



Pondage: Legal Analysis

Dr Cameron Miles

*Indus Waters Treaty (Pakistan v
India), PCA Case No 2023-01*

**Hearing for the
Second Phase on the Merits**

2 February 2026

Procedural Order No 17 (I)



PCA Case No. 2023-01
IN THE MATTER OF
THE INDUS WATERS WESTERN RIVERS ARBITRATION

- before -

THE COURT OF ARBITRATION CONSTITUTED
IN ACCORDANCE WITH THE INDUS WATERS TREATY 1960

- between -

THE ISLAMIC REPUBLIC OF PAKISTAN

- and -

THE REPUBLIC OF INDIA

PROCEDURAL ORDER
(SECOND PHASE ON THE

WHEREAS on 8 November 2025, the Court issued Procedural Order No. 16, indicating, among other things, that either Party may request a further phase of the proceedings specific to “resolving the basis upon which India must determine the installed capacity and anticipated load of a proposed Annexure D, Part 3 HEP, and, once determined, how these elements are to be taken into account for purposes of the calculation of maximum Pondage” (the “**Capacity/Load/Pondage Calculation Issues**”);

COURT OF ARBITRATION:

Professor Sean D. Murphy (Chairman)
Professor Wouter Buytaert
Professor Jeffrey P. Minear
Judge Awn Shawkat Al-Khasawneh
Dr. Donald Blackmore

SECRETARIAT:

The Permanent Court of Arbitration

21 November 2025

Procedural Order No 17 (II)



PCA Case No. 2023-01
IN THE MATTER OF
THE INDUS WATERS WESTERN RIVERS ARBITRATION

- before -

THE COURT OF ARBITRATION
IN ACCORDANCE WITH THE INDUS

- between -

THE ISLAMIC REPUBLIC OF

- and -

THE REPUBLIC OF PAKISTAN

PROCEDURAL ORDER
(SECOND PHASE ON THE MERITS)

COURT OF ARBITRATION:

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SECRETARIAT:

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21 November 2025

- 2.3.5 Pakistan’s current position as to the basis upon which India must determine the installed capacity and anticipated load of a proposed Annexure D, Part 3 HEP, including what limits, if any, the Treaty places on India’s discretion in this respect;
- 2.3.6 Pakistan’s current position as to how those elements (once determined), along with others, are to be taken into account for purposes of the calculation of maximum Pondage under Paragraph 8(c) of Annexure D to the Treaty; and
- 2.3.7 Any other issues Pakistan considers relevant to a decision on the questions at issue for the Second Phase on the Merits.



Part I

How is installed capacity and anticipated load to be determined?



Guiding principles from the General Issues Award

- 1. Installed capacity is the total capacity of a HEP's turbines; anticipated load is the expected daily and weekly load on the HEP.
- 2. Installed capacity and anticipated load must be determined on the basis of a *"realistic, well-founded, and defensible"* projection.
- 3. India bears the burden of proving its projections by reference to Paragraph D.9 and Appendix D.II material.
- 4. Installed capacity and anticipated load must reflect how the HEP will *"actually be operated"* and cannot be used to inflate the Pondage allocation.

Guiding principle 2 (I)



REPORTS OF INTERNATIONAL ARBITRAL AWARDS

RECUEIL DES SENTENCES ARBITRALES

Award in the Arbitration regarding the Indus Waters Kishenganga
Pakistan and India --
Sentence arbitrale relative à l'affaire « Eaux de l'Indus
Kishenganga » opposant le Pakistan et l'Inde

20 December 2013 - 20 décembre 2013

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397. Turning to the threshold for necessity, the Court sees no need to associate this term with indispensability or emergency action, as argued by Pakistan. The concept of necessity appears elsewhere in the Treaty without such connotations, including the provisions of Annexure G interpreted by the Court in its Order on Interim Measures.⁵⁹⁴ The Court sees no reason, for purposes of the Treaty, to ascribe to it any special meaning beyond the normal use of the term to describe action that is “required, needed or essential for a particular purpose.”⁵⁹⁵ The Court considers inapposite the concepts of necessity developed in international trade law, investment law and other special areas. Likewise, the Court finds it inappropriate to import the understanding of necessity as a circumstance precluding wrongfulness under the law of State responsibility.

⁵⁹⁵ *Ibid.* The Oxford English Dictionary defines “necessary” as a synonym of “required to be done, achieved, or present; needed” (Concise, 11th ed., 2008). Similarly, the New Oxford American Dictionary provides the following synonyms for “necessary”: “required to be done, achieved, or present; needed; essential” (3rd ed., 2010).



Guiding principle 2 (II)

Realistic

- *"Characterised by fidelity of representation; representing things as they really are."*
- *"Facing reality squarely: not impractical or visionary."*

Well-founded

- *"Built on a firm or solid base; having a foundation in fact or reason, based on good grounds and evidence."*
- *"Constructed on a solid or firm foundation."*
- *"Having a firm foundation in fact: based on excellent reasoning, information, judgment and grounds."*

Defensible

- *"Able to be defended; easily defended; justifiable."*
- *"Capable of being defended."*



Guiding principles from the General Issues Award

Installed capacity is the total capacity of a HEP's turbines; anticipated load is the expected daily and weekly load on the HEP.

Installed capacity and anticipated load must be determined on the basis of a *"realistic, well-founded, and defensible"* projection.

India bears the burden of proving its projections by reference to Paragraph D.9 and Appendix D.II material.

Installed capacity and anticipated load must reflect how the HEP will *"actually be operated"* and cannot be used to inflate the Pondage allocation.

Guiding principle 3



PCA Case No. 2021-09
IN THE MATTER OF
THE INDUS WATERS WESTERN RIVER TREATY
- before -
THE COURT OF ARBITRATION
IN ACCORDANCE WITH THE INDUS WATERS WESTERN RIVER TREATY
- between -
THE ISLAMIC REPUBLIC OF PAKISTAN
- and -
THE REPUBLIC OF INDIA
AWARD ON ISSUES OF GENERAL PRINCIPLES
OF THE INDUS WATERS WESTERN RIVER TREATY
COURT OF ARBITRATION
Professor Sean D. Murphy
Professor Wouter Bu
Professor Jeffrey P. M
Judge Awn Shawkat AL-F
Dr. Donald Black
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The Permanent Court of
8 August 2025

Power and Secondary Power”.¹²⁵⁰ Thus, to fulfill its Treaty obligations, India must include information and an explanation relating to its calculation of maximum Pondage pursuant to Paragraph 8(c). India’s notification must give Pakistan sufficient time to respond with its views as to whether the design is compliant with the Treaty. In this respect, the deadline of *at least* six months before construction in Paragraph 9 of Annexure D should be seen as a minimum, and notification provided earlier (indeed, potentially much earlier) as necessary to enable India still to modify its design in the face of valid concerns. If Pakistan raises timely objections, India must give them careful consideration and both Parties must proceed in a spirit of cooperation and good faith. Ultimately, if a difference emerges in this regard between the Parties, it is for India, as the proponent of the design and construction of the HEP, to establish that the proposed maximum Pondage satisfies the requirements of Paragraph 8(c), bearing in mind any Pakistani position that a more Treaty-compliant alternative exists.



Guiding principles from the General Issues Award

- Installed capacity is the total capacity of a HEP's turbines; anticipated load is the expected daily and weekly load on the HEP.
- Installed capacity and anticipated load must be determined on the basis of a *"realistic, well-founded, and defensible"* projection.
- India bears the burden of proving its projections by reference to Paragraph D.9 and Appendix D.II material.
- Installed capacity and anticipated load must reflect how the HEP will *"actually be operated"* and cannot be used to inflate the Pondage allocation.

Guiding principle 4



PCA Case No. 2023-01
IN THE MATTER OF
THE INDUS WATERS WESTERN RIVERS ARBITRATION

- before -

THE COURT OF ARBITRATION CONSTITUTED
IN ACCORDANCE WITH THE

THE ISLAMIC RE

THE REPU

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REGARDING DISCLO

COURT OF

Professor Sean D
Professor Ivonne duysens
Professor Jeffrey P. Minear
Judge Awn Shawkat Al-Khasawneh
Dr. Donald Blackmore

SECRETARIAT:

The Permanent Court of Arbitration

29 January 2026

35. The Court recalls that, in the Second Phase on the Merits, the Court is to “resolv[e] the basis upon which India must determine the installed capacity and anticipated load of a proposed Annexure D, Part 3 HEP, and, once determined, how these elements are to be taken into account for purposes of the calculation of maximum Pondage”. Further, the Court recalls that, in its Award on Issues of General Interpretation, the Court stated that, “[a]s a general matter, the plant’s installed capacity and anticipated load *must correspond to how the plant will actually be operated*; it cannot be hypothesized in a manner that serves to inflate the amount of maximum Pondage”.⁹

Relevance of hydrology



Installed Capacity

- Cannot be any greater than that which the hydrology can realistically support.
- Compare 330MW KHEP with 1856 Swalkot HEP.

Anticipated Load

- Determines when the HEP is able to produce power.
- Compels that stability of flow be taken into account in determining load.

Relevance of the power system (I)



HYDROELECTRIC HANDBOOK

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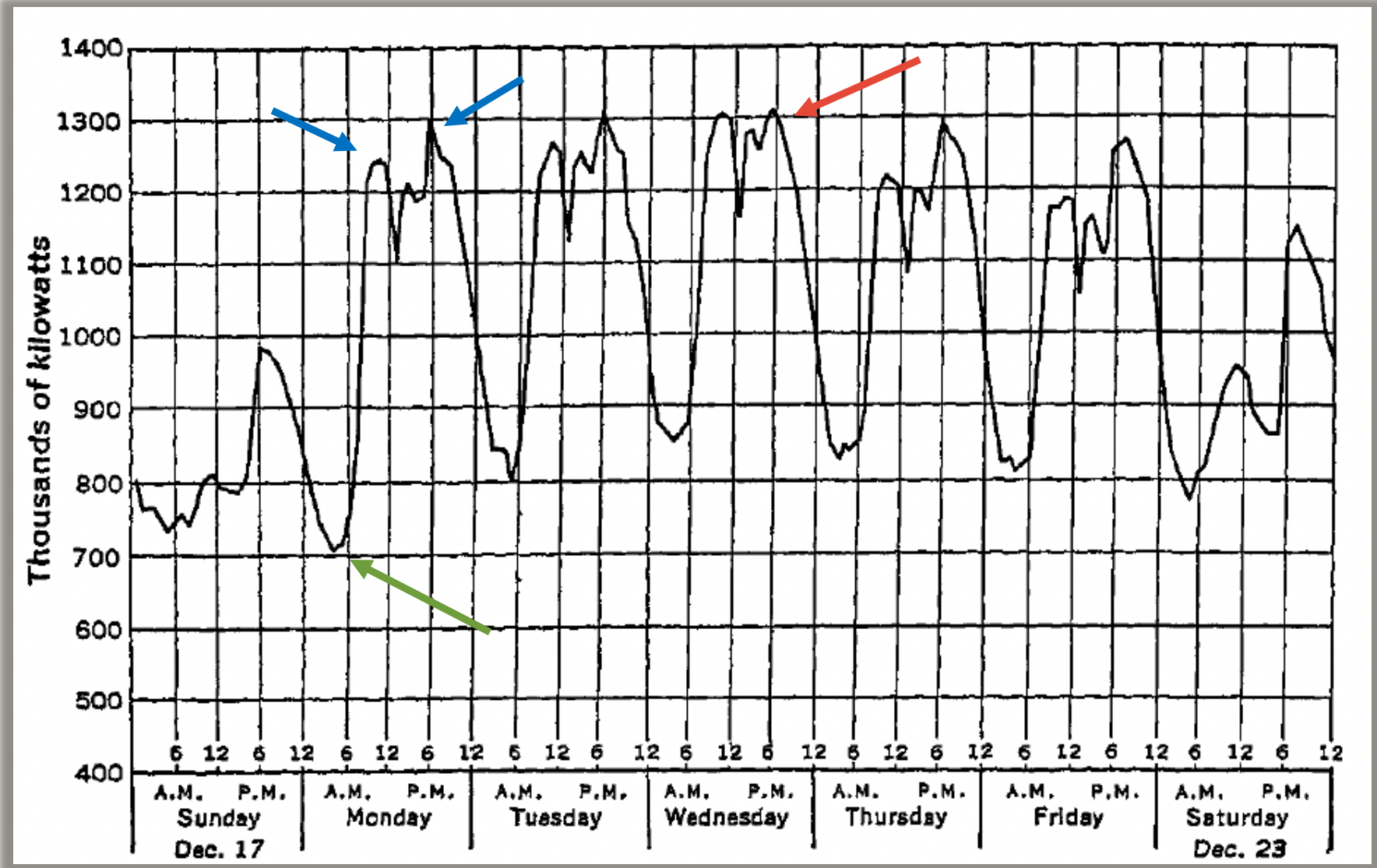
SECOND EDITION

NEW YORK · JOHN WILEY & SONS, INC.
LONDON · CHAPMAN & HALL, LIMITED

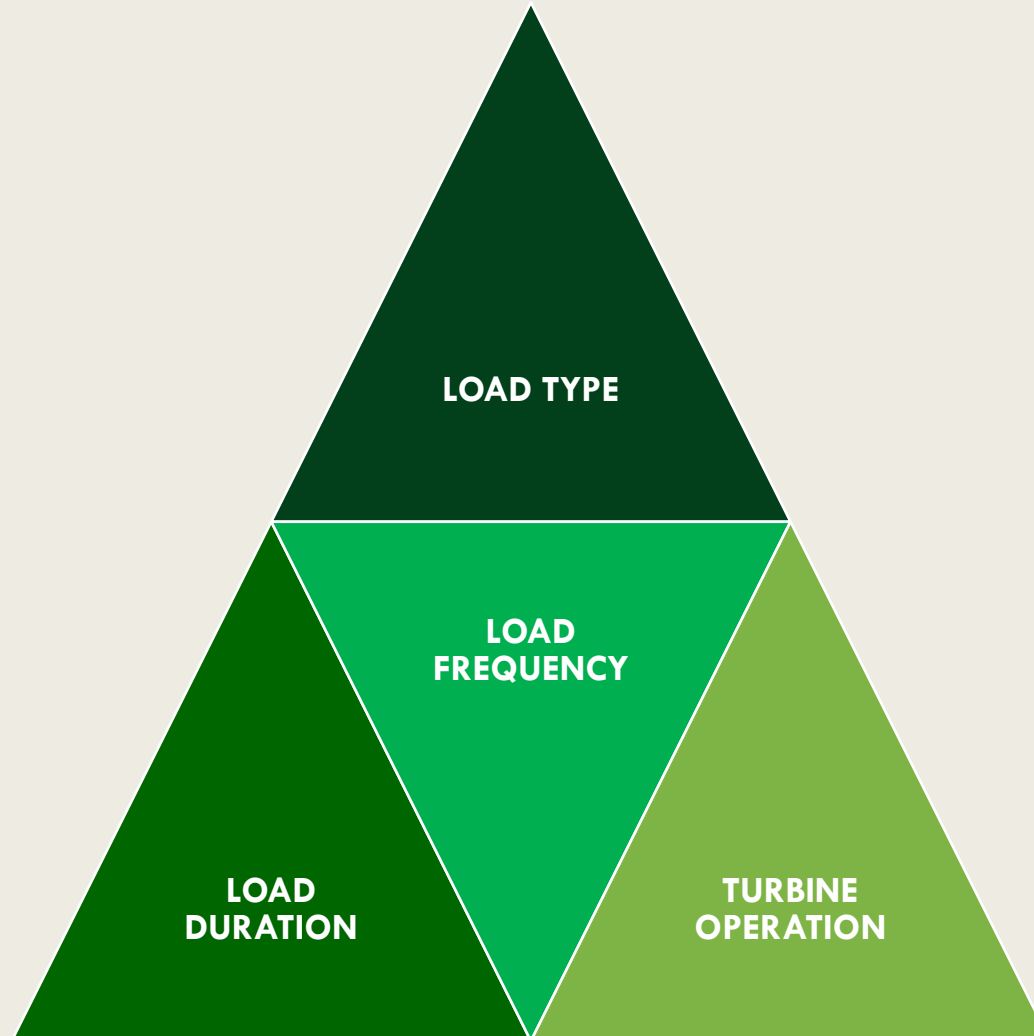
2. Effect of Pondage on Plant Capacity. The advisable capacity of a hydroelectric project depends upon the extent to which the installation may be utilized within the limits of the connected load curve (see Chapter 14). The following examples will serve to indicate the various limitations of a water-power development as affected by market requirements, capacity, pondage, stream flow, and steam plants.

6. Weekly Load Curves. If one examines the weekly load curves for any given system for the past few years, he will be impressed by the similarity of the shape of the weekly load curve for any given period in the year. Thus, if one were to take a typical weekly load curve for October of a recent year and multiply the ordinates by the growth ratio between the two periods, he would closely approximate the actual weekly load curve for October of the later year. This similarity in the shape of the weekly load curve for any given period of the year makes this curve particularly valuable in helping to determine how a proposed hydro plant may be fitted to the load curve.

Relevance of the power system (II)



Relevance of the power system (III)



Load type



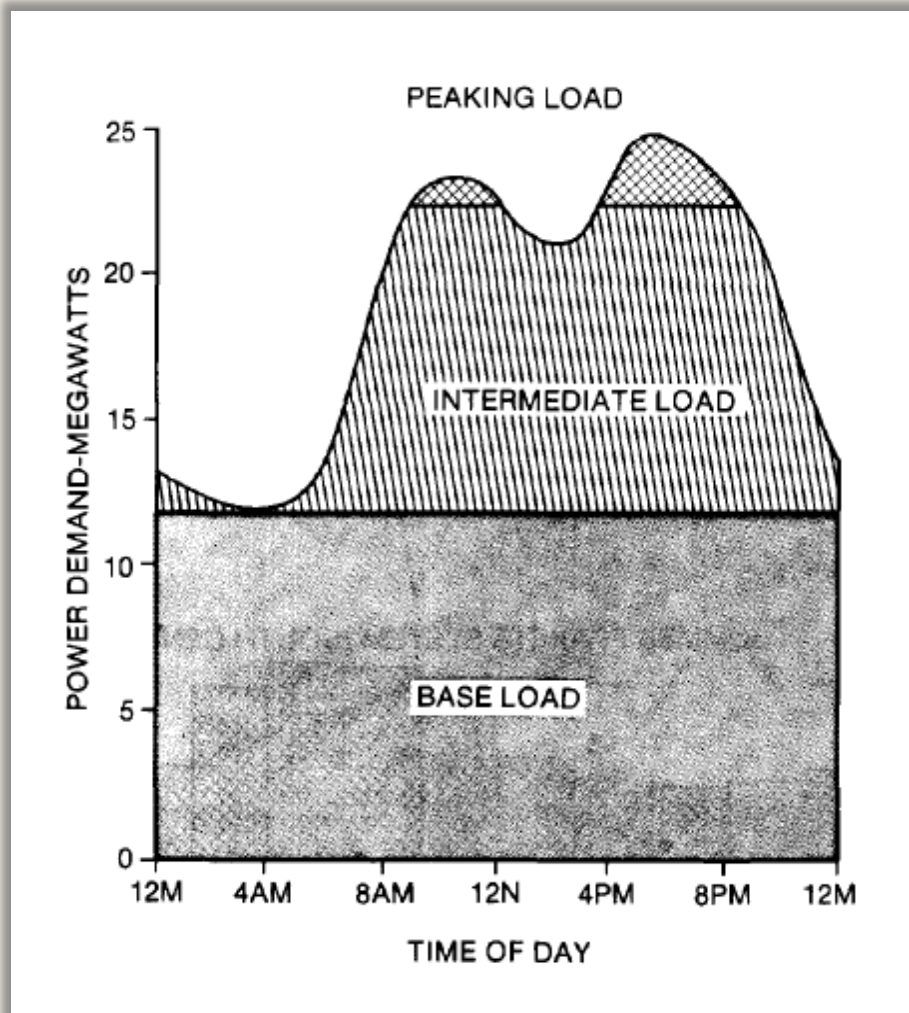
UNIT LOADING

- HEP follows the minute-to-minute movement of the power system.
- As demand is never zero, HEP cannot be zero loaded, but can store water in times of lower demand.

BLOCK LOADING

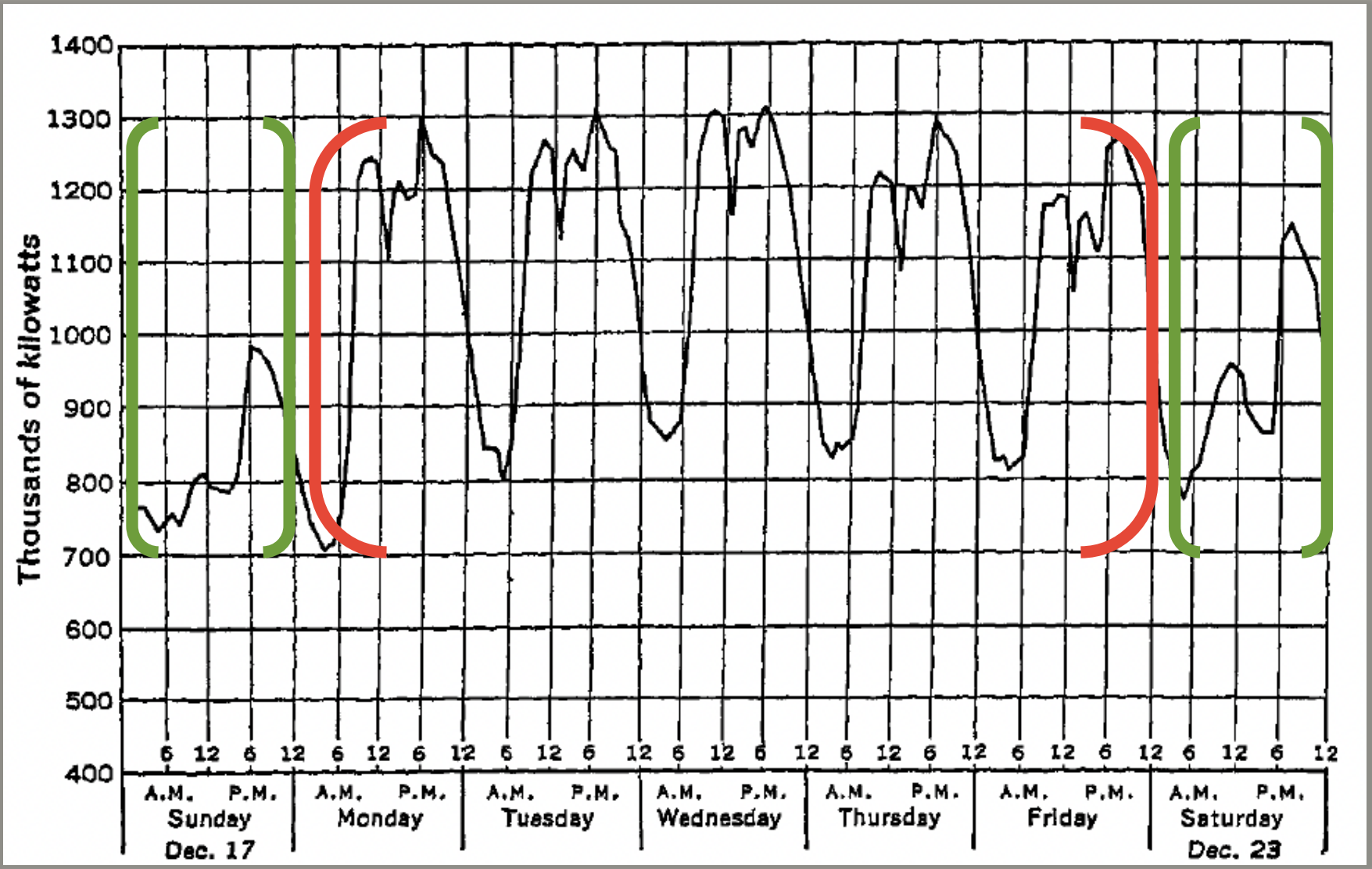
- HEP produces during times of peak demand, in defined 'blocks' of power generation.
- When not producing, HEP may be zero loaded to maximise storage.

Load duration

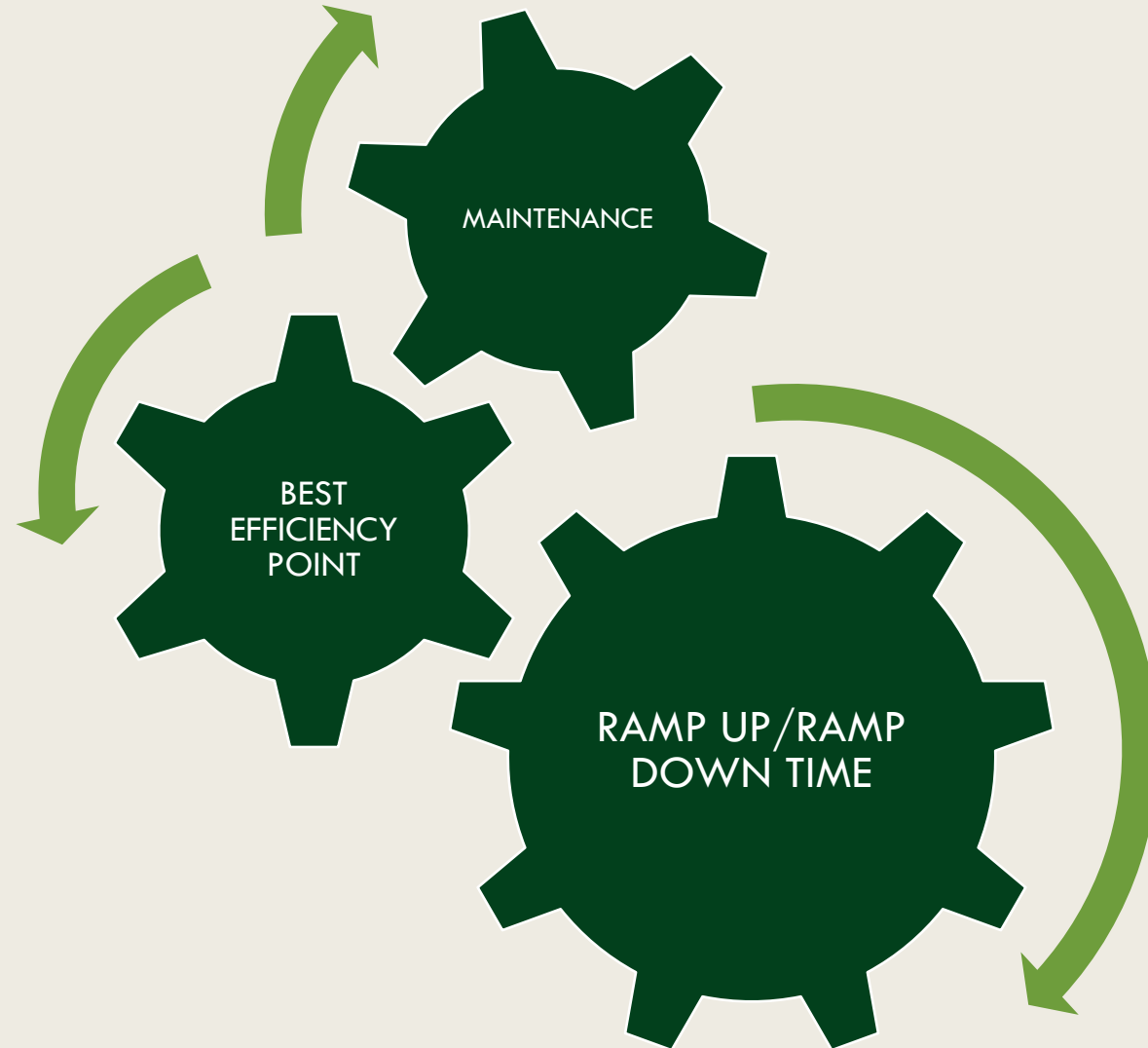


- **BASELOAD:** always required, 24 hours per day.
- **INTERMEDIATE:** above baseload, 8–14 hours per day.
- **PEAK:** above intermediate load, less than 8 hours per day.

Load frequency



Turbine operation





Part II

How is installed capacity and anticipated load to be taken into account?

Paragraph 8(c) and the General Issues Award



PCA Case No. 2023-01
IN THE MATTER OF
THE INDUS WATERS WESTERN RIVERS ARBITRATION
- before -
THE COURT OF ARBITRATION CONSTITUTED
IN ACCORDANCE WITH THE INDUS WATERS TREATY
- between -
THE ISLAMIC REPUBLIC OF PAKISTAN
- and -
THE REPUBLIC OF INDIA

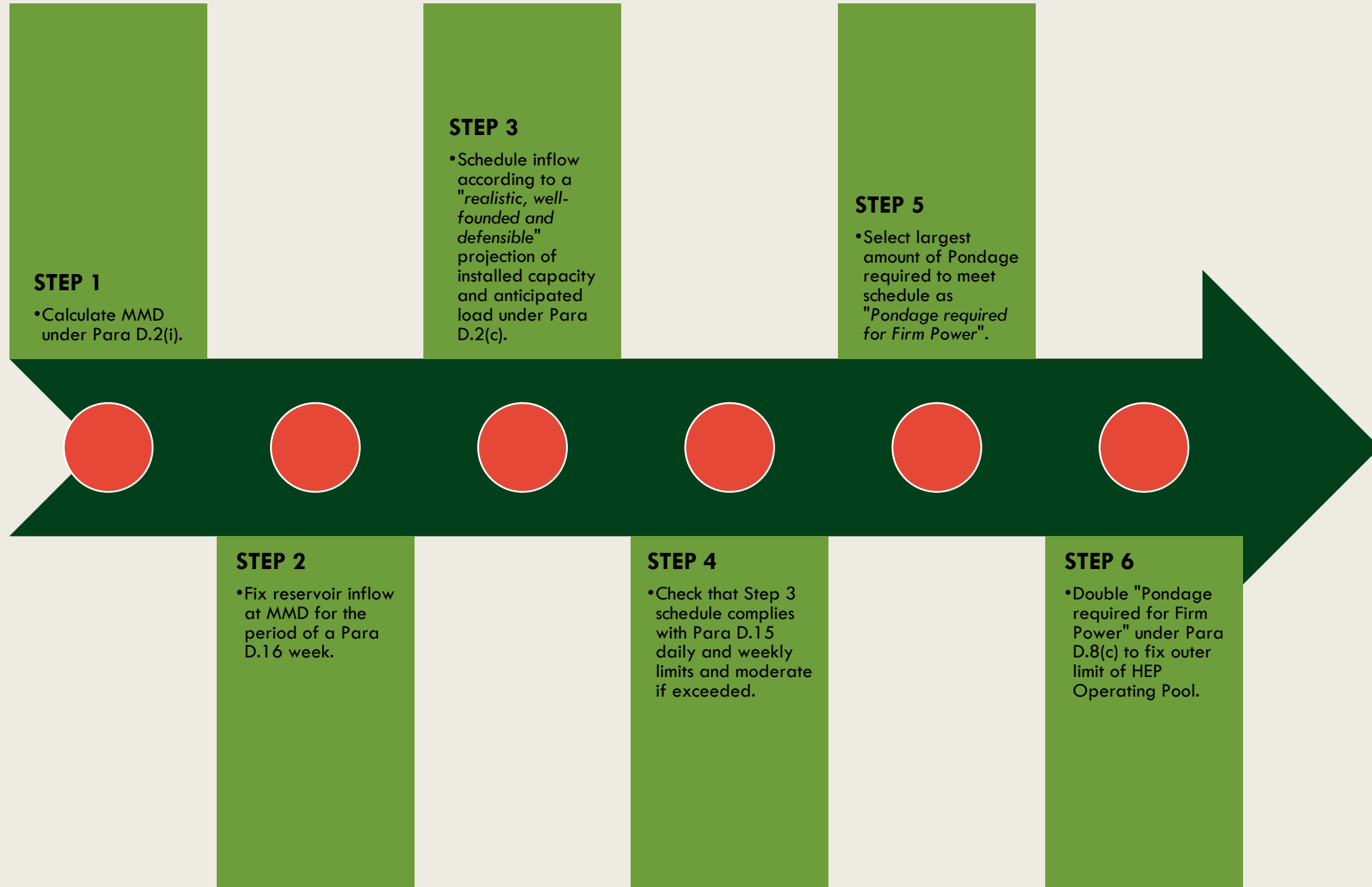
AWARD ON ISSUES OF GENERAL INTERPRETATION
OF THE INDUS WATERS TREATY

COURT OF ARBITRATION:
Professor Sean D. Murphy (Chairman)
Professor Wouter Buytaert
Professor Jeffrey P. Minear
Judge Awn Shawkat Al-Khasawneh
Dr. Donald Blackmore

SECRETARIAT:
The Permanent Court of Arbitration

8 August 2025

- (1) “Firm Power”, shall be calculated as the hydro-electric power corresponding to the minimum mean discharge at the site of the Plant, calculated in accordance with Paragraph 2(i) of Annexure D;
- (2) “Pondage required for Firm Power” shall be calculated based on the water that can be accumulated and released at the site of India’s proposed Annexure D, Part 3 HEP during the course of no more than a seven-day period, within the following constraints:
 - (i) Pondage required for Firm Power shall be calculated based on what can be accumulated during that period when the stream flow of the river is at the MMD, as set forth in Paragraph 2(i) of Annexure D;
 - (ii) “Pondage required for Firm Power” shall be calculated based on a realistic projection of the proposed HEP’s installed capacity and anticipated load, reflecting the fluctuations in the discharge of the turbines arising from variations in the daily and weekly loads of the plant, as set forth in Paragraph 2(c) of Annexure D; and
 - (iii) “Pondage required for Firm Power” shall be calculated in a manner that abides by the daily and weekly release requirements set out in Paragraph 15 of Annexure D; and
- (3) “maximum Pondage” shall be no more than twice the Pondage calculated in accordance with the above requirements.





Key interpretive assumptions for Step 3

1. Installed capacity and anticipated load must be **“realistic, well-founded and defensible”**.
2. What is **“realistic, well-founded and defensible”**:
 1. must correspond to how the HEP will **“actually be operated”** once constructed;
 2. cannot be **“hypothesized in a manner that serves to inflate”** maximum Pondage; and
 3. must be **proved** by India on the basis of **Para D.9 material**.
3. How the HEP will **“actually be operated”** will be determined by:
 1. the **hydrology** of the HEP site; and
 2. the **needs of the power system** to which the HEP will contribute **during the dry season**.
4. The needs of the power system will be determined by reference to **a load curve representative of typical dry season demand**.
5. When determining capacity utilized and anticipated load, account should be taken of:
 1. **weekend/weekday** power distribution;
 2. the need for the HEP to **meaningfully contribute** to the power system;
 3. the need for a **realistic daily dispatch schedule**; and
 4. HEP turbine **operational requirements**.



Part III

Other matters relevant to
calculation of maximum
Pondage

Paragraph 15 and the General Issues Award (I)



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- before -

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IN ACCORDANCE WITH THE INDUS WATERS TREATY

- between -

THE ISLAMIC REPUBLIC OF PAKISTAN

- and -

THE REPUBLIC OF INDIA

AWARD ON ISSUES OF GENERAL INTEREST
OF THE INDUS WATERS TREATY

COURT OF ARBITRATION

Professor Sean D. Murphy (Chairman)
Professor Wouter Buytaert
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Judge Awn Shawkat Al-Khasab
Dr. Donald Blackmore

SECRETARIAT:

The Permanent Court of Arbitration

8 August 2025

678. Thus, the ordinary meaning of Paragraph 8(c) must be interpreted in its context, to include other relevant provisions of Annexure D and of the Treaty as a whole. One important element of context is Paragraph 15 of Annexure D, which plays a crucial role in ensuring that India meets its obligation under Article III to “let flow” the waters of the Western Rivers, subject to the exceptions noted therein.¹¹⁵⁰ Paragraph 15 generally requires that: (a) the same volume of water received in the river upstream of the plant in a week must be released back into the river below the plant in the same week; and (b) the volume of water delivered into the river in any given day generally shall not be less than 30 per cent or more than 130 per cent of the volume received above the plant during the same 24-hour period.¹¹⁵¹ These basic operational constraints, albeit

Paragraph 15 and the General Issues Award (II)



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- betw
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AWARD ON ISSUES OF GENERAL INTERPRETATION
OF THE INDUS WATERS TREATY 1960

COURT OF ARBITRATION
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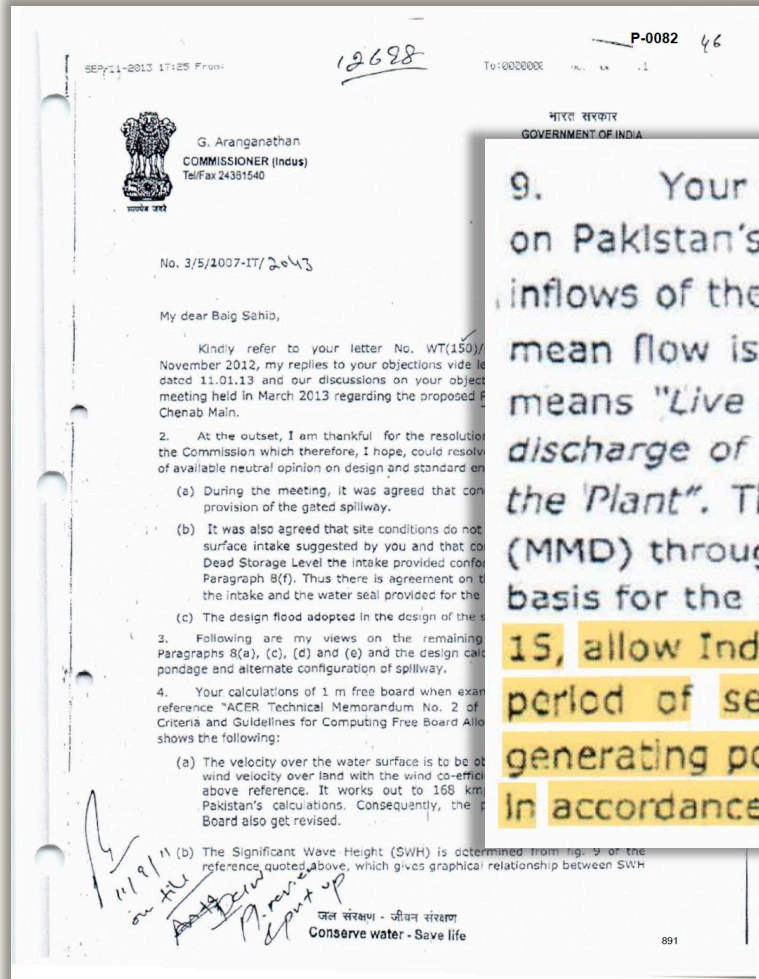
SECRETARIAT:

The Permanent Court of Arbitration

8 August 2025

681. Thus, although Paragraph 8(c) does not expressly refer to Paragraph 15, the latter is a vital element for the methodology for calculating “maximum Pondage”, for it serves as a turbine discharge constraint that must be considered in determining how to manage water storage to meet the HEP’s daily and weekly load conditions. Absent the daily and weekly water delivery requirements contained in Paragraph 15, India would have much greater latitude to accumulate storage to meet peak load demands, contrary to the object and purpose of the Treaty.¹¹⁵⁹

India's approach to Paragraph 15



9. Your objection to the volume of Pondage in Rattle HEP once again rests on Pakistan's view of the determination of Pondage to meet fluctuations in the inflows of the river Chenab over a period of consecutive seven days in which the mean flow is close to MMD. To the contrary, as per Paragraph 2(c), "Pondage" means "Live storage of only sufficient magnitude to meet the fluctuations in the discharge of the turbines arising due to variations in daily and weekly loads of the Plant". The requirement of continuous release of Minimum Mean Discharge (MMD) through the turbine, as you state, is nowhere stated in the Treaty as the basis for the determination of Pondage. Further, the operation rules in Paragraph 15, allow India to hold or release water within a band of 50% to 130% within a period of seven days. Therefore, there can be no objection to the Plant generating power in any pattern, including peaking, so long as it releases water in accordance with Paragraph 15.

Paragraph 15 and the General Issues Award (III)



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AWARD ON ISSUES OF GENERAL INTERPRETATION
OF THE INDUS WATERS TREATY

COURT OF ARBITRATION:

Professor Sean D. Murphy (Chairman)
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SECRETARIAT:

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8 August 2025

- (1) “Firm Power”, shall be calculated as the hydro-electric power corresponding to the minimum mean discharge at the site of the Plant, calculated in accordance with Paragraph 2(i) of Annexure D;
- (2) “Pondage required for Firm Power” shall be calculated based on the water that can be accumulated and released at the site of India’s proposed Annexure D, Part 3 HEP during the course of no more than a seven-day period, within the following constraints:
 - (i) Pondage required for Firm Power shall be calculated based on what can be accumulated during that period when the stream flow of the river is at the MMD, as set forth in Paragraph 2(i) of Annexure D;
 - (ii) “Pondage required for Firm Power” shall be calculated based on a realistic projection of the proposed HEP’s installed capacity and anticipated load, reflecting the fluctuations in the discharge of the turbines arising from variations in the daily and weekly loads of the plant, as set forth in Paragraph 2(c) of Annexure D; and
 - (iii) “Pondage required for Firm Power” shall be calculated in a manner that abides by the daily and weekly release requirements set out in Paragraph 15 of Annexure D; and

E-flow and the *Kishenganga* Court (I)



REPORTS OF INTERNATIONAL ARBITRAL AWARDS

RECUEIL DES SENTENCES ARBITRAL

Award in the Arbitration regarding the Indus Water Treaty between
Pakistan and India --
Sentence arbitrale relative à l'affaire « Eaux de l'Indus » opposant le Pakistan et l'Inde

20 December 2013 - 20 décembre 2013

VOLUME XXXI pp.1-358

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451. Similarly, this Court recalls the acknowledgement by the Tribunal in the *Iron Rhine* arbitration of the “principle of general international law” that States have “a duty to prevent, or at least mitigate” significant harm to the environment when pursuing large-scale construction activities.⁶⁶² As the *Iron Rhine* Tribunal determined, this principle “applies not only in autonomous activities but also in activities undertaken in implementation of specific treaties,”⁶⁶³ such as, it may be said, the present Treaty.

E-flow and the *Kishenganga* Court (II)



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452. It is established that principles of international environmental law must be taken into account even when (unlike the present case) interpreting treaties concluded before the development of that body of law. The *Iron Rhine* Tribunal applied concepts of customary international environmental law to treaties dating back to the mid-nineteenth century, when principles of environmental protection were rarely if ever considered in international agreements and did not form any part of customary international law. Similarly, the International Court of Justice in *Gabčíkovo-Nagymaros* ruled that, whenever necessary for the application of a treaty, “new norms have to be taken into consideration, and ... new standards given proper weight.”⁶⁶⁴ It is therefore incumbent upon this Court to interpret and apply this 1960 Treaty in light of the customary international principles for the protection of the environment in force today.

E-flow and the *Kishenganga* Court (III)



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ARBITRAL

Award in the Arbitration re
Sentence arbitrale relati
Kishenganga

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455. There is thus no disagreement between the Parties that the maintenance of a minimum flow downstream of the KHEP is required in response to considerations of environmental protection. The Parties differ, however, as to the quantity of water that would constitute an appropriate minimum; thus, the precise amount of flow to be preserved remains to be determined by the Court.

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E-flow and the *Kishenganga* Court (III)



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Kishenganga » opposant le Pakistan

20 December 2013 - 20 décembre 2013

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112. As the Court held in its *Partial Award*, “States have ‘a duty to prevent, or at least mitigate’ significant harm to the environment when pursuing large-scale construction activities.”¹⁶¹ In light of this duty, the Court has no difficulty concluding that the requirement of an environmental flow (without prejudice to the level of such flow) is necessary in the application of the Treaty. At the same time, the Court does not consider it appropriate, and certainly not “necessary,” for it to adopt a precautionary approach and assume the role of policymaker in determining the balance between acceptable environmental change and other priorities, or to permit environmental considerations to override the balance of other rights and obligations expressly identified in the Treaty—in particular the entitlement of India to divert the waters of a tributary of the Jhelum. The Court’s authority is more limited and extends only to mitigating significant harm. Beyond that point, prescription by the Court is not only unnecessary, it is prohibited by the Treaty. If customary international law were applied not to circumscribe, but to negate rights expressly granted

Pondage and HEP operational rules (I)



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- before -

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AWARD ON ISSUES OF GENERAL INTERPRETATION
OF THE INDUS WATERS TREATY

COURT OF ARBITRATION:
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Dr. Donald Blackmore

SECRETARIAT:
The Permanent Court of Arbitration

8 August 2025

680. The Court agrees that Paragraph 8(c) identifies a design criterion, while Paragraph 15 sets out an operational criterion. Yet, any engineering work is designed with reference to the manner in which it may be, and is intended to be, operated; hence, design and operation cannot be so strictly separated. As the *Kishenganga* Court rightly noted in its Partial Award, a “review of the context of Paragraph 15 makes clear that the provision is placed within a continuum of design, construction and operation that cannot properly be separated into watertight compartments”.¹¹⁵⁷ To that end, it found that the provisions contained in Part 3 of Annexure D “must be interpreted in a mutually reinforcing manner to avoid forbidding with one provision what is permitted by others”.¹¹⁵⁸ In this instance, both design and operational provisions serve to constrain the volume of maximum Pondage at the HEP. Indeed, India’s ability to time the retention or release of water—the central concern of Paragraph 15—turns on the volume of water able to be temporarily stored as Pondage pursuant to Paragraph 8(c).

Pondage and HEP operational rules (II)



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Professor Weidong Cai
Professor Jeffrey J. Gold
Judge Awn Shawkat Al-Khasawneh
Dr. Donald Blackmore

SECRETARIAT:

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8 August 2025

681. Thus, although Paragraph 8(c) does not expressly refer to Paragraph 15, the latter is a vital element for the methodology for calculating “maximum Pondage”, for it serves as a turbine discharge constraint that must be considered in determining how to manage water storage to meet the HEP’s daily and weekly load conditions. Absent the daily and weekly water delivery requirements contained in Paragraph 15, India would have much greater latitude to accumulate storage to meet peak load demands, contrary to the object and purpose of the Treaty.¹¹⁵⁹

India and e-flow post-Kishenganga





STEP 1

- Calculate MMD under Para D.2(i).

STEP 3

- Schedule inflow according to a "realistic, well-founded and defensible" projection of installed capacity and anticipated load under Para D.2(c).

STEP 5

- Check that the Step 3 schedule incorporates the applicable e-flow for the HEP site that India must provide under customary international law and moderate as required.

STEP 7

- Double "Pondage required for Firm Power" under Para D.8(c) to fix outer limit of HEP Operating Pool.

STEP 2

- Fix reservoir inflow at MMD for the period of a Para D.16 week.

STEP 4

- Check that Step 3 schedule complies with Para D.15 daily and weekly limits and moderate if exceeded.

STEP 6

- Select largest amount of Pondage required to meet schedule as "Pondage required for Firm Power".

