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ANNEXURE D—GENERATION OF HYDRO-ELECTRIC POWER BY INDIA ON THE WESTERN RIVERS

(Article III (2)(d))

1. The provisions of this Annexure shall apply with respect to the use by India of the waters of the Western Rivers for the generation of hydro-electric power under the provisions of Article III (2)(d) and, subject to the provisions of this Annexure, such use shall be unrestricted: Provided that the design, construction and operation of new hydro-electric plants which are incorporated in a Storage Work (as defined in Annexure E) shall be governed by the relevant provisions of Annexure E.

Part 1—Definitions

2. As used in this Annexure:

(a) "Dead Storage" means that portion of the storage which is not used for operational purposes and "Dead Storage Level" means the level corresponding to Dead Storage.

(b) "Live Storage" means all storage above Dead Storage.

(c) "Pondage" means Live Storage of only sufficient magnitude to meet fluctuations in the discharge of the turbines arising from variations in the daily and the weekly loads of the plant.

(d) "Full Pondage Level" means the level corresponding to the maximum Pondage provided in the design in accordance with Paragraph 8(e).

(e) "Surcharge Storage" means uncontrollable storage occupying space above the Full Pondage Level.

(f) "Operating Pool" means the storage capacity between Dead Storage level and Full Pondage Level.

(g) "Run-of-River Plant" means a hydro-electric plant that develops power without Live Storage as an inte-
(h) "Regulating Basin" means the basin whose only purpose is to even out fluctuations in the discharge from the turbines arising from variations in the daily and the weekly loads of the plant.

(i) "Firm Power" means the hydro-electric power corresponding to the minimum mean discharge at the site of a plant, the minimum mean discharge being calculated as follows:

The average discharge for each 10-day period (1st to 10th, 11th to 20th and 21st to the end of the month) will be worked out for each year for which discharge data, whether observed or estimated, are proposed to be studied for purposes of design. The mean of the yearly values for each 10-day period will then be worked out. The lowest of the mean values thus obtained will be taken as the minimum mean discharge. The studies will be based on data for as long a period as available but may be limited to the latest 5 years in the case of Small Plants (as defined in Paragraph 18) and to the latest 25 years in the case of other Plants (as defined in Paragraph 8).

(j) "Secondary Power" means the power, other than Firm Power, available only during certain periods of the year.

Part 2—Hydro-Electric Plants in Operation, or under Construction, as on the Effective Date

3. There shall be no restriction on the operation of the following hydro-electric plants which were in operation as on the Effective Date:

<table>
<thead>
<tr>
<th>Name of Plant</th>
<th>Capacity (exclusive of standby units) (kilowatts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Pahalgam</td>
<td>186</td>
</tr>
<tr>
<td>(ii) Bandipura</td>
<td>30</td>
</tr>
</tbody>
</table>
4. There shall be no restriction on the completion by India, in accordance with the design adopted prior to the Effective Date, or on the operation by India, of the following hydro-electric plants which were actually under construction on the Effective Date, whether or not the plant was on that date in partial operation:

<table>
<thead>
<tr>
<th>Name of Plant</th>
<th>Designed Capacity (kilowatts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Mahora</td>
<td>12,000</td>
</tr>
<tr>
<td>(ii) Ganderbal</td>
<td>15,000</td>
</tr>
<tr>
<td>(iii) Kupwara</td>
<td>150</td>
</tr>
<tr>
<td>(iv) Bhadarwah</td>
<td>600</td>
</tr>
<tr>
<td>(v) Kishtwar</td>
<td>350</td>
</tr>
<tr>
<td>(vi) Rajouri</td>
<td>650</td>
</tr>
<tr>
<td>(vii) Chinani</td>
<td>14,000</td>
</tr>
<tr>
<td>(viii) Nichalani Banihal</td>
<td>600</td>
</tr>
</tbody>
</table>

5. As soon as India finds it possible to do so, but not later than 31st March 1961, India shall communicate to Pakistan the information specified in Appendix I to this Annexure for each of the plants specified in Paragraphs 3 and 4. If any such information is not available or is not pertinent to the design of the plant or to the conditions at the site, it will be so stated.

6. (a) If any alteration proposed in the design of any of the plants specified in Paragraph 3 and 4 would result in a material change in the information furnished to Pakistan under the provisions of Paragraph 5, India shall, at least 4 months in advance of making the alteration, communicate particulars of the change to Pakistan in writing and the provisions of Paragraph 7 shall then apply.

(b) In the event of an emergency arising which requires repairs to be undertaken to protect the integrity of any of
the plants specified in Paragraphs 3 and 4, India may undertake immediately the necessary repairs or alterations and, if these repairs or alterations result in a change in the information furnished to Pakistan under the provisions of Paragraph 5, India shall as soon as possible communicate particulars of the change to Pakistan in writing. The provisions of Paragraph 7 shall then apply.

7. Within three months of the receipt of the particulars specified in Paragraph 6, Pakistan shall communicate to India in writing any objection it may have with regard to the proposed change on the ground that the change involves a material departure from the criteria set out in Paragraph 8 or 18 of this Annexure or Paragraph 11 of Annexure E as the case may be. If no objection is received by India from Pakistan within the specified period of three months, then Pakistan shall be deemed to have no objection. If a question arises as to whether or not the change involves a material departure from such of the criteria mentioned above as may be applicable, then either Party may proceed to have the question resolved in accordance with the provisions of Article IX (1) and (2).

Part 3—New Run-of-River Plants

8. Except as provided in Paragraph 18, the design of any new Run-of-River Plant (hereinafter in this Part referred to as a Plant) shall conform to the following criteria:—

(a) The works themselves shall not be capable of raising artificially the water level in the Operating Pool above the Full Pondage Level specified in the design.

(b) The design of the works shall take due account of the requirements of Surcharge Storage and of Secondary Power.

(c) The maximum Pondage in the Operating Pool shall not exceed twice the Pondage required for Firm Power.

(d) There shall be no outlets below the Dead Storage Level, unless necessary for sediment control or any
other technical purpose; any such outlet shall be of the minimum size, and located at the highest level, consistent with sound and economical design and with satisfactory operation of the works.

(e) If the conditions at the site of a Plant make a gated spillway necessary, the bottom level of the gates in normal closed position shall be located at the highest level consistent with sound and economical design and satisfactory construction and operation of the works.

(f) The intakes for the turbines shall be located at the highest level consistent with satisfactory and economical construction and operation of the Plant as a Run-of-River Plant and with customary and accepted practice of design for the designated range of the Plant's operation.

(g) If any Plant is constructed on the Chenab Main at a site below Kotru (Longitude 74° - 59' East and Latitude 33° - 09' North), a Regulating Basin shall be incorporated.

9. To enable Pakistan to satisfy itself that the design of a Plant conforms to the criteria mentioned in Paragraph 8, India shall, at least six months in advance of the beginning of construction of river works connected with the Plant, communicate to Pakistan, in writing, the information specified in Appendix II to this Annexure. If any such information is not available or is not pertinent to the design of the Plant or to the conditions at the site, it will be so stated.

10. Within three months of the receipt by Pakistan of the information specified in Paragraph 9, Pakistan shall communicate to India, in writing, any objection that it may have with regard to the proposed design on the ground that it does not conform to the criteria mentioned in Paragraph 8. If no objection is received by India from Pakistan within the specified period of three months, then Pakistan shall be deemed to have no objection.
11. If a question arises as to whether or not the design of a Plant conforms to the criteria set out in Paragraph 8, then either Party may proceed to have the question resolved in accordance with the provisions of Article IX(1) and (2).

12. (a) If any alteration proposed in the design of a Plant before it comes into operation would result in a material change in the information furnished to Pakistan under the provisions of Paragraph 9, India shall immediately communicate particulars of the change to Pakistan in writing and the provisions of Paragraphs 10 and 11 shall then apply, but the period of three months specified in Paragraph 10 shall be reduced to two months.

(b) If any alteration proposed in the design of a Plant after it comes into operation would result in a material change in the information furnished to Pakistan under the provisions of Paragraph 9, India shall, at least four months in advance of making the alteration, communicate particulars of the change to Pakistan in writing and the provisions of Paragraphs 10 and 11 shall then apply, but the period of three months specified in Paragraph 10 shall be reduced to two months.

13. In the event of an emergency arising which requires repairs to be undertaken to protect the integrity of a Plant, India may undertake immediately the necessary repairs or alterations; if these repairs or alterations result in a change in the information furnished to Pakistan under the provisions of Paragraph 9, India shall, as soon as possible, communicate particulars of the change to Pakistan in writing to enable Pakistan to satisfy itself that after such change the design of the Plant conforms to the criteria specified in Paragraph 8. The provisions of Paragraphs 10 and 11 shall then apply.

14. The filling of Dead Storage shall be carried out in accordance with the provisions of Paragraph 18 or 19 of Annexure E.
15. Subject to the provisions of Paragraph 17, the works connected with a Plant shall be so operated that (a) the volume of water received in the river upstream of the Plant, during any period of seven consecutive days, shall be delivered into the river below the Plant during the same seven-day period, and (b) in any one period of 24 hours within that seven-day period, the volume delivered into the river below the Plant shall be not less than 30%, and not more than 130%, of the volume received in the river above the Plant during the same 24-hour period: Provided however that:

(i) where a Plant is located at a site on the Chenab Main below Ramban, the volume of water received in the river upstream of the Plant in any one period of 24 hours shall be delivered into the river below the Plant within the same period of 24 hours;

(ii) where a Plant is located at a site on the Chenab Main above Ramban, the volume of water delivered into the river below the Plant in any one period of 24 hours shall not be less than 50% and not more than 130%, of the volume received above the Plant during the same 24-hour period; and

(iii) where a Plant is located on a Tributary of The Jhelum on which Pakistan has any Agricultural Use or hydro-electric use, the water released below the Plant may be delivered, if necessary, into another Tributary but only to the extent that the then existing Agricultural Use or hydro-electric use by Pakistan on the former Tributary would not be adversely affected.

16. For the purpose of Paragraph 15, the period of 24 hours shall commence at 8 A.M. daily and the period of 7 consecutive days shall commence at 8 A.M. on every Saturday. The time shall be Indian Standard Time.

17. The provisions of Paragraph 15 shall not apply during the period when the Dead Storage at a Plant is being
filled in accordance with the provisions of Paragraph 14. In applying the provisions of Paragraph 15:

(a) a tolerance of 10% in volume shall be permissible; and

(b) Surcharge Storage shall be ignored.

18. The provisions of Paragraphs 8, 9, 10, 11, 12 and 13 shall not apply to a new Run-of-River Plant which is located on a Tributary and which conforms to the following criteria (hereinafter referred to as a Small Plant):

(a) the aggregate designed maximum discharge through the turbines does not exceed 300 cusecs;

(b) no storage is involved in connection with the Small Plant, except the Pondage and the storage incidental to the diversion structure; and

(c) the crest of the diversion structure across the Tributary, or the top level of the gates, if any, shall not be higher than 20 feet above the mean bed of the Tributary at the site of the structure.

19. The information specified in Appendix III to this Annexure shall be communicated to Pakistan by India at least two months in advance of the beginning of construction of the river works connected with a Small Plant. If any such information is not available or is not pertinent to the design of the Small Plant or to the conditions at the site, it will be so stated.

20. Within two months of the receipt by Pakistan of the information specified in Appendix III, Pakistan shall communicate to India, in writing, any objection that it may have with regard to the proposed design on the ground that it does not conform to the criteria mentioned in Paragraph 18. If no objection is received by India from Pakistan within the specified period of two months, then Pakistan shall be deemed to have no objection.

21. If a question arises as to whether or not the design of a Small Plant conforms to the criteria set out in Para-
graph 18, then either Party may proceed to have the question resolved in accordance with the provisions of Article IX(1) and (2).

22. If any alteration in the design of a Small Plant, whether during the construction period or subsequently, results in a change in the information furnished to Pakistan under the provisions of Paragraph 19, then India shall immediately communicate the change in writing to Pakistan.

23. If, with any alteration proposed in the design of a Small Plant, the design would cease to comply with the criteria set out in Paragraph 18, then the provisions of Paragraphs 18 to 22 inclusive shall no longer apply and, in lieu thereof, the provisions of Paragraphs 8 to 13 inclusive shall apply.

Part 4—New Plants on Irrigation Channels

24. Notwithstanding the foregoing provisions of this Annexure, there shall be no restriction on the construction and operation by India of new hydro-electric plants on any irrigation channel taking off the Western Rivers, provided that

(a) the works incorporate no storage other than Pondage and the Dead Storage incidental to the diversion structure, and

(b) no additional supplies are run in the irrigation channel for the purpose of generating hydro-electric power.

Part 5—General

25. If the change referred to in Paragraphs 6(a) and 12 is not material, India shall communicate particulars of the change to Pakistan, in writing, as soon as the alteration has been made or the repairs have been undertaken. The provisions of Paragraph 7 or Paragraph 23, as the case may be, shall then apply.
APPENDIX I TO ANNEXURE D

(Paragraph 5)

1. Location of Plant
   General map showing the location of the site; if on a Tributary, its situation with respect to the main river.

2. Hydraulic Data
   (a) Stage-area and stage-capacity curves of the reservoir, forebay and Regulating Basin.
   (b) Full Pondage Level, Dead Storage Level and Operating Pool.
   (c) Dead Storage capacity.

3. Particulars of Design
   (a) Type of spillway, length and crest level; size, number and top level of spillway gates.
   (b) Outlet works: function, type, size, number, maximum designed capacity and sill levels.
   (c) Aggregate designed maximum discharge through the turbines.
   (d) Maximum aggregate capacity of power units (exclusive of standby units) for Firm Power and Secondary Power.
   (e) Regulating Basin and its outlet works: dimensions and maximum discharge capacity.

4. General
   Probable date of completion of river works, and dates on which various stages of the plant would come into operation.
APPENDIX II TO ANNEXURE D

(Paragraph 9)

1. **Location of Plant**
   General map showing the location of the site; if on a Tributary, its situation with respect to the main river.

2. **Hydrologic Data**
   (a) General map (Scale: $\frac{1}{4}$ inch or more = 1 mile) showing the discharge observation site or sites or rainfall gauge stations on whose data the design is based. In case of a Plant on a Tributary, this map should also show the catchment area of the Tributary above the site.
   
   (b) Observed or estimated daily river discharge data on which the design is based (observed data will be given for as long a period as available; estimated data will be given for as long a period as possible; in both cases data may be limited to the latest 25 years).
   
   (c) Flood data, observed or estimated (with details of estimation).
   
   (d) Gauge-discharge curve or curves for site or sites mentioned in (a) above.

3. **Hydraulic Data**
   (a) Stage-area and stage-capacity curves of the reservoir, forebay and Regulating Basin, with contoured survey maps on which based.
   
   (b) Full Pondage Level, Dead Storage Level and Operating Pool together with the calculations for the Operating Pool.
   
   (c) Dead Storage capacity.
   
   (d) Estimated evaporation losses in the reservoir, Regulating Basin, head-race, forebay and tail-race.
   
   (e) Maximum designed flood discharge, discharge-capacity curve for spillway and maximum designed flood level.
   
   (f) Designated range of operation.
4. **Particulars of Design**

(a) Dimensioned plan showing dam, spillway, intake and outlet works, diversion works, head-race and forebay, powerhouse, tail-race and Regulating Basin.

(b) Type of dam, length and height above mean bed of river.

(c) Cross-section of the river at the site; mean bed level.

(d) Type of spillway, length and crest level; size, number and top level of spillway gates.

(e) Type of intake, maximum designed capacity, number and size, sill levels; diversion works.

(f) Head-race and tail-race: length, size, maximum designed capacity.

(g) Outlet works: function, type, size, number, maximum designed capacity and sill levels.

(h) Discharge proposed to be passed through the Plant, initially and ultimately, and expected variations in the discharge on account of the daily and the weekly load fluctuations.

(i) Maximum aggregate capacity of power units (exclusive of standby units) for Firm Power and Secondary Power.

(j) Regulating Basin and its outlet works: type, number, size, sill levels and designed maximum discharge capacity.

5. **General**

(a) Estimated effect of proposed development on the flow pattern below the last plant downstream (with details of estimation).

(b) Probable date of completion of river works, and dates on which various stages of the Plant would come into operation.
1. **Location of Small Plant**

General map showing the location of the site on the Tributary and its situation with respect to the main river.

2. **Hydrologic Data**

(a) Observed or estimated daily Tributary discharge (observed data will be given for as long a period as available; estimated data will be given for as long a period as possible; in both cases, data may be limited to the latest five years).

(b) Flood data, observed or estimated (with details of estimation).

(c) Gauge-discharge curve relating to discharge site.

3. **Hydraulic Data**

(a) Stage-area and stage-capacity curves of the forebay with survey map on which based.

(b) Full Pondage Level, Dead Storage Level and Operating Pool together with the calculations for the Operating Pool.

4. **Particulars of Design**

(a) Dimensioned plan showing diversion works, outlet works, head-race and forebay, powerhouse and tail-race.

(b) Type of diversion works, length and height of crest or top level of gates above the mean bed of the Tributary at the site.

(c) Cross-section of the Tributary at the site; mean bed level.

(d) Head-race and tail-race: length, size and designed maximum capacity.
(e) Aggregate designed maximum discharge through the turbines.

(f) Spillway, if any: type, length and crest level; size, number and top level of gates.

(g) Maximum aggregate capacity of power units (exclusive of standby units) for Firm Power and Secondary Power.