal plate that got detached from the bottom inner casing of the HP turbine. At that time Unit I had attained the stage of producing 100 *per cent* power and Unit II was ready to go for hot run.

Unit I was shut down due to suspected damaged rotor on 26 September 2014 and restarted on 7 December 2014 (73 days). As noted by the Management, the non-availability of the critical part of turbo machinery resulted in loss of electricity production from Unit I and caused a revenue loss of about ₹ eight crore per day. Consequently, it was decided to remove Unit II's HP turbine rotor and use it in Unit I to ensure power production from Unit I. The replacement was finally done on 27 October 2014. It was also decided to send the defective turbine rotor of Unit I to Bharat Heavy Electricals Limited (BHEL), Hyderabad for correcting the defects and using it in Unit II after rectification. The repair work was undertaken by BHEL, Hyderabad at a cost of ₹ 8.93 crore. In addition, an amount of ₹ 0.30 crore was incurred on transportation and packing cost and an amount of ₹ 3.53 crore was incurred towards replacement of Unit I turbine damaged components with Unit II and installation of repaired rotor in Unit II.

As the machines were damaged due to manufacturing defects within the warranty period, the repair and replacements/refitting costs of the Turbine was to be borne by ASE. However, no such claim was raised by NPCIL against ASE putting an additional burden of ₹ 12.76 crore on NPCIL for carrying out repairs and replacement of turbine rotors. The shutdown of 73 days also resulted in loss of electricity generation and consequently loss of revenue to the tune of ₹ 53.73 crore.

The Management stated that it had already estimated the amount of claim that was to be submitted to ASE for recovery on account of repair / replacement of defective components or on account of items procured by NPCIL on behalf of ASE. While agreeing for final takeover of KKNPP Unit I, a provision of ₹ 40.48 crore (USD 6.03 million at the exchange rate of ₹ 67.17 per USD) had been maintained in the Performance Bank Guarantee of ASE towards claims of NPCIL which included amount towards repair of Turbine Blades.

The Management's reply is unverifiable as NPCIL did not provide details of adjustments of ₹ 12.76 crore from the performance bank guarantee of ASE (July 2017). Moreover the reply is silent regarding the revenue loss as pointed out by the Audit.

4.2.4 No action initiated for recovery/adjustment for non/defective supply of material

During implementation, instances were noticed where NPCIL had to place new orders for certain materials due to non/defective supply of items which were included in ASE's scope. However, NPCIL neither assessed the extra payment/loss due to this non/defective supply nor did it initiate action for recovery/adjustments from ASE. The details are given in the following paragraphs:

a) After supply of valves was made by ASE at KKNPP, NPCIL noticed that the electric motors were of compact type and specialized rewinding contractors of NPCIL were not able to rewind or repair them. NPCIL then purchased spares for motorized valves compatible motors from M/s Tulaelectroprivod CC FZE, Russia for ₹ 19.20 crore (USD 3.11 million) in November 2014. Since the original electric motors did not comply with the specifications of NPCIL, it should have got them replaced from ASE without any cost. Thus purchasing compatible motors from M/s Tulaelectroprivod CC FZE, Russia instead of insisting on replacement of compact motors from ASE, led to avoidable expenditure of ₹ 19.20 crore.

The Management also confirmed that the subject electric motor, because of its compact type, could not be repaired/rewound by NPCIL contractor.

b) ASE supplied 'valve actuators'²⁹, which were found to be damaged/non functional and beyond instant repair. NPCIL placed an order (August 2014) for these items on M/s Tulaelectroprivod, Russia for ₹ 1.62 crore on a single tender basis. However, it did not assess the extra payment/loss and also did not initiate action for its recovery/adjustment from ASE.

c) According to the warranty/guarantee clause included in the supply contract entered with ASE as per GFA, the guarantee period for supplies for each unit under the contract was 12 months from the date of provisional takeover of the respective unit. Further, if the defect or failure of the component or system was caused by faulty design, the contractor would modify such design component or system in order to exclude the possibility of such defect and failure at his own cost. Techno Commercial offers (TCOs) received for requirements at

²⁹ A valve actuator is the mechanical part for opening and closing a valve.

site/ components /items, which became non functional during commissioning of Unit I and additional volume of instrumentation for Unit II, received from Russian side were negotiated and contracts were entered on 31 August 2011 and 10 September 2014 with ASE for USD 5.33 million (₹ 24.53 crore) and USD 5.75 million (₹ 34.98 crore).

Audit observed that majority of items under the above contracts were procured for replacement of damaged/ faulty items supplied under the supply contracts entered with ASE as per GFA. Since warranty/guarantee clause was included in the supply contracts, the damaged/ faulty items should have been rectified/ replaced by ASE at their own cost. The procurement of damaged / faulty items resulted in extra expenditure. However, the quantum of extra expenditure could not be quantified as no separate details related to faulty items were available in the records of NPCIL. The segregation of procurement of non-functional items and other items was not available on record. NPCIL neither provided details of comparison with the original rate of the equipment nor with the rate from Indian manufacturer despite repeated requisitions from Audit.

d) In another case NPCIL had to place order on M/s Integrated Engineers & Consultants Private Limited for supply of 'C Channels' and 'Brackets', though these items were in the scope of ASE but were not supplied by it. NPCIL had to incur an amount of ₹ 19.82 lakh on this account. No action was taken by NPCIL to recover this amount from ASE.

The Management replied (28 June 2017) that NPCIL had a system of recording deficiencies observed in the equipment while commissioning of systems/equipment wherein the agencies responsible for such deviations were also identified and recorded. The four instances mentioned in the audit report were items damaged during storage/erection/commissioning and hence were not in the purview of warranty/obligation of ASE.

The reply of the Management is not acceptable as in respect of the first three observations, the Management could not explain why the failure could not be attributed to ASE, especially as no documents were on record to indicate that NPCIL was responsible for the defect/damage of items.

Regarding the fourth observation, it relates to non supply of items. Hence the question of damage on account of NPCIL does not arise and the amount should have been recovered from ASE.

Audit Recommendation No. 8	DAE's reply to the Audit Recommendation
NPCIL should take timely action for recovery/ adjustment for non/defective supply of material by ASE.	The Department noted and accepted the recommendation.

4.2.5 Liquidated Damages

Liquidated Damages (LD) are levied by the NPCIL in case of non compliance of agreed terms and conditions by the Contractor (ASE). These have both a deterrent and compensatory effect and are important components of contracts.

a) Non recovery/short claim of LD - ₹ 463.08 crore

In accordance with the GFA, NPCIL entered into four supply contracts and one contract relating to elaboration of working documents falling under Russian scope.

As per Article 23.1.1 read with 23.1.2, the total of LD was to be levied at the rate of 0.03 *per cent* of value of each supply item or document package, restricted to five *per cent* or two *per cent* of the total price of the contract as the case may be. Audit observations on LD are given as under:

(i) LD claims above 0.03 *per cent* were limited to only two or five *per cent* of individual item though the contracted limit was two *per cent* or five *per cent* of the contract price. This resulted in short claim of LD in respect of five contracts to the tune of USD 19.54 million (₹ 126.74 crore).

(ii) In three contracts (including third Country supply contracts entered with ASE), the rate of Liquidated damages being applied by NPCIL or ASE was two *per cent* instead of five *per cent* as provided in TCO. The GFA signed in November 2001 provides that TCO of July 2001 and subsequently as agreed in Joint Coordination Committee (JCC) meeting held in July and August 2001 will collectively referred to as 'revised TCO'. A review of JCC meetings revealed that issue of reduction of LD rate from five *per cent* to two *per cent* was not deliberated in the meetings. Therefore, the reduction in maximum limit of LD from five *per cent* as per TCO to two *per cent* resulted in undue benefit to ASE to the extent of USD 29.24 million (₹ 186.65 crore) and consequent loss to NPCIL.

(iii) The schedule for submission of working documents under a contract (No.77-225/16200) for the year 2001-02 was mutually agreed. However, the packages were

submitted with a delay ranging from 1 to 258 number of days (delay calculated beyond 30 calendar days from due date as per Article 23 for levy of LD) for which no claim for applicable LD worth USD 0.48 million (₹ 2.33 crore) was lodged by NPCIL.

(iv) Article 23.2.4 of the General Conditions of Contract (GCC) attached to the contract stated that if the LD claim is justified, the customer shall draw the invoice to the Contractor for the payment of LD subject to payment; the contractor shall pay the invoice within 30 days upon its receipt.

It was however noticed in audit that though claim letters were issued, invoice for recovery of LD as provided in the contract were not raised in respect of five contracts amounting to USD 22.72 million (₹ 147.36 crore). It was further seen from records that efforts to recover LD were put into abeyance as this project was stated to be implemented through international co-operation as per Inter Governmental Agreement (IGA) and a decision was taken that final adjustment will be carried out at the completion of the project. However, the contract clearly provided that if the claim is justified, the customer would draw the invoice to the Contractor for the payment of LD and the contractor shall pay the invoice within 30 days upon its receipt. Therefore, the decision of the Management to keep the recovery of LD from Russian side in abeyance even when the Company was resorting to borrowings for repayment of the Russian credit was against financial interest of NPCIL.

The Management replied that the works related to erection and commissioning of Nuclear Steam Supply System and Turbine Generator as well as operation of Nuclear Power Plant during guarantee was in ASE scope in the initial Techno Commercial Offer and on shifting of the same to NPCIL's scope, the scope of ASE was limited to that of a supplier only and LD were, therefore, calculated in line with any supply contract. Further, in respect of deferring the decision for realization of claims towards LD, the Management stated that the contracts provided that if at end of the project, it was established that the overall project had not been delayed on account of delay in delivery of equipment and materials by ASE, the amount of LD would be refunded back to ASE. The delay analysis was to be carried out at the end of the project after final takeover of KKNPP Unit II for settlement of claims.

The reply of the Management that on shifting of erection and commissioning of NSSS and TG from scope of ASE to NPCIL, the scope of ASE was limited to that of a supplier only and that LD were therefore calculated in line with any supply contract is not acceptable as the shifting of scope was agreed before entering into the supply contracts with ASE and as such

the terms incorporated/ signed by both the parties were legally binding on both the parties. Further the decision for deferring the recovery of LD is also not acceptable as NPCIL was aware that the delay in supply of working documents/ equipment and material was affecting the Indian scope of work and would result in delay in completion of the Project. Hence the non recovery of LD till date (July 2017) even though Unit I and Unit II were delayed by seven and nine years respectively, is not acceptable. Further, Management has not furnished reply to observations raised by Audit at sub-paras (ii) and (iii).

b) Non recovery of LD in respect of Erection reserve contracts entered with ASE - ₹ 1.41 crore

Audit observed that LD valuing USD 2,18,098.30 could not be recovered due to reasons like not raising the invoices, no claim for LD recovery etc. in respect of Erection reserve procured. Details are given below:

Table 4.9: Non-recovery of Liquidated Damages

No. of cases	Contract number	Observation	Amount (USD)	Amount (₹)
2	111200 and 97400	Claim letter raised, however invoices not raised	1,04,776.60	67,95,810.28
1	90300	No clause for recovery of LD	32,850.47	21,30,681.48
2	1108700 and 1202700	Claim letter not raised	80,471.23	52,19,363.98
Total			2,18,098.30	1,41,45,855.74 or ₹ 1.41 crore

The Management replied (28 June 2017) that the contracts did not provide for direct deduction of LD from the invoices of the contractor and that NPCIL is in the process of raising debit notes for realizing LD claims.

Though the items have been delivered during the period 2009-10 to 2014-15, the debit note for realizing the LD is yet to be raised (July 2017) even after a lapse of considerable time ranging from two to eight years resulting in blocking of funds amounted to ₹ 1.41 crore.

Audit Recommendation No. 9	DAE's reply to the Audit Recommendation
Liquidated damages should be claimed in an accurate and timely fashion.	The Department accepted the recommendation and stated that the process of LD recovery has started.

4.3 Indian Scope

4.3.1 Shifting of Russian scope without proper cost-benefit analysis resulted in delays and extra expenditure of ₹ 706.87 crore

The Russian side (ASE) submitted, after acceptance of the DPR by NPCIL (Jan 2001), a Techno Commercial offer (TCO) (July 2001) for construction of Units I and II of Kudankulam project indicating Russian scope and Indian scope. For carrying out the Russian scope of work, ASE had initially indicated a total amount of USD 2,293 million excluding the estimated price of USD 220 million for supply from third countries. The TCO submitted by ASE was negotiated by a high-level Committee constituted by DAE and in the Joint Coordination Committee (JCC) meeting (July 2001), the price of the Russian scope was agreed to be reduced to a fixed price of USD 1,600 million. In this meeting, the Russian side also made an offer that the cost of the Russian scope may further decrease if the work of erection and commissioning of Nuclear Steam Supply System (NSSS) and Turbo Generator (TG) was shifted to the Indian scope. Thereafter, in the final negotiation (20-26 August 2001), the offer was accepted by NPCIL and, the cost of the project for Russian scope was reduced to a fixed price of USD 1,535 million (₹ 7,217 crore). This was to bring reduction to the tune of USD 65 million (₹ 305.50 crore) by way of decrease in the number of Russian personnel at site.

Audit found that NPCIL incurred expenditure of ₹ 1,012.37 crore towards erection and commissioning of the NSSS and TG as against ₹ 305.50 crore (USD 65 million) originally envisaged (Russian scope). Thus NPCIL incurred an extra amount of ₹ 706.87 crore as it did not conduct a cost benefit analysis before agreeing to the shifting of scope. Details are given below:

a) The Indian side had indicated that it would only be able to take any decision on shifting of responsibility after knowledge of cost allocated to these obligations by the Russian side. However, no cost-breakup was made available by ASE to NPCIL. Thus, even though the figure of USD 65 million remained unverified, NPCIL agreed to the shift in the scope of works.

b) NPCIL incurred an expenditure of ₹ 295.54 crore on work contracts for erection and commissioning of NSSS and TG. Scrutiny of records revealed that the responsibility of erection and commissioning of NSSS and TG was shifted to Indian side for the stated purpose of achieving optimization by reducing the number of Russian technical personnel at site. However, the total fixed Russian man-months provided in the original contract (August 2002) actually increased from 6,053 to 11,567 man-months and there was an increase in cost by USD 45.90 million (₹ 226.55 crore) for deputation of Russian technical specialists during erection and commissioning stage. This defeated the stated purpose of optimization desired to be achieved by shifting the erection and commissioning from Russian to India scope.

c) During erection and commissioning of Unit I, a considerable quantity of Electrical, Mechanical and Instrumentation and Control items and components were damaged or developed faults which were replaced by using corresponding items from Unit II, since no erection reserve was available. To source these equipment, NPCIL had to enter into various contracts with ASE for procurement of erection reserve equipment/ material costing USD 87.55 million (₹ 490.28 crore). This was done as and when requirement arose. Even though the TCO submitted in July 2001 indicated that the equipment/services for erection were to be procured by the Russians from the local markets in India but the same was procured from ASE without doing any comparative rate analysis.

In spite of repeated enquiries/reminders, KKNPP Management/NPCIL did not provide list of equipment which got damaged or developed fault during erection/ commissioning of Unit I. In absence of this information, the scope of audit was limited as it could not examine whether the faults/ damages were avoidable and who was responsible for the same.

Shifting of the work of NSSS and TG to the Indian scope, without any cost-benefit analysis resulted in NPCIL incurring ₹1,012.37 crore (₹ 295.54 crore + ₹ 226.55 crore + ₹ 490.28 crore) on work contracts, Russian manpower costs and procurement of items respectively, thus leading to an additional expenditure of ₹ 706.87 crore. This was one of the major reasons for the escalations in cost of the project. The shifting of NSSS and TG to Indian scope also resulted in delays in erection of NSSS/TG (25 months and 22 months in respect of Unit I and Unit II respectively) which also contributed towards overall delay in commissioning and completion of project.

The Management replied (28 June 2017) that NSSS and TG form the core of Nuclear Power Plant and in order to learn the traits of the technology the same was also undertaken by the

Indian side and that the benefit of learning, which is not generally parted by foreign vendor, cannot be quantified in monetary terms. Further, the entire amount of additional expenditure due to increase in deputation of Russian Specialists and Procurement of Erection Reserves on account of commissioning works related to NSSS and TG, considered by Audit while calculating the additional financial implication is not correct as deputation of Russian specialist was required for supervision during the entire construction and erection works and erection reserves were purchased for entire plant as spares were not available for replacement of components found damaged during erection and commissioning..

The reply of the Management is not tenable. As per Clause 2.2.5.4 of the TCO submitted by Russian Federation, ASE (the contractor) was to provide for deputation at site its team of qualified personnel for commissioning of the plant and the operation and maintenance personnel were to be provided by NPCIL, who were to be trained by the contractor for taking up such jobs. Moreover, given the fact that the Russians continue to be engaged even in the commissioning process of Unit II (December 2016), the extra expenditure of ₹ 706.87 crore cannot be justified solely on the grounds of experience gained. As the entire technical support of Russian support upto commissioning was to be carried out with in the original deputation contract, the increase in Russian man months defeated the stated purpose of optimization desired to be achieved by shifting the erection and commissioning from Russian to India scope.

Regarding remaining part of Management’s reply, as already stated above, NPCIL had to spend ₹ 490.28 crore towards procurement of equipment from ASE as erection reserve to replace damaged/faulty items during the erection/commissioning for the NSSS and TG. Despite repeated enquiries, the amount and details of materials consumed from erection reserve was not provided to Audit. In absence of this information, no assurance can be derived whether erection reserves were actually utilised.

Audit Recommendation No. 10	DAE’s reply to the Audit Recommendation
Cost benefit analysis should be invariably conducted before agreeing to a shift in scope of work from Russian side to Indian side and <i>vice versa</i> .	DAE noted and accepted the recommendation.

4.3.2 Avoidable expenditure on Transportation of supplies from Sea port at Russia to KKNPP Site

NPCIL received considerable supplies through the sea routes. Related audit observations are as follows:

a) Avoidable expenditure of ₹ 8.37 crore

As per clause 3.2.2 of the supply contract, the contractor (ASE) shall advise the customer (NPCIL), by fax, the date of supply availability of dispatch at port, size dimension etc. The agreed rate for transportation was USD 75 per Freight Tons³⁰ (FRT). A notice of 45 days was to be given prior to each expected date of the vessel arrival for all consignments, except for over dimensional consignment for which notice period shall be 60 days prior to each expected date of the vessel arrival. As per clause 3.2, based on the above requirement, NPCIL shall freight the vessel and shall confirm timely arrival of the vessel at the port of shipment.

It was noticed in audit that M/s Lee & Muirhead Ltd (M/s L&M) raised (16 February 2005) the issue that actual height of packages varied between 10.180 meter and 14.645 meter as against maximum height of packages at eight meters plus-minus 10 *per cent*. Further M/s L&M stated (21 February 2005) that at the time of loading, substantial number of non-stackable packages were supplied by ASE, with substandard packing, incorrect recorded dimensions of the packages and cargo not being made available three days prior to arrival of the vessel at port to facilitate preparation of the proper stowage plan required to be submitted to Port Authorities. M/s L&M demanded compensation of USD 60 per FRT from NPCIL over the agreed rate of USD 75 per FRT for frequent changes in the stowage plan and wastage of space due to such non stackable cargo.

The proposal was put up to Board which approved the proposal stating that while tendering, these issues could not be foreseen and ASE is hardly in a position to exercise any control over stackability as it has to depend on numerous manufacturers spread over distant locations and also there was no provision in the contract between NPCIL and ASE to take care of last moment changes in the consignment being delivered at port for shipment by ASE. Accordingly, Amendment No. 6 (22 March 2005) to the contract was issued and the value of the contract was revised from ₹ 140.87 crore to ₹ 168.63 crore. NPCIL assumed an estimation of 60 *per cent* loss of cargo space. Accordingly initial rate of USD 75 per FRT

³⁰ Gross Freight tons of Cargo

was increased by 60 per cent and revised rate of USD 120 per FRT (USD 75 per FRT plus 60 per cent of USD 75 per FRT) was agreed upon.

However it was seen from the details submitted (16 February 2005) by M/s L&M in respect of seven vessels that loss of space range averaged out to only 43 per cent and therefore revised rate should be USD 107 per FRT (USD 75 per FRT plus 43 per cent of USD 75 per FRT). Adoption of higher percentage (60 per cent) of loss of space on an assumption basis during calculation of new rate resulted in extra expenditure of ₹ 8.37³¹ crore. Moreover, no claim was raised on ASE for extra expenditure on account of non-stackable consignments.

The Management replied (28 June 2017) that the 43 per cent space lost due to non-stackable cargo was based on the calculations carried out for seven vessels which had more dense cargo transported for the Project. During later part of the logistic contract however, more diverse cargo was schedule to be transported which was bound to have higher non-stackability and hence average of 60 per cent non-stackability was agreed. It further stated that there was no linear correlation of rates with loss of cargo space due to non stackability. Rates were mutually agreed with space loss of 60 per cent to avoid issues in future.

The reply of the Management is not tenable as the actual average loss of space was only around 43 per cent based on seven vessels pertains to period 2003 to 2005 where loss of space ranges from 30 per cent to 57 per cent. The assumption of higher rate on the basis of remaining shipments was assumed without any documentary evidence. Resultantly, NPCIL incurred an extra payment of ₹ 8.37 crore to the contractor which remained to be recovered from ASE.

b) Payment of Inadmissible charges to transporters – ₹ 7.08 crore.

For KKKNP, the Equipment and Materials were being supplied by M/s Atomstroyexport (ASE) through Free on Board (FOB)³² Sea Ports of Russian Federation (RF)/Third Countries (TC). As per the agreement between NPCIL and ASE, transportation of these supplies from Sea Ports of RF/TC to Tuticorin Port and to KKNPP Site was under NPCIL scope.

The work of Port handling, Shipping and Transportation of Heavy Lift (HL)/Over dimensional and normal consignments (Break Bulk cargo) of equipment and materials

³¹ ₹ 77.23 crore* (USD 120 per FRT – USD 107 per FRT)/ USD 120 per FRT where ₹ 77.23 crore represent amount paid to M/s L&M for transportation services.

³² Supply of goods at the specified location as per agreement after which buyer takes responsibility of the goods.

through Sea route/Air route (from Russian Ports/third countries ports to India and further inland transportation to KKNPP Site, Storage & Warehouse Management and further transport to erection point) was awarded (December 2002) on L1 basis to M/s Lee & Muirhead Ltd (L&M). The award was on turnkey basis for ₹ 140.87 crore. The rate quoted by the party was inclusive of all taxes, duties, port charges and any other levies including wharfage charges. Later, vide Amendment (22 March 2005) two additional items (shipment of super over dimensional consignments and shipment of non-stackable consignments) were added to the contract and the value of the contract was revised to ₹ 168.63 crore.

As per terms of the contract, if the mid-sea discharge (by anchoring the vessel mid-sea near KKNPP site) of Over Dimensional /HL cargo and other associated break bulk cargo was not possible at any occasion due to some reason or otherwise, the contractor was to transport such cargo by the suitable barge from Tuticorin port to KKNPP site at the same rates as quoted for transportation from mid-sea discharge point to KKNPP site by barge.

In February 2004 M/s L&M communicated to NPCIL that mid sea operations at Kudankulam were virtually impossible excepting few vessels when the wind conditions as well as the swell would be favorable for operations. M/s L&M also requested (11 February 2004) compensation for the additional wharfage charges stating that wharfage was included as part of the transportation cost in the quote while assuming that the quantities would be discharged as per the tender condition i.e. 40 per cent at Tuticorin and 60 per cent at KK anchorage with 10 per cent variation. The proposal for payment of differential cost of wharfage charges was put up to the Board of Directors of the company (April 2005). The Board while approving the proposal noted that the term for contract provided for mid-sea discharge of cargo during fair weather and advised that the matter be negotiated with the contractor so that the contractor shares part of the costs with NPCIL.

Based on negotiation, a rate of ₹ 575 per metric tonne (MT) for handling and transportation charges from Tuticorin Port to KKNPP Site to be borne by NPCIL was finally agreed upon (April 2005). Due to this revision, NPCIL had to incur an avoidable additional expenditure of ₹ 7.08 crore towards reimbursement of wharfage charges (₹ 6.10 crore) and additional handling charges (₹ 0.98 crore). This additional payment was unwarranted as the same was to be borne by the contractor as per terms of the contract.

The Management replied (28 June 2017) that the contractor was ready to unload the cargo through mid-sea discharge at KKNPP and at no point did he refuse to do so. Had any of the

consignment of long manufacturing cycle been lost due to such risky operation, schedule for completion of the Project would have been imperiled. NPCIL therefore instructed the Contractor that all consignments should be taken to Tuticorin Port and then brought to Site through Barge. The payment towards reimbursement of wharfage charges and additional handling charges amounting to ₹7.08 crore therefore was justified payment necessitated due to NPCIL requirement which was arrived through mutual agreement in line with contract conditions. Accordingly, approval of NPCIL Board was obtained.

The reply of the Management is not tenable as the tender terms contract with M/s L&M stated that if mid sea discharge is not possible, for any reason, the contractor shall transport such cargo by suitable barge from Tuticorin port to KKNPP site without any extra payment by the NPCIL. For errors in assumptions made by the contractor at the time of bid submission, the extra costs cannot be borne by NPCIL. It was responsibility of contractor to familiarize itself with the terms and conditions given in tender and quote the price accordingly at the time of tendering. Hence the additional payment of ₹ 7.08 crore was not in order.

c) Avoidable expenditure of ₹ 11.72 crore on dead freight

As per Schedule A of schedule of items, quantities and rates of work order dated 2 December 2002, a quantity of 2.55 lakh FRT was to be transported from Russian Federation/Third Countries to Tuticorin Port/Mid-Sea discharge at KKNPP site. According to the terms and conditions of the contract minimum inducement on cargo volume of 2,000 MT equivalent of 5,000 FRT (higher of weight in MT volume in cubic meters) was required to be made available at the notified port for each break bulk shipment to M/s L&M who was awarded the contract in December 2002.

However, it was noticed in audit that NPCIL/ASE failed to provide the minimum inducement quantity i.e. 5,000 FRT in case of supplies from third countries. This resulted in payment of dead freight weight amounting to ₹ 11.72 crore to M/s L&M, as per the *ibid* provision of the contract; it being the difference between minimum inducement of cargo load and actual cargo load.

The Management replied (28 June 2017) that while providing inputs for formulation of Contract for Logistics Services for KKNPP Units I and II, ASE informed that they will be providing a cargo of 5,000 FRT for each Break Bulk Shipment and for obtaining competitive rates, a clause for minimum inducement therefore was accordingly built into the Contract.

Because of delay in delivery of supplies to the port by ASE, in some of the cases, the minimum induced quantity could not be provided and dead freight charges were paid to the Logistics Contractor. NPCIL could have waited for some more time for ASE to accumulate the cargo at port so that minimum induced quantity was available and would have attracted detention, port storage and demurrage charges. This would have also delayed all items already available at port. For delay in supplies, the contracts with ASE provide for LD and claim in this respect have already been raised.

The reply of the Management is not acceptable because NPCIL had claimed LD from ASE only in respect of delay in supplies of material and not for dead freight charges. Due to delay in delivery of supplies to the port by ASE, the minimum induced quantity could not be provided which resulted in avoidable expenditure of ₹ 11.72 crore on account of dead freight charges being paid to the Logistics Contractor which should have also been recovered from ASE.

4.3.3 Awarding work orders valuing ₹ 141.38 crore on single tender/nomination basis

According to NPCIL Works Construction Management Manual, single tender can be called only in the following cases:

- a) Work of proprietary nature
- b) There is only one source of Supply/Contractor
- c) Replacements and addition to existing equipment/structure is of a proprietary nature
- d) Work requiring equipment, plant or process for which only one party has been developed by DAE/NPCIL and that is only source available
- e) Shutdown work / emergency work where normal course of tendering process will have an effect on overall plan performance / construction schedule.
- f) Work of inescapable urgency which can directly affect the commissioning of the Power Plant and the party has already established equipment and necessary infrastructure at the project site, and the normal tendering process will cause time and cost overruns on project schedule.

Further, as per CVC guidelines, award of contract on nomination basis/single tender is to be resorted to only under exceptional circumstances such as natural calamities and emergencies or there were no bids to repeated tenders or where only one supplier has been licensed in respect of goods sought to be procured and PSUs are not exempted from the applicability of CVC guidelines.

Audit observed during test check that in six work orders valuing ₹ 141.38 crore, contract was awarded on single tender/nomination basis *ibid* criteria prescribed in the manual and CVC guidelines. Out of these, five work orders valuing ₹ 119.58 crore were given to three Public Sector Undertakings (PSUs)³³.

At the time of approval for single tender mode/nomination basis, it was stated by NPCIL that in view of urgency of the work and due to availability of experienced, familiar and skilled manpower competent to undertake such jobs, available with only the proposed single party, the work may be awarded on single tender/nomination basis.

However, Audit noticed that there were delays ranging from 3 to 9 months in awarding the work from the date of approval of work by the competent authority which contradicted the Management's stand about urgency. Further, there was no justification/comparison found on record that only the awardees had the requisite experience and competent manpower. In fact, even for works like annual maintenance contract single tender process was resorted to.

The Management replied (28 June 2017) that contract / work orders as pointed by in audit para for Erection Reserves were for procurement of such items and spares which were of proprietary nature, assorted type and required in small quantity. There was no alternative other than to procure these from ASE through single tender / nomination basis. It further stated that NPCIL has not violated any guidelines laid by CVC in this regard.

The Management reply is not relevant as the contracts referred here related to execution of work by Indian contractors under Indian scope of work and not to supply of material by ASE. The reason for awarding these jobs by single tender mode to Indian contractors has not been furnished by NPCIL (July 2017).

Thus, awarding contracts on single tender basis not only resulted in loss of opportunity on the part of Company to get the benefits of competitive prices but this also was in violation of the extant provisions of the Work contract manual of NPCIL and CVC guidelines.

Audit Recommendation No. 11	DAE's reply to the Audit Recommendation
Work orders should not be awarded on a single tender basis unless they qualify for the same as per NPCIL manual and CVC guidelines.	DAE noted and accepted the recommendation.

³³ M/s BHEL, M/s ECIL and M/S Keltron

4.3.4 Execution of additional item / quantum of works valuing ₹ 159 crore

For the work of erection and commissioning of KKNPP plants the Russian federation was to depute its specialist at site for overall monitoring and stage-wise supervision. However, despite involvement of Russian specialists and NPCIL's scientists since the stage of preparation of the DPR, NPCIL failed to identify certain civil, mechanical and instrumentation works which were required to be executed as part of this project at the planning stage. Resultantly, works had to be done additionally than what was envisaged in the approved project documents.

Out of 106 works, Audit noticed in eight cases where extra work amounting to ₹ 159 crore was executed beyond the limit of 25 per cent³⁴ over and above the contracted work. The works i.e. beyond 125 per cent, were not identified earlier and were awarded to the contractors at their quoted rates in the already executed contracts. It was noticed that the nature of extra work included welding work, erection and testing of smaller bore carbon steel pipes, supply and erection of high-density polyethylene pipes, fabrication of pipes, supply of single push button station etc. which should have been considered for inclusion at the time of planning in the preparatory stages. Details of extra work as percentage of original cost are given in *Annexure IV*.

The Management replied (28 June 2017) that since many of the first of the kind system were there in the Nuclear Power Plant, the exact estimation of the work was not possible at the time of tendering. As and when the design evolved, the additional work wherever mandated had to be carried out through the existing contractors only.

The reply is not acceptable as even though the plant is first of its kind, however, similar civil, electrical and other works were done by NPCIL personnel in other Nuclear Power Plants. Justifying the additional works citing design changes while executing the works indicates lack of proper planning and coordination between ASE and NPCIL in assessing the site conditions / requirements before the start of execution of work.

Thus, allocation of additional work to the existing contractors without any rate analysis resulted not only in increase in the cost of the project by ₹ 159 crore but also in loss of opportunity to obtain competitive rates.

³⁴ As was provided in general conditions of contract

Audit Recommendation No. 12	DAE's reply to the Audit Recommendation
NPCIL should award work to existing contractors after proper rate analysis to obtain competitive rates.	DAE noted and accepted the recommendation.

4.3.5 Absence of agreement for work orders valuing ₹ 79.53 crore

Work orders were issued by NPCIL for execution of works, wherein both the parties – NPCIL and Contractor together were to execute an agreement for the respective works within the days specified in the work order.

In seven test checked cases, Audit noticed that work orders valuing ₹ 79.53 crore were issued without any agreement between the parties. Thus, formal agreement containing all the requisite documents which needed to be signed within a reasonable time, for each work order, to give the contract a legal sanctity, was not entered into in these cases.

The Management replied (28 June 2017) that the agreements with the contractors have invariably been entered into, sooner or later.

The reply is unacceptable as the agreements for the respective works were to be executed within the time period as specified in the work order and not at a later date. Further, in seven test checked cases, Audit noticed that these contracts worth ₹ 79.53 crore were issued without any agreement with the parties, which was in violation of terms and conditions of work orders. This lapse could create problems by way of NPCIL not having a defined time schedule for deliverables or a deterrent tool (like LD) to seek compensation in cases of delayed/unsatisfactory work done by the contractor(s). The interests of the company remained unprotected in these cases. There was no monitoring mechanism to ensure that an agreement should invariably be signed between NPCIL and contractor(s), as required under the respective work orders, before awarding the work.

Audit Recommendation No. 13	DAE's reply to the Audit Recommendation
Agreements for execution of work order should invariably be entered into by NPCIL with the contractor before award of the contracts.	DAE noted and accepted the recommendation.

4.3.6 Absence of Schedule of Rates for various works

According to Construction Management Manual of NPCIL, in order to facilitate the preparation of estimates, and also to serve as a guide in finalizing rates during the course of execution of contract, a Schedule of Rates (SORs) was to be maintained for each kind of work commonly executed in the units. Data base for working out rates for commonly executed items was to be as per norms stipulated by Central Public Works Department, GOI. Further, SORs were to be prepared on the basis of the rates prevailing in each unit and necessary analysis of the rates for each description of work and for varying conditions thereof should, so far as practicable, be recorded.

However, Audit noticed that SORs were not updated before preparation of estimates for various works of KKNPP. In all the test checked work files, Audit observed that in absence of SORs, estimates were prepared based on the work order rates available for other units of NPCIL like Tarapur Atomic Power Plant in Maharashtra and Kaiga Atomic Power plant in Karnataka or earlier approved rates for similar nature work at site.

Further, for preparation of estimates CVC guidelines state that the estimates should take into consideration all relevant factors based on the prevailing market price of various inputs such as labour, material, equipment etc. at the concerned locations to arrive at maximum accurate estimates. However, it was observed that for preparing estimates by NPCIL, work order rates were arrived by assessing the similar nature of work of units located at other places.

Moreover, as per the Manual, in cases where the items included in the tender are available in the current schedule of rates, the amount of tender to be accepted should not exceed more than 10 per cent of the amount worked out on the basis of the current schedule of rate plus (or minus) the enhancement (or decrease) on account of relevant cost index. However, in respect of 19 test checked cases, Audit noticed variation ranging from (-) 54 per cent to (-) 26 per cent between the value of work estimated and awarded.

Audit also noticed that due to non-preparation of SORs even for works of routine nature like construction of pump houses, tunnels, chlorination plants, sea water pipelines and discharge channels, the tenders awarded were for ₹ 348.93 crore as against the estimated value put to tender i.e., ₹ 588 crore, that is 41 per cent lower; this indicated that the estimation process at KKNPP, even for routine works was not done on a realistic basis.

The Management replied (28 June 2017) that the estimates for major Civil packages of KKNPP Units I and II were carried out by market rate analysis through an engineering consultant expert in the field. These estimates were adopted by NPCIL for preparation of respective tenders, obtaining technical sanction from competent authority including detailed estimates forming part of technical sanction.

Construction manual is a guide and not a mandatory document. This method of estimation is also used in NPCIL. KKNPP, being in a very early stage, was not having any Schedule of Rates at the point of time of preparation of referred tenders. Schedule of rates for all civil works were established later and are being used for all works as on date. This schedule of rates is being revised as per guidelines.

The Management accepted that the estimates during the initial period were prepared without SORs and on the basis of estimates of similar works executed in other projects. Though NPCIL stated that later SORs were prepared, till the completion of audit, neither SORs nor the estimates prepared on the basis of this SORs were produced to Audit.

Absence of SORs resulted in not having a control parameter to monitor preparation of budgetary estimates. Preparation of inflated estimates adversely affects the budgeting and funds arrangement processes and was avoidable.

Audit Recommendation No. 14	DAE's reply to the Audit Recommendation
NPCIL should prepare schedule of rates, at least, for the works of routine nature like construction of pump house, tunnel, chlorination plant etc with a view to have better estimation of rates for awarding contracts.	DAE noted and accepted the recommendation.

4.4 Third Country Contracts

4.4.1 Third country contracts made by ASE - Non reasonability of rates

A contract valuing USD 191 million (pre-revised USD 220 million) was entered into (August 2002) between NPCIL and ASE for supply of equipment and materials from third countries under Russian and Indian scope. Audit examination revealed the following:

a) As per Clause 2.2 of the contract, the prospective bidders' for third country supplies were to be shortlisted in consultation with NPCIL. Further, Clause 2.4 states that bids/offers received by ASE from the bidders of third countries were to be evaluated jointly by ASE with NPCIL and sub-contracts would be awarded by ASE with the approval/consent of NPCIL.

It was, however, noticed that entire purchase from third countries supply was assigned to Russian side (ASE) and NPCIL did not participate in any joint evaluation of bids/offers with ASE. Moreover, no consent/approval of NPCIL was obtained by ASE before finalizing the sub-contracts to third countries. Only a list of sub-contracts entered into by ASE with various third countries, which were un-priced, was provided by ASE to NPCIL.

b) As per clause 2.4.2.2 of the Techno Commercial Offer (TCO) entered into by NPCIL with ASE, the order of accounting the difference between the estimated and actual prices for the supply procured in third countries was to be detailed between the parties at the contract stage. However, no such clause was found included in the contract entered into by NPCIL with ASE for third country supplies. As a result ASE did not furnish to NPCIL the total value of all contracts executed with third countries and NPCIL had no way to ensure that the value of all such contracts was indeed to the tune of the agreed amount of USD 191 million (₹ 899.95 crore). It was also observed that an amount of USD 19 million (₹ 92.04 crore) towards 10 per cent interest free advance was paid by NPCIL to ASE for third country supplies without ascertaining whether similar provisions existed in the sub-contracts entered by ASE with third country suppliers.

NPCIL allowed ASE to make purchases without ensuring NPCIL's role as per terms and conditions of the contract. These issues were neither recorded nor brought to the notice of Senior Management which also did not have a monitoring system to ensure that the contract was being executed according to the extant terms and conditions.

The Management replied (28 June 2017) that the total price of USD 220 million (before agreed adjustment for CIS contract) was agreed as a fixed price in case all procurements from Third Countries were to be carried out through ASE and this price is a part of total price of all contracts as per agreed TCO. Reasonability of the rates within a fixed price therefore need not be ascertained. The price breakup carried out was a notional price/ rate mainly for custom clearance purpose. An amount of USD 19.05 million paid as advance under this Contract was in line with the contract drafted on the basis of Inter-Governmental Agreement (IGA) & General Framework Agreement (GFA).

The Management's reply that the price of ASE scope of supplies under third country contracts was a fixed price is not acceptable. As per clause 4.1 of GFA, the Russian scope of work was at fixed price while the supplies from third countries falling under Indian scope and Russian scope was not at fixed price but was only the upper limit of the escalated cost estimated on the basis of FOB supply terms. Clause 2.2.1.8 of GFA and contract clause 2.4 of Article 2 provided that ASE will invite quotations and select the vendors jointly with NPCIL. Hence the Management's contention that third country supply was included in Russian scope at fixed price, due to which reasonability of rates need not be ascertained, is not factually correct and is in violation of GFA and terms of the contract.

Audit Recommendation No. 15	DAE's reply to the Audit Recommendation
<p>With regard to the contracts for supply of equipment by third country, NPCIL should consider participating in joint evaluation of bids, with a view to ensure price reasonability of the contract(s).</p>	<p>DAE noted and accepted the recommendation, in case order is placed by NPCIL directly on third Countries.</p> <p>DAE has partially accepted the recommendation. However, Audit is of the view that in order to ensure reasonability of rates of equipment procured, through ASE under third country contracts, NPCIL may devise a suitable mechanism for the same.</p>

4.4.2 Discrepancies in payments made against supplies of equipment and materials

A contract was entered between NPCIL and ASE (August 2002) for an amount of USD 191 million for supply of equipment and materials from third countries. Following discrepancies were noticed during verification of payment procedures under the contract:

a) As per clause 6.2.1 of contract, NPCIL had to pay to ASE 15 *per cent* of the price of the contract for supplies and services amounting to USD 189.80 million within 3 months from the date of signing of the contract against submission of invoice along with signed copies of sub-contracts. Audit noticed that the sub-contracts submitted along with the invoice did not contain details like price of the sub-contract and terms of payment from the sub-contracts and payment of 15 *per cent* (USD 28.47 million) was released without verifying the details of its sub-contracts.

b) As per clause 3.4.3 of the NPCIL's standard general conditions of contract, governing supply of imported Stores, the contractor would submit performance Bond/ Bank Guarantee for an amount equal to 10 *per cent* of the total value of the contract as security for satisfactory performance. However, it was seen that NPCIL had not included this provision under a contract (Contract no. 22700, August 2002) entered with ASE for supply of equipment and materials under third country contracts. This was in violation of NPCIL's standard general conditions of contract.

The Management replied (28 June 2017) that there was no obligation of ASE to involve NPCIL in the commercial negotiations with suppliers from third countries. The price of ASE scope of supplies was a fixed price considering that all third country contracts were to be signed by ASE with third country supplier. There cannot be scope for bargain in a fixed price contract. The contract clauses clearly provided that only un-priced copy of sub contract shall be provided to NPCIL. The advance amount of 15 per cent was released after ASE fulfilled all the required conditions as per contract.

The Management's reply that the price of ASE scope of supplies under third country contracts was at fixed price is not acceptable. As per clause 4.1 of GFA, the supplies from third countries falling under Indian scope and Russian scope was not a fixed price but was only the upper limit of the escalated cost estimated on the basis of FOB supply terms. As per clause 6.2.1 of the contract for supply of equipment and materials from third countries, ASE was to provide a copy of the sub-contract to NPCIL. The said clause does not contain any provision about the supply of un-priced copy of sub contract. Hence, due to providing un-priced copy of sub-contract by ASE, the payment of 15 *per cent* without verifying the price and terms of payment of sub-contract, is therefore not in order.

4.5 Non transfer of land ownership in the company's name.

The Government of Tamil Nadu accorded sanction for acquisition of 1,225.16 hectares of land (February 1990) for KKNPP plant site and township. The land to the extent of 1,083.42 hectares towards plant site (929.52 hectares) and Township (153.90 hectares) is in the name of NPCIL. However, ownership for land to the extent of 141.735 hectares (Plant site-117.435 hectares and township-24.30 hectares) had still not been transferred in the name of NPCIL even after 27 years from the date of approval notwithstanding the fact that it was specified in the Government of Tamil Nadu order (February 1990) that NPCIL has to get the ownership of land transferred in its own name. No reasons were offered by the NPCIL for not getting the ownership transferred to its own name.

The Management replied (28 June 2017) that the land available at the plant site is sufficient for implementation of KKNPP Units I to VI including the facilities for spent fuel storage.

The Management's reply is not relevant as reasons for non - transfer of land in the name of NPCIL even after 27 years have not been addressed by the company.

4.6 Start of commercial operation of the KKNPP Unit I by NPCIL before getting the license

The Atomic Energy Regulatory Board (AERB) is responsible for the safety, supervision of Nuclear Power Projects and Plants (NPPs), which is done through an elaborate safety review mechanism and periodic regulatory inspections. All nuclear power projects have to undergo an elaborate in-depth safety review during the consenting stage which includes siting, construction and commissioning. Authorizations/ clearances for siting, construction, commissioning and operation at rated power for NPPs are to be issued in stages as per the AERB Safety Code on Regulation of Nuclear Facilities and procedure as described in AERB Safety Guide on Consenting Process for Nuclear Power Plants and Research Reactors. Based on NPCIL submissions related to various consenting stages as per AERB guide on consenting, AERB reviews the documents and application through in-house review groups, specialist groups and Advisory Committee for Project Safety Review (ACPSR).

During review process NPCIL submits various presentations, responses, justification/calculation notes and reports to AERB. On the same being in order and meeting the prescribed requirements, AERB issues clearance for the relevant stage of Nuclear Power Project (NPP) along with stipulations to be complied with (both for the current stage and next stage). On compliance of the stipulations, NPCIL is to submit compliance reports for the same.

Before authorization of commissioning/operation of the plant/project is granted, AERB needs to be satisfied by appropriate review of -

- a) Final design analysis report prepared by the project plant;
- b) Commissioning reports and results thereof; and
- c) Proposed operating procedures and operational limits and conditions that the plant/project can be operated without undue risk to the operating personnel and the population.

The license to operate to any Nuclear Power Plant (NPP) is granted upon fulfillment of conditions as stated above at a), b) and c) above. After satisfactory review during project stage, AERB issues operating licence to a NPP for a period of up to five years. Further, AERB's guidelines also stipulated that Utility has to submit application for obtaining license for regular power operation along with final safety analysis report and detailed performance reports etc. which were reviewed at various stages of design or commissioning review process.

AERB granted, in August 2014, clearance to NPCIL for operation of KKNPP Unit I up to 100 *per cent* full power for limited duration (Phase C3³⁵ stage) till 31 December 2014; it later extended the date till 30 April 2015 subject to compliance with certain stipulations³⁶. AERB granted the licence for regular operation of the plant on 10 July 2015. However, it was noticed in audit that NPCIL declared commercial operation of the Unit I of KKNPP on 31 December 2014 which was six months before receiving the license from AERB for regular operation of the plant. Moreover, the records pertaining to dates of completion of final safety review and its submission date to AERB were not produced to Audit despite repeated enquires. NPCIL also could not produce documents to substantiate whether it complied with the stipulations as mentioned in the AERB's sanction letter dated 30 August 2014. In absence of this information, it is not clear whether NPCIL had complied with all the stipulated safety and security conditions at the time of declaration of the commercial operation of the plant on 31 December 2014. In absence of such information, the fact that Unit I of KKNPP was put into commercial operation after duly fulfilling the operational safety and security of the plant, as required under AERB guidelines, remained unverifiable in audit.

³⁵ Stage at which reactor power is raised upto 100 per cent full power

³⁶ Recommendation of ACPSR-LWR, Industrial and Fire Safety requirements as per Atomic Energy (Factories) Rules, 1996, All relevant recommendations with regard to Nuclear Security aspects.

The Management replied that various stages during the process followed were submission of Preliminary Safety Analysis Report (PSAR) as per the framework guidelines of United States Nuclear Regulatory Commission which was mutually agreed between the Indian and Russian sides. AERB after carefully scrutinizing and reviewing these processes had given clearance to KKNPP Unit I for 100 per cent full power operation till April 2015 which was further extended till Refueling Shutdown (June 2015), as NPCIL complied with all the stipulations of AERB. The due process was followed in getting the approval from CMD, NPCIL for commercial operation declaration. Hence declaration of commercial operation is in no way violating the principles of regulatory stipulations which have been complied duly by NPCIL.

The Management's reply did not address to the specific audit observation as to how the commercial operation of KKNPP Unit I was started on 31 December 2014 which was six months before getting the license from AERB for regular operations on 10 July 2015.

4.7 Pre service inspection of Reactor Pressure Vessel

Reactor vessel is one of the most crucial components of Nuclear Plants, which houses the reactor core and other key reactor internals. To assure the reliability of safety related components of nuclear plant, Pre Service Inspection is essential.

Initially NPCIL awarded (January 2011) the Pre-Service Inspection work of Reactor Pressure Vessels reactor components of Unit I to a contractor - M/s VR Enterprises for an amount of ₹ 31.40 lakh. The work was to be carried out by the contractor as per the technical/expert advice and guidance of NPCIL officers and was to be completed by June 2011. The proposal for inspection by engaging Indian contractor was stated to be based on the previous experience of NPCIL in earlier Pressurized Heavy Water Reactors and was an attempt to reduce the cost. However, NPCIL could not guide and extend professional advice/expertise to the contractor for discharging its work due to its complexity and the work was short closed on 28 June 2011; ₹ 8.76 lakh was paid to the contractor for the part of work executed. Later the work was awarded to M/s HRID on 29 July 2011, a Croatian firm at a cost of Euro 0.79 million (₹ 5.01 crore³⁷). The work was completed by M/s HRID on 31 July 2012.

Audit observed that NPCIL's initial decision to execute the Pre Service Inspection work through local Indian contractor and later awarding the work to a foreign firm owing to its lack of expertise in guiding the contractors in carrying out the work indicated deficient planning towards carrying out the pre-service inspection. Moreover, ASE had sourced the Reactor Pressure Vessel from M/s HRID, hence, NPCIL should have considered the pre-service inspection by an independent third party to ensure independent and objective evaluation.

³⁷ Based on exchange rate of ₹ 63.10 per Euro on the date of contract.

The Management stated that Pre-service inspection (PSI) is carried out for collection of base line data for monitoring health during service life of plant/ equipment by in-service inspection (ISI). HRID, being the Original Equipment Manufacturer were hired for conducting PSI, based on its experience with domestic vendor.

The reply of the Management is not satisfactory as the reactor vessel which houses the reactor core is of immense safety significance. Hence, the pre-service inspection of pressure vessel by an independent third party, other than the reactor pressure vessel manufacturer (M/s HRID) would have been appropriate.

4.8 Inadequate High level Monitoring

To ensure co operation and peaceful application of nuclear energy in all the applicable fields including power generation between Indian and Russian Federation, a high level co-ordination committee {also called Joint Coordination Committee (JCC)} was set up in the year 2000. Audit noticed that since its constitution till September 2010, the committee periodically met and reviewed the progress of the implementation of KKNPP project. The minutes of the meetings indicated that there were discussions on important issues relating to the implementation of the project and decisions were taken for expediting the implementation of the project. However as per the records produced to Audit, no such meetings of JCC were held after September 2010. Moreover, no specific reasons for not conducting such high level meetings since September 2010 were found on record. Major cases of disagreements on various issues like non-pursuance of Liquidated Damages (LDs), manpower adjustments, delays in supply items etc. could have been sorted out, had JCC held its regular meetings.

The Management replied (28 June 2017) that JCC was formed to resolve issues requiring high level intervention. By the year 2010, major issues were resolved and project was in final implementation stage with commissioning of the systems going on. The JCC meetings were therefore not held after 2010 although the concerned authorities were apprised of implementation of the project on regular basis. It further stated that in 2011, the local people agitation started and project got delayed. However this was to be tackled at the level of Indian Federal/ State Governments only.

The Management's reply is not acceptable as holding of regular meetings would have sorted out the difficulties / issues concerning delays, non-pursuance of LDs, manpower adjustments, delays in supply items etc which remained un-addressed and were not sorted out in a timely manner.

Conclusion

The commercial operation of Kudankulam Nuclear Power Project (KKNPP)'s Units I and II have been delayed substantially. The delays were primarily due to shifting of work from Russian scope to Indian scope; in execution of work and in submission of working documents/supply of equipment/materials by ASE; delays due to design changes; erection delays and additional works. The delay in completion have also resulted in cost overruns. The increase in cost was mainly due to additional Russian manpower requirement, increase in expenses on erection and commissioning of nuclear system auxiliaries, execution of additional works and payment of escalation/under utilization charges to the Indian contractors.

The project also suffered from various deficiencies such as commercialization before getting the required licence to operate from the competent authority, extending undue benefits to Russian agency, non-assessment of manpower with consequent avoidable expenditure and non recovery of liquidated damages.

New Delhi
Dated : 11 August 2017



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Dated : 11 August 2017



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