IN THE MATTER OF
THE INDUS WATERS KISHENGANGA ARBITRATION

-before-

THE COURT OF ARBITRATION CONSTITUTED
IN ACCORDANCE WITH THE INDUS WATERS TREATY 1960
BETWEEN THE GOVERNMENT OF INDIA
AND THE GOVERNMENT OF PAKISTAN
SIGNED ON 19 SEPTEMBER 1960

-between-

THE ISLAMIC REPUBLIC OF PAKISTAN

-and-

THE REPUBLIC OF INDIA

FINAL AWARD

COURT OF ARBITRATION:

Judge Stephen M. Schwebel (Chairman)
Sir Franklin Berman KCMG QC
Professor Howard S. Wheater FREng
Professor Lucius Caflisch
Professor Jan Paulsson
Judge Bruno Simma
H.E. Judge Peter Tomka

SECRETARIAT:

The Permanent Court of Arbitration

20 December 2013

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GLOSSARY OF DEFINED TERMS

Court	The Court of Arbitration in these proceedings as constituted pursuant to Article IX(5) and Annexure G of the Treaty
KHEP	Kishenganga Hydro-Electric Project
GWh	Gigawatt hours
India's Comments, CEA Report, August 2013	India's Comments on the Information Supplied by Pakistan on 21 June 2013, Vol. 2, Tab B, Central Electricity Authority, "Further Submissions on Impact of Minimum Releases from KHEP on Power Generation at KHEP," August 2013
India's Comments, CWC Report, August 2013	India's Comments on the Information Supplied by Pakistan on 21 June 2013, Vol. 2, Tab A, Central Water Commission (CWC), Government of India, "Hydrology Report," August 2013
India's Comments, Kondolf Report, August 2013	India's Comments on the Information Supplied by Pakistan on 21 June 2013, Tab C, G Mathias Kondolf, "Environmental Flows for the Kishenganga River Below KHEP," 13 August 2013
India's Data Submission, CEA Report, June 2013	India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, Vol. 2, Tab B, Central Electricity Authority, "Impact of Minimum Releases from KHEP on Power Generation at KHEP," June 2013
India's Data Submission, CWC Report, June 2013	India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, Vol. 2, Tab A, Central Water Commission (CWC), Government of India, "Hydrology Report," June 2013
India's Data Submission, DHI Report, 2013	India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, Tab F, DHI (India) Water & Environment, "Environmental Studies for Assessment of Impacts of Minimum Flow Releases," June 2013
NJHEP	Neelum-Jhelum Hydro-Electric Project
Order on Interim Measures	Order on the Interim Measures Application of Pakistan issued by the Court on 6 June 2011

Pakistan's Comments, NESPAK Hydrology Report, August 2013	Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), Annex A, National Engineering Services Pakistan (Pvt.) Limited, "Kishenganga Dam Partial Award: NESPAK's Comments on India's CWC Hydrology Report of June 2013," August 2013
Pakistan's Comments, NESPAK Power Generation Report, August 2013	Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), Annex C, National Engineering Services Pakistan (Pvt.) Limited, "Kishenganga Dam Partial Award: NESPAK Comments on India's 'CEA' Report on Impact of Minimum Release from KHEP on Power Generation by KHEP," August 2013
Pakistan's Data Submission, Environmental Report, June 2013	Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), Tab A, Water Matters, Southern Waters, Hagler Bailly Pakistan, Beuster, Clarke & Associates: "Kishenganga Dam Partial Award, Data Sought: Environmental Flows," 6 June 2013
Pakistan's Data Submission, NESPAK Hydrology Report, June 2013	Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), Tab C, National Engineering Services Pakistan (Pvt.) Limited, "Kishenganga Dam Partial Award: Detailed Information on Hydrological Estimates," June 2013 (including peer review by Professor Jens Christian Refsgaard in Appendix V)
Pakistan's Data Submission, NESPAK Power Generation Report, June 2013	Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), Tab B, National Engineering Services Pakistan (Pvt.) Limited, "Kishenganga Dam Partial Award: Power Generation at Neelum-Jhelum Hydroelectric Project," June 2013
Pakistan's Memorial, Environmental Report, April 2011	Pakistan's Memorial, Vol. 3, Tab D, Hagler Bailly Pakistan, Water Matters, Southern Waters & Beuster, Clarke and Associates, "Kishenganga/Neelum River Water Diversion: Environmental Assessment," May 2011
Pakistan's Memorial, NESPAK Report, April 2011	Pakistan's Memorial, Vol. 3, Tab B, National Engineering Services Pakistan (Pvt.) Limited, "Kishenganga/Neelum River, Hydrology and Impact of Kishenganga Hydroelectric Plant on Energy Generation in Pakistan," April 2011

Pakistan's Reply, NESPAK Report, February 2012	Pakistan's Reply, Vol. II, Tab B, National Engineering Services Pakistan (Pvt.) Limited, "NESPAK Consideration of India's Hydrology Report," February 2012
Partial Award	Partial Award issued by the Court on 18 February 2013
Parties	The Islamic Republic of Pakistan and the Republic of India
Treaty	Indus Waters Treaty 1960 Between the Government of India, the Government of Pakistan and the International Bank for Reconstruction and Development signed at Karachi on 19 September 1960, 419 U.N.T.S. 126
World Bank	International Bank for Reconstruction and Development

I. PROCEDURAL HISTORY

1. A detailed history of this arbitration is set out in the Court's Partial Award of 18 February 2013 (the "***Partial Award***"). In the present procedural summation, the Court records key developments subsequent to the issuance of its *Partial Award*.

A. THE INDUS WATERS TREATY AND THE INITIATION OF THIS ARBITRATION

2. On 19 September 1960, the Governments of the Republic of India and the Islamic Republic of Pakistan (the "**Parties**") signed the Indus Waters Treaty (the "**Treaty**").[1] The Treaty was also signed by the International Bank for Reconstruction and Development (the "**World Bank**") in respect of the World Bank's role under certain provisions of the Treaty. Instruments of ratification were exchanged between the Parties on 12 January 1961; the Treaty entered into force on that date with retroactive effect to 1 April 1960, as stated in Article XII(2).

3. Through a *Request for Arbitration* dated 17 May 2010, Pakistan initiated proceedings against India pursuant to Article IX and Annexure G of the Treaty.

4. In its Request for Arbitration, Pakistan stated that the Parties had failed to resolve the "Dispute" concerning the Kishenganga Hydro-Electric Project (the "**KHEP**") by agreement pursuant to Article IX(4) of the Treaty. Pakistan identified "two questions that are at the centre" of the dispute in the following terms:

> a. Whether India's proposed diversion of the river Kishenganga (Neelum) into another Tributary, i.e. the Bonar-Madmati Nallah, being one central element of the Kishenganga Project, breaches India's legal obligations owed to Pakistan under the Treaty, as interpreted and applied in accordance with international law, including India's obligations under Article III(2) (let flow all the waters of the Western rivers and not permit any interference with those waters) and Article IV(6) (maintenance of natural channels)?
>
> b. Whether under the Treaty, India may deplete or bring the reservoir level of a run-of-river Plant below Dead Storage Level (DSL) in any circumstances except in the case of an unforeseen emergency?[2]

5. As of 17 December 2010, a Court of Arbitration (the "**Court**") was constituted, comprising: Judge Stephen M. Schwebel (Chairman), Sir Franklin Berman, Professor Howard S. Wheater, Professor Lucius Caflisch, Professor Jan Paulsson, Judge Bruno Simma, and H.E. Judge Peter Tomka.

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1 *Indus Waters Treaty 1960 Between the Government of India, the Government of Pakistan and the International Bank for Reconstruction and Development*, 19 September 1960, 419 U.N.T.S. 126 ("Treaty").

2 Pakistan's Request for Arbitration, para. 4.

B. THE PROCEEDINGS ON INTERIM MEASURES AND THE MERITS

6. On 23 September 2011, further to a request from Pakistan and after receiving the written and oral submissions of both Parties, the Court issued its *Order on the Interim Measures Application of Pakistan dated 6 June 2011* (the "**Order on Interim Measures**"). The operative provisions of the Order read:

> 152. Having found that it is necessary to lay down certain interim measures in order to "avoid prejudice to the final solution . . . of the dispute" as provided under Paragraph 28 of Annexure G to the Indus Waters Treaty, the Court unanimously rules that:
>
> (1) For the duration of these proceedings up until the rendering of the Award,
>
> (a) It is open to India to continue with all works relating to the Kishenganga Hydro-Electric Project, except for the works specified in (c) below;
>
> (b) India may utilize the temporary diversion tunnel it is said to have completed at the Gurez site, and may construct and complete temporary cofferdams to permit the operation of the temporary diversion tunnel, such tunnel being provisionally determined to constitute a "temporary by-pass" within the meaning of Article I(15)(b) as it relates to Article III(2) of the Treaty;
>
> (c) Except for the sub-surface foundations of the dam stated in paragraph 151(iv) above, India shall not proceed with the construction of any permanent works on or above the Kishenganga/Neelum River riverbed at the Gurez site that may inhibit the restoration of the full flow of that river to its natural channel; and
>
> (2) Pakistan and India shall arrange for periodic joint inspections of the dam site at Gurez in order to monitor the implementation of sub-paragraph 1(c) above. The Parties shall also submit, by no later than December 19, 2011, a joint report setting forth the areas of agreement and any points of disagreement that may arise between the Parties concerning the implementation of this Order.
>
> 153. The Court shall remain actively seized of this matter, and may revise this Order or issue further orders at any time in light of the circumstances then obtaining.

7. Between May 2011 and May 2012, the Parties made written submissions to the Court. From 20 to 31 August 2012, the Court held a two-week hearing in The Hague.

8. On 18 February 2013, the Court issued its *Partial Award* in which it decided as follows:

> Having considered the Parties' written and oral submissions, the Court of Arbitration unanimously decides:
>
> A. In relation to the First Dispute,
>
> (1) The Kishenganga Hydro-Electric Project, as described to the Court by India, constitutes a Run-of-River Plant for the purpose of Paragraph 15 of Annexure D to the Indus Waters Treaty, and in particular sub-paragraph (iii) thereof.
>
> (2) India may accordingly divert water from the Kishenganga/Neelum River for power generation by the Kishenganga Hydro-Electric Plant and may deliver the water released below the power station into the Bonar Nallah.

(3) India is however under an obligation to construct and operate the Kishenganga Hydro-Electric Plant in such a way as to maintain a minimum flow of water in the Kishenganga/Neelum River, at a rate to be determined by the Court in a Final Award.

B. In relation to the Second Dispute,

(1) Except in the case of an unforeseen emergency, the Treaty does not permit reduction below Dead Storage Level of the water level in the reservoirs of Run-of-River Plants on the Western Rivers.

(2) The accumulation of sediment in the reservoir of a Run-of-River Plant on the Western Rivers does not constitute an unforeseen emergency that would permit the depletion of the reservoir below Dead Storage Level for drawdown flushing purposes.

(3) Accordingly, India may not employ drawdown flushing at the reservoir of the Kishenganga Hydro-Electric Plant to an extent that would entail depletion of the reservoir below Dead Storage Level.

(4) Paragraphs B(1) and B(2) above do not apply to Run-of-River Plants that are in operation on the date of issuance of this Partial Award. Likewise, Paragraphs B(1) and B(2) do not apply to Run-of-River Plants already under construction on the date of issuance of this Partial Award, the design of which, having been duly communicated by India under the provisions of Annexure D, had not been objected to by Pakistan as provided for in Annexure D.

C. This Partial Award imposes no further restrictions on the construction and operation of the Kishenganga Hydro-Electric Plant, which remain subject to the provisions of the Treaty as interpreted in this Partial Award.

D. To enable the Court to determine the minimum flow of water in the Kishenganga/Neelum River referred to in paragraph A(3) above, the Parties are required to submit to the Court the information specified in paragraphs 458 to 462 within the time periods set out in paragraph 463 of this Partial Award.

E. The interim measures indicated by the Court in its 23 September 2011 *Order on the Interim Measures Application of Pakistan dated 6 June 2011* are hereby lifted.

F. The costs of the proceedings to be awarded by the Court pursuant to Paragraph 26 of Annexure G to the Treaty shall be determined in the Court's Final Award.

9. Paragraphs 458 to 463 of the *Partial Award*, referenced in Section D of the Court's Decision, provide:

458. The Parties are requested to provide further data concerning the impacts of a range of minimum flows to be discharged at the KHEP dam on the following:

For India:

a) power generation at the KHEP;

b) environmental concerns from the dam site at Gurez to the Line of Control;

For Pakistan:

a) power generation at the NJHEP [Neelum-Jhelum Hydro-Electric Project];

b) agricultural uses of water downstream of the Line of Control to Nauseri; and

c) environmental concerns at and downstream of the Line of Control to Nauseri.

459. In compiling these further data, the Parties are required to incorporate a sufficient range of minimum flows so as to give the Court a full picture of the sensitivity of the river system.

460. These data should be accompanied by full information on the assumptions underlying these analyses, including those for power generation and environmental concerns, and the associated uncertainty in the Parties' estimates.

461. In addition, the Court would welcome receiving more detailed information on the estimates already put before it by each Party of historical flows at the KHEP dam site, at the Line of Control and at the NJHEP dam site.[668]

462. Finally, the Court would also welcome provision by the Parties of any relevant legislation, regulatory pronouncements or decisions that the Governments of Pakistan and India may have respectively issued concerning environmental flow requirements for hydro-electric or similar projects and, in particular, the Government of India for the KHEP.[669]

463. The Parties are requested to provide the foregoing information to the Court by no later than 120 days from the issuance of this Partial Award (i.e., by 19 June 2013). Each Party is invited to then comment on the information submitted by the other Party no later than 60 days thereafter (i.e., by 19 August 2013). After considering these submissions, the Court will issue its Final Award setting forth its decision on this matter, and will exert its best effort to do so by no later than the end of 2013.

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668 In the case of Pakistan, these are the daily flow data corresponding to Annexes 3, 4 and 9 of Pakistan's Memorial, vol. 3, Tab B, National Engineering Services Pakistan Limited, "Kishenganga/Neelum River: Hydrology and Impact of Kishenganga Hydroeletric Plant on Energy Generation in Pakistan," April 2011 (covering the period from 1971 to 2004). In the case of India these are daily flow estimates from the KHEP and the Line of Control for the same period. These data should be provided electronically, in Excel format.

669 In this regard, the Court recalls the Agent of India's statement at the hearing on the merits that the Indian National Hydroelectric Power Corporation (NHPC) and the Ministry of Environment and Forests had undertaken to cooperate to select an appropriate quantum for a minimum environmental flow at the KHEP. Hearing Tr., (Day 9), 30 August 2012, at 115:7-12.

C. PROCEEDINGS ON INDIA'S REQUEST FOR CLARIFICATION OR INTERPRETATION

10. On 20 May 2013, India submitted to the Court *a Request for Clarification or Interpretation*, pursuant to paragraph 27 of Annexure G to the Treaty, in which it requested "clarification or interpretation with respect to paragraph B.1 of the Court's Decision" in the *Partial Award*.

11. Paragraph 27 of Annexure G provides:

> At the request of either Party, made within three months of the date of the Award, the Court shall reassemble to clarify or interpret its Award. Pending such clarification or interpretation the Court may, at the request of either Party and if in the opinion of the Court circumstances so require, grant a stay of execution of its Award. After furnishing this clarification or interpretation, or if no request for such clarification or interpretation is made within three months of the date of the Award, the Court shall be deemed to have been dissolved.

12. At the invitation of the Court, Pakistan presented a *Submission in Response to India's Request for Interpretation or Clarification* on 19 July 2013. India submitted a *Reply on the Request for Clarification or Interpretation* on 2 September 2013. Pakistan presented its *Rejoinder to India's*

Reply dated 2 September 2013 in the matter of India's Request for Clarification or Interpretation on 30 September 2013.

13. On 20 December 2013, the Court issued its *Decision on India's Request for Clarification or Interpretation,* the operative portion of which states as follows:

> Having considered the Parties' written submissions, the Court of Arbitration unanimously decides that:
>
> A. India's Request for Clarification or Interpretation of the Court's *Partial Award* of 18 February 2013 is timely and admissible.
>
> B. Subject to Paragraph B(4) of the Decision in the *Partial Award* of 18 February 2013, the prohibition on the reduction below Dead Storage Level of the water in the reservoirs of Run-of-River Plants on the Western Rivers, except in the case of unforeseen emergency, is of general application.

D. PROCEEDINGS ON THE MATTER OF THE MINIMUM FLOW

14. On 21 June 2013, Pakistan transmitted its *Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462),* accompanied by (1) two expert reports by National Engineering Services Pakistan (Pvt) Limited; (2) an expert report by Water Matters, Southern Waters, Hagler Bailly Pakistan and Beuster Clarke & Associates; and (3) three supporting reports, submitted electronically, by Southern Waters Ecological Research and Consulting CC in association with Hagler Bailly Pakistan, Beuster, Clarke & Associates, and Streamflow Solutions CC. On the same day, India transmitted its *Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013*, together with expert reports by: (1) the Indian Central Water Commission; (2) the Indian Central Electricity Authority; (3) DHI (India) Water & Environment; (4) Dr Michael J.B. Green; (5) Dr Niels Jepsen; (6) Professor G. Mathias Kondolf; (7) Dr John S. Richardson; and (8) Dr Edmund D. Andrews. After receiving both submissions, the Registry transmitted copies simultaneously to the Parties and to the Court of Arbitration.

15. On 13 August 2013, the Court granted both Parties a one-week extension of the deadline for the submission of the Parties' comments fixed in paragraph 463 of the *Partial Award*.

16. On 26 August 2013, Pakistan submitted its *Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award),* accompanied by expert reports by: (1) National Engineering Services Pakistan (Pvt.) Limited; (2) Professor Jens Christian Refsgaard; (3) Dr Gregory L. Morris; (4) Water Matters, Southern Waters, Hagler Bailly Pakistan, Streamflow Solutions, Beuster, Clarke & Associates, and Fluvius; and (5) Dr Ian Campbell. On the same day, India presented its *Comments on the Information Supplied by Pakistan on 21 June 2013*, accompanied by expert

reports by: (1) the Indian Central Water Commission, (2) the Indian Central Electricity Authority, (3) Professor G. Mathias Kondolf, (4) Dr Edmund D. Andrews, and (5) Dr Niels Jepsen. After receiving both submissions, the Registry transmitted copies simultaneously to the Parties and to the Court of Arbitration.

II. ARGUMENTS OF THE PARTIES

A. ADMISSIBILITY OF THE PARTIES' SUBMISSIONS

Pakistan's Arguments

17. Pakistan objects to the scope of India's Submission of 21 June 2013 on the ground that India "seek[s] to overturn or revise decisions that have been taken, with final and binding effect, in the Partial Award."[3] According to Pakistan, "India has used the occasion of the Court's request to submit data and information as an opportunity to put forward further, new, arguments and to adduce further, new, expert evidence."[4] Pakistan requests the Court to "extract from the submissions of each Party the data that it requires, and . . . disregard extraneous material."[5]

India's Arguments

18. India objects that the "constellation of environmental material" accompanying Pakistan's submissions goes well beyond the Court's request for data and is "pervaded by what amounts to advocacy."[6] India criticizes the scope and content of Pakistan's submissions but makes no request to the Court, stating that "India is confident that the Court will see this strategy for what it is."[7]

B. THE PARTIES' SUBMISSIONS ON HYDROLOGY

19. In paragraph 461 of its *Partial Award*, the Court had invited the Parties to provide "more detailed information on the estimates already put before it by each Party of historical flows at the KHEP dam site, at the Line of Control and at the [Neelum-Jhelum Hydro-Electric Project ("**NJHEP**")] dam site." The accompanying footnote specified that

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3 Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), para. 2.

4 *Ibid.*, para. 4.

5 *Ibid.*, para. 13.

6 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 1.3.

7 *Ibid.*, para. 1.3.

> [i]n the case of Pakistan, these are the daily flow data corresponding to Annexes 3, 4 and 9 of Pakistan's Memorial, vol. 3, Tab B, National Engineering Services Pakistan Limited, "Kishenganga/Neelum River: Hydrology and Impact of Kishenganga Hydroeletric Plant on Energy Generation in Pakistan," April 2011 (covering the period from 1971 to 2004). In the case of India these are daily flow estimates from the KHEP and the Line of Control for the same period.

20. In the reports submitted in response to the Court's order,[8] Pakistan provides daily flow estimates at the KHEP dam site, the Line of Control and the NJHEP dam site, which substantially reproduce figures previously submitted.[9] India gives ten-daily flow estimates at the KHEP dam site and the Line of Control, and monthly flow estimates at the Line of Control and the NJHEP dam site.[10] Each Party then uses its figures to evaluate the potential impact of a range of minimum flows on the environment and power generation at the KHEP and NJHEP.[11]

21. The Parties' methodologies for estimating flow are not dissimilar. Both Parties use flow data from measuring stations located near the targeted location, if such data are available for the

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8 Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), Tab C, National Engineering Services Pakistan (Pvt.) Limited, "Kishenganga Dam Partial Award: Detailed Information on Hydrological Estimates," June 2013 (including peer review by Professor Jens Christian Refsgaard in Appendix V) ("Pakistan's Data Submission, NESPAK Hydrology Report, June 2013"); Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), Annex A, National Engineering Services Pakistan (Pvt.) Limited, "Kishenganga Dam Partial Award: NESPAK's Comments on India's CWC Hydrology Report of June 2013," August 2013 ("Pakistan's Comments, NESPAK Hydrology Report, August 2013"); Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), Annex B, Jens Christian Refsgaard, "Comments to CWC's Hydrology Report of June 2013," August 2013 ("Pakistan's Comments, Refsgaard Report, August 2013").

9 Pakistan's Data Submission, NESPAK Hydrology Report, June 2013, Appendices I-III.

10 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, Vol. 2, Tab A, Central Water Commission (CWC), Government of India, "Hydrology Report," June 2013 ("India's Data Submission, CWC Report, June 2013"), Annexes II-V. Pakistan emphasizes that, contrary to the "Court's express request," India has failed to provide daily flow estimates, while India explains that reliable daily flow series could not be constructed as "a good amount of statistical approximations have already been performed in view of the uncertainties in observed flows" and any further estimation would be "artificial" and "unrealistic" (Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), paras. 16–17; India's Data Submission, CWC Report, June 2013, paras. 13.1, 13.5, 14.1). India also submits a second report: India's Comments on the Information Supplied by Pakistan on 21 June 2013, Vol. 2, Tab A, Central Water Commission (CWC), Government of India, "Hydrology Report," August 2013 ("India's Comments, CWC Report, August 2013").

11 *See* India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, paras. 2.4-2.5, 3.12, 3.19; Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), Tab A, Water Matters, Southern Waters, Hagler Bailly Pakistan, Beuster, Clarke and Associates, "Kishenganga Dam Partial Award, Data Sought: Environmental Flows," June 6, 2013, s. 3.5.2; Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), Tab B, National Engineering Services Pakistan (Pvt.) Limited, "Kishenganga Dam Partial Award: Power Generation at Neelum-Jhelum Hydroelectric Project," June 2013 ("Pakistan's Data Submission, NESPAK Power Generation Report, June 2013"), s. 2.1.

relevant years (1971 to 2004).[12] Both Parties fill in gaps in these data by correlating the available data from the selected measuring stations with those of a reference station and by conducting a regression analysis.[13] Both Parties use the Muzzafarabad measuring station as their reference station on the Kishenganga/Neelum River.[14] For locations where there are no nearby measuring stations, such as at the Line of Control, both Parties estimate flow using data from stations situated elsewhere along the Kishenganga/Neelum.[15]

22. Despite these methodological similarities, the Parties disagree as to: (i) whether data previously exchanged under the Treaty or "corrected" data should be used for calculating the minimum flow; (ii) whether data from the Nauseri gauging station are reliable and sound; and (iii) whether to use Pakistan's or India's regression analysis for filling in gaps in the observed data. The Parties also disagree (iv) about the appropriate framework of analysis, and the resultant availability of flow, at the Line of Control.

1. Data previously exchanged under the Treaty vs. "corrected" data

Pakistan's Arguments

23. With respect to the data it collected at its Muzzafarabad measuring station, Pakistan uses what it calls "corrected" or "quality-assured" data.[16] While Pakistan provides "raw" data to India pursuant to the data exchange requirements of Article VI(1) of the Treaty, these data are subsequently evaluated by Pakistan's Surface Water Hydrology Directorate to account for variations in the level or stage over the course of the day (in particular during the high-flow season) and to adjust the rating curve between the stage and the river discharge on the basis of

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[12] Thus, for the KHEP dam site, both Parties rely on data collected at the Gurez and Wampora gauging stations, which are located 2 km and 5 km respectively from the dam site. Pakistan (but not India) also relies on data obtained at the Nauseri gauging station for its flow estimates at the NJHEP dam site. *See* Pakistan's Memorial, Vol. 3, Tab B, National Engineering Services Pakistan (Pvt.) Limited, "Kishenganga/Neelum River: Hydrology and Impact of Kishenganga Hydroelectric Plant on Energy Generation in Pakistan," April 2011 ("Pakistan's Memorial, NESPAK Report, April 2011"), s. 1.3; India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, paras. 2.7-2.8, 2.20-2.21.

[13] Pakistan's Memorial, NESPAK Report, April 2011, pp. 17-32; India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, para. 2.9.

[14] Pakistan's Memorial, NESPAK Report, April 2011, p. 17; India's Counter-Memorial dated 23 November 2011, Vol. 2A, Tab A, Central Water Commission (CWC), Government of India, "Hydrology Report on Kishenganga Hydro-Electric Project," October 2011, pp. 37-38.

[15] Pakistan's Memorial, NESPAK Report, April 2011, pp. 35–40; India's Data Submission, CWC Report, June 2013, para. 10.2.

[16] Pakistan's Reply, Vol. II, Tab B, National Engineering Services Pakistan (Pvt.) Limited, "NESPAK Consideration of India's Hydrology Report," February 2012 ("Pakistan's Reply, NESPAK Report, February 2012"), p. 3, s. ES.4.

an annual analysis of potential changes.[17] Pakistan considers such quality assurance to be standard practice,[18] although such data are not, and according to Pakistan cannot be, shared with India within the three-month period required by the Treaty.[19] However, Pakistan submits that India could have accessed these corrected data by consulting, for a fee, the yearbooks of Pakistan's Surface Water Hydrology Directorate.[20]

24. Pakistan submits that, for the purpose of determining the minimum flow, the Court should use the most reliable data, in accordance with good scientific practice, regardless of whether the data in question were originally exchanged pursuant to the Treaty.[21]

25. Pakistan contends that India's argument that Pakistan tampered with its Muzzafarabad data is baseless, as is evident from the small difference between the Parties' data and the fact that the alleged discrepancies occur during the high-flow periods. Pakistan would derive no benefit from changing the values for discharges that exceed the combined capacity of the KHEP and NJHEP, as such high flows are irrelevant to the Court's minimum flow determination.[22]

India's Arguments

26. India submits that, in making its minimum flow determination, the Court should rely solely on data contemporaneously exchanged by the Parties pursuant to Article VI(1) of the Treaty, for three reasons.[23] First, Pakistan has failed to explain why it did not supply India with the corrected data prior to this arbitration.[24] Second, according to India, the Parties' intent was that data exchanged pursuant to the Treaty be used in the Treaty's implementation.[25] Third, India

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17 Pakistan explains that the data provided to India under Article VI(1) were the current measurements taken at Muzzafarabad. However, these measurements were sporadic, and the gaps in the data could not accurately be filled by correlating the current measurements and the daily water level (stage) measurements taken at Muzzafarabad because the current and stage measurements were taken at different times of day. Pakistan further explains that, for the corrected data, discharge values were computed from stage measurements taken at Muzzafarabad by applying rating curves based on additional data. *See* Pakistan's Data Submission, NESPAK Hydrology Report, June 2013, Appendix IV, pp. 112-115.

18 Pakistan's Data Submission, NESPAK Hydrology Report, June 2013, Appendix V, pp. 131-33.

19 *Ibid.*, Appendix IV, p. 112; Appendix V, p. 132.

20 Hearing Tr., (Day 1), 20 August 2012, at 83:12 to 84:6 (Cross-Examination of Mr Mehr Ali Shah).

21 Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), paras. 21-22; *see also* Pakistan's Comments, Refsgaard Report, August 2013, p. 50.

22 Pakistan's Data Submission, NESPAK Hydrology Report, June 2013, Appendix IV, s. 2.1(d).

23 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 2.34.

24 *Ibid.*, para. 2.15.

25 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, paras. 2.15-2.16.

argues that Pakistan's "corrected" data contain numerous inconsistencies[26] and cannot be verified because Pakistan has failed to explain how it arrived at its corrections.[27]

27. India argues that, as a result of these unexplained corrections of the data, Pakistan underestimates dry season flows at Muzzafarabad and overestimates flows at the KHEP dam site. The effect is thereby to exaggerate the adverse effect of reduced flows on power generation by the NJHEP and to underestimate the adverse effects of any minimum flow on power generation at the KHEP.[28]

28. India also takes issue with Pakistan's use of the data for the Gurez and Wampora gauging stations previously transmitted by India under the Treaty. India notes that while both Parties have described the high-flow data from the Gurez station and the low-flow data from the Wampora station as unreliable (and both were discarded by India), Pakistan appears to have made use of the low-flow data from Wampora and has otherwise not explained which of India's data it used in calculating the flow at the KHEP and which it discarded.[29]

2. Reliability and integrity of data from the Nauseri gauging station

Pakistan's Arguments

29. In estimating daily flows at the NJHEP dam site, Pakistan relies, ***inter alia***, on data collected during an 18-month period (July 1990 to December 1991) at the Nauseri gauging station, from which it derives a 34-year time-series covering 1971 to 2004 through a correlation to the flows at Muzzafarabad.

30. Pakistan submits that the Nauseri data from this 18-month period are reliable because the Nauseri and Muzzafarabad data are highly correlated for that time.[30] A high correlation is not

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[26] For example, India notes that Pakistan's corrected data indicate that measurements are missing for certain days for which observed data was actually communicated to India under the Treaty and vice versa, and that there are discrepancies between the data provided by Pakistan in this arbitration and the Surface Water Hydrology Directorate's published data. ***See*** India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 2.18; India's Data Submission, CWC Report, June 2013, para. 9.10; India's Comments, CWC Report, August 2013, para. 14.

[27] India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, paras. 2.17-2.19; India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 2.17.

[28] India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, para. 2.13; India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 2.19.

[29] India's Comments on the Information Supplied by Pakistan on 21 June 2013, paras. 2.5-2.12; India's Data Submission, CWC Report, June 2013, para. 9.11.

[30] Pakistan's Reply, NESPAK Report, February 2012, s. 5.1.4.

surprising, given that the two measuring stations are only 35 kilometres apart and have similar catchment areas. [31]

India's Arguments

31. India submits that data collected at the Nauseri gauging station should not be used because they were not communicated to India pursuant to Article VI(1) of the Treaty and because a period of 18 months is too short to determine whether information obtained at a gauging station is reliable. [32] India adds that the correlation between the Nauseri and Muzzafarabad data is unusually high, which suggests that the Nauseri data were not observed but rather fully derived from the Muzzafarabad data.[33]

3. Regression analysis

Pakistan's Arguments

32. Pakistan submits that, to fill in gaps in the observed data, a single annual regression equation using monthly discharges should be used to correlate data from the various gauging stations on the Kishenganga/Neelum.[34] According to Pakistan, India's use of seasonal regression equations (that is, different equations for different groups of months) is less reliable because such equations are based on fewer data points and ignore outliers.[35] According to Pakistan, the quantity of data points is a particular concern in light of the "inherent uncertainties" in India's data for the sites at Gurez and Wampora, and the large variation between individual data points and the regression line.[36]

India's Arguments

33. India uses a seasonal regression analysis, applying three distinct correlation equations for the periods from November to February (the low flow season), March to June (the snow-melt

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31 Pakistan's Data Submission, NESPAK Hydrology Report, June 2013, Appendix IV, s. 2.2(c).

32 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, paras. 2.21-2.23; India's Comments on the Information Supplied by Pakistan on 21 June 2013, paras. 2.23(i)&(ii), 2.35; India's Data Submission, CWC Report, June 2013, para. 9.7.

33 India's Rejoinder, Vol. II, Tab A, Central Water Commission (CWC), "Response to the Replies of NESPAK on CWC's Hydrology Report," April 2012, s. 4.1.

34 Pakistan's Data Submission, NESPAK Hydrology Report, June 2013, Appendix IV, pp. 124-125.

35 Pakistan's Data Submission, NESPAK Hydrology Report, June 2013, Appendix IV, p. 124; Pakistan's Reply, Vol. II, Tab A, Jens Christian Refsgaard, "Review of NESPAK Consideration of India's Hydrology Report," 15 February 2012, p. 4.

36 Pakistan's Comments, NESPAK Hydrology Report, August 2013, para. 5.25.

season), and July to October (the high flow season).[37] According to India, this analysis is preferable because it takes into account "the vastly different flow patterns associated with the different seasons affecting the river system."[38]

34. India submits that Pakistan's use of an annual regression analysis may explain why Pakistan's flow series indicates that flows were greater at the KHEP dam site than at the Line of Control in some months, despite the contribution of tributaries between these two locations.[39]

4. Flow at the Line of Control

Pakistan's Arguments

35. Pakistan objects to India's use of a 90-percent reliable (i.e., dry) year for its analysis. In Pakistan's view, values from such years ignore extreme conditions that occur from time to time and such an approach "distorts the picture of the hydrology of the river."[40] According to Pakistan, the Court's minimum flow determination should be based on "an understanding of the *actual* existing flow regime, not a flow regime ironed out [to] exclude extreme hydrological conditions that have in fact occurred, and that will continue to reoccur, leading to actual impacts on the riverine ecosystem."[41]

36. According to Pakistan, "India's presentation seems oriented to depict that there is ample water availability in the form of flow contributions from the intermediate catchment between KHEP dam site and the Line of Control."[42] In fact, Pakistan argues, in natural conditions, flows below 10 cumecs at the KHEP occur only 0.7 percent of the time, yet with a minimum flow release of 4.25 cumecs as proposed by India, such low flows would occur 55 percent of the time.[43] On

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37 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, paras. 2.25-2.27; India's Data Submission, CWC Report, June 2013, para. 6.2, 7.1.

38 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, para. 2.29; India's Data Submission, CWC Report, June 2013, paras. 7.1-7.5, 9.6; India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 2.25.

39 India's Data Submission, CWC Report, June 2013, paras. 9.14-9.16; India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 2.31.

40 Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), para. 20(e)&(g).

41 *Ibid.*, para. 17 (emphasis in original); Pakistan's Comments, NESPAK Hydrology Report, August 2013, para. 5.34. Pakistan also notes that India's use of a hydrological year beginning in June is not in accordance with best practices (Pakistan's Comments, NESPAK Hydrology Report, August 2013, para. 5.30).

42 Pakistan's Comments, NESPAK Hydrology Report, August 2013, para. 5.33.

43 Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), para. 18; Pakistan's Comments, NESPAK Hydrology Report, August 2013, paras. 5.51-5.52.

India's own figures, Pakistan contends, India's proposed release would create flows at the Line of Control that are lower than the lowest ever recorded flow 18.5 percent of the time.[44]

India's Arguments

37. India bases its analysis of the flow available at the Line of Control on a 90-percent reliable year (in other words, a flow that will be available in 90 percent of years), arguing that this is the basis on which Indian Run-of-River Plants are designed.[45] Examining the intermediate flow between the KHEP and the Line of Control under both Indian and Pakistani data, India calculates that intervening tributaries add between 2.1 and 3.31 cumecs with 90 percent reliability.[46] Combined with even the 3.94-cumec minimum promised by India's Agent at the merits hearing, the flow at the Line of Control would be more than 6 cumecs—and likely more than 7 cumecs—90 percent of the time.[47] With the addition of a further 3 cumecs from a tributary just 4 kilometres downstream of the Line of Control, India submits that a substantial flow would be available under any minimum release from the KHEP.[48]

C. THE PARTIES' SUBMISSIONS ON THE EFFECT OF MINIMUM FLOW ON POWER GENERATION AND THE ECONOMICS OF THE KHEP

38. As requested by the Court, both Pakistan and India have presented data on the effect of a range of flows on power generation at their respective hydro-electric plants—Pakistan with respect to the NJHEP and India with respect to the KHEP. Each Party has also commented on the other's presentation of effects on power generation at its plant.

Pakistan's Arguments

39. For the NJHEP, Pakistan outlines the lost energy that would result from 17 different scenarios for a minimum release from the KHEP. These scenarios present a reduction in energy generation at the NJHEP ranging from 0 to 13.6 percent. Among these, the minimum flow of 3.94 cumecs promised by India during the merits hearing would result in a loss at the NJHEP of 635 gigawatt hours ("**GWh**") or 12.3 percent of capacity.[49] Pakistan also calculates the

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44 Pakistan's Comments, NESPAK Hydrology Report, August 2013, para. 5.56.

45 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, paras. 2.51, 2.53, 3.11.

46 India's Data Submission, CWC Report, June 2013, paras. 15.2-15.8.

47 *Ibid.*, para. 15.9.

48 *Ibid.*, para. 15.10.

49 Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), para. 19.

revenue lost on the basis of "replacement energy by means of energy from fuel oil and high speed diesel power generation" and contends that a 3.94-cumec release would result in an annual loss for Pakistan of USD 130,400,000.[50] Although the losses vary substantially across the outlined scenarios, Pakistan contends that a minimum flow of less than 80 cumecs at the KHEP would cause a significant loss in energy at the NJHEP.[51]

40. Turning to India's submission on power generation at the KHEP, Pakistan argues that India's data are misleading and that India's submission amounts to an attempt to "re-litigate an issue that was exhaustively addressed during the hearing on the merits."[52] Pakistan argues that India incorrectly assumes that "the Partial Award gives priority to India's needs and thus concludes that Pakistan's entitlement to downstream flows should be 'limited to a minimum.'" [53] According to Pakistan, India then structures its presentation of data accordingly and considers minimum flows only between 0 to 10 cumecs. Pakistan submits that India, in doing so, has neglected the actual finding of the *Partial Award* that "[b]oth Parties' entitlements under the Treaty must be made effective so far as possible"[54] and has also failed to "fulfil the Court's requirement of incorporating a sufficient range of minimum flows to be discharged below the KHEP so as to give the Court a 'full picture' of the sensitivity of the river system."[55]

41. Pakistan further criticizes India's presentation of data that, in Pakistan's view, follows from India's assumption of priority. First, Pakistan disputes the idea that power plants are designed on the basis of dry-year flows and argues that "India is using a dry year as the base scenario for analysis because the effect of downstream releases is magnified in percentage terms when examined in the context of the reduced water flows in a dry year."[56] Second, Pakistan objects to the fact that India has presented energy losses only for December, the lowest flow month. In Pakistan's view, "the point to be examined is the magnitude of those losses in the context of the average annual energy production at KHEP, not the magnitude of those losses in the context of

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50 *Ibid.*, paras. 19-20.

51 *Ibid.*, para. 21.

52 Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), paras. 23-24.

53 *Ibid.*, para. 24.

54 *Ibid.*, para. 25, *quoting* Partial Award, para. 446.

55 Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), Annex C, National Engineering Services Pakistan (Pvt.) Limited, "Kishenganga Dam Partial Award: NESPAK Comments on India's 'CEA' Report on Impact of Minimum Release from KHEP on Power Generation by KHEP," August 2013 ("Pakistan's Comments, NESPAK Power Generation Report, August 2013"), para. 4.2.

56 Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), para. 28.

the driest month of a dry year."[57] Finally, Pakistan objects that India has exaggerated energy losses at the KHEP by comparing them against a scenario of no downstream release, notwithstanding that its own laws already mandate a 4.25-cumec minimum.[58]

42. In presenting its data, Pakistan maintains that India has invoked the threat to the economic viability of the KHEP posed by higher minimum releases, but "has not put before the Court the data that would be needed for any detailed and reliable assessment of the economic viability of KHEP."[59] Pakistan accordingly has constructed its own economic analysis, using the cost of the KHEP published in 2011, the cost of energy from other sources in India, and prevailing interest rates.[60] Based on this analysis, Pakistan concludes that the KHEP would generate an economic internal rate of return ranging from 20.2 percent with no minimum release to 10.9 percent with a 100-cumec minimum release. As even this last figure is well above the 6 percent interest rate prevailing in India at the time the project was approved, Pakistan concludes that the "KHEP remains economically viable for all of the scenarios formulated and tested by Pakistan in its submission of 21 June 2013."[61]

India's Arguments

43. As context for its data on energy generation at the KHEP, India submits that "the Partial Award makes it clear that the KHEP and NJHEP are not to be treated on a basis of equality."[62] According to India, the Court's reasoning in the ***Partial Award*** was such that the "obligation to release a 'minimum flow' should indeed be limited to a minimum."[63] India also recalls its arguments that Pakistan has much more water available to it at the NJHEP site, that each cumec of water generates significantly more energy at the KHEP than it would at the NJHEP, and that India's losses are compounded because releases from the KHEP will also reduce energy generation at India's Uri-I and Uri-II projects on the lower Jhelum.[64]

44. In response to the Court's request for data, India outlines the effect on power generation during dry (90-percent dependable), average (50-percent dependable), and wet (10-percent dependable) years. India calculates the losses at a range of minimum flows between 0 and 10

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57 *Ibid.*, para. 29.

58 *Ibid.*, para. 30.

59 *Ibid.*, para. 32.

60 *See* Pakistan's Comments, NESPAK Power Generation Report, August 2013, paras. 5.1-5.10.

61 *Ibid.*, paras. 5.10-5.11.

62 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, para. 3.5.

63 *Ibid.*, para. 3.7.

64 *Ibid.*, para. 3.7.

cumecs and provides both annual and dry season (October-March) figures for percentage loss of generating capacity.[65] Based on these data, India reaches the following conclusions:

> - For every cumec of minimum release below KHEP dam, there is a definite loss in power generation at KHEP.
> - The winter months from the October to March are associated with low flows and the power generation will be adversely affected during these months on account of minimum releases from KHEP dam. This reduction would be almost Linear in nature.
> - The average annual loss in energy generation at KHEP is the maximum in 90% Dependable Year (Dry Year) viz. about 16% [with a 10-cumec minimum release] which works out as around 32 MU per cumec.
> - On monthly basis, the loss in energy on account of minimum release below KHEP dam would be significant in Dry Year (90% dependable year) with the loss being as high as 80.2% in percentage terms in the month of December corresponding to minimum release of 10 cumec.[66]

45. Turning to Pakistan's flow data regarding the NJHEP, India considers Pakistan's seventeen minimum flow scenarios to be "grossly inflated."[67] In India's view, the releases proposed by Pakistan "would cause the KHEP to be completely shut down for months of the year, and . . . are contrary to the Court's statements in the Partial Award regarding India's right under the Treaty to proceed with the KHEP in a manner that makes the project viable."[68]

46. According to India, any minimum flow greater than 4.25 cumecs would seriously compromise the economic viability of the KHEP.[69] Examining a 90-percent dependable (dry) year (on the basis of which the KHEP was designed), India submits that a minimum release of 20 cumecs would render the KHEP inoperable for three months of the year, while Pakistan's 100-cumec release would prevent the KHEP from operating for 10 months of the year.[70] On the whole,

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65 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, Vol. 2, Tab B, Central Electricity Authority, "Impact of Minimum Releases from KHEP on Power Generation at KHEP," June 2013 ("India's Data Submission, CEA Report, June 2013").

66 India's Data Submission, CEA Report, June 2013, s. 6.

67 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 4.3. India also objects to the fact that Pakistan's submission presents power losses that are higher than those indicated in its Memorial and Reply submissions as a result of a design change at the NJHEP in April 2012. According to India, "it is inadmissible for Pakistan to augment its alleged losses in this manner at such a late stage of the proceedings, particularly when no evidence supporting how the increase was arrived at has been furnished. Even though the amount of increase is relatively modest – 702 GWh vs. 695 GWh – this still represents a 1% increase [and] . . . each percentage point is important." India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 4.20.

68 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 4.3.

69 *Ibid.*, para. 4.8; ***see generally*** India's Comments on the Information Supplied by Pakistan on 21 June 2013, Vol. 2, Tab B, Central Electricity Authority, "Further Submissions on Impact of Minimum Releases from KHEP on Power Generation at KHEP," August 2013 ("India's Comments, CEA Report, August 2013").

70 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 4.4.

India argues, "Pakistan's minimum release scenarios of 10 cumecs and above would cause the KHEP to operate below its design discharge for between 60% and 95% of the time, a result that simply would not respect India's priority of right to the waters."[71]

47. Even with a minimum flow of 10 cumecs, India submits that during a 90-percent dependable (dry) year, the KHEP would suffer a significantly larger percentage loss of generating capacity than would the NJHEP. "Given that the Court has ruled that the KHEP has priority in right over the NJHEP with respect to the use of the waters of the river for hydro-electric power generation," India argues, "it is impossible to justify a 10 cumec minimum release, let alone higher releases."[72]

48. With a minimum release of 7.2 cumecs during a 90-percent dependable (dry) year, India notes, the percentage loss at the two plants would be equal (at 11.2 percent). Nevertheless, in India's view,

> even this 7.2 cumec scenario would result in the KHEP being able to operate at its design discharge for only four months of the year – a result that would run counter to the Court's admonition that the KHEP must not be made to operate at only a small fraction of its design capacity. Moreover, a minimum release of 7.2 cumec would also not reflect the Court's finding that the KHEP has priority in right to the waters, a factor which strongly militates in favour of a lower minimum release, and the fact that Pakistan's losses have been overstated as a result of its new claim and the use of non-Treaty flow data.[73]

D. THE PARTIES' SUBMISSIONS ON AGRICULTURAL USES IN THE NEELUM VALLEY

Pakistan's Arguments

49. Pakistan observes that agriculture in the Neelum Valley is "almost entirely dependent on rain" rather than on water from the Kishenganga/Neelum.[74] This is, however, a system of "subsistence farming as water is often unavailable to meet crop needs."[75] According to Pakistan, improvements in agricultural productivity will depend on the introduction of lift irrigation, using solar, high-speed diesel, or small-scale hydro-electric powered pumps. Looking to the future, Pakistan concludes that "[a]ny future development in the agricultural sector, and hence the possibility of breaking the cycle of poverty, is predicated upon the

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71 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 4.17.

72 *Ibid.*, para. 4.31.

73 *Ibid.*, para. 4.31 (footnotes omitted).

74 Pakistan's Reply, para. 4.52.

75 *Ibid.*, para. 4.52.

uninterrupted flow of water which, if ensured, will make a substantial difference to the quality of life of the inhabitants of the Neelum Valley."[76]

50. Pakistan acknowledges the difficulty of providing data with respect to future agricultural uses. It nevertheless maintains that "[a]gricultural uses are . . . expressly protected by paragraph 15(iii) of Annexure D,"[77] and submits that "some allowance must be made for future development in striking the balance to which the Court has referred in its Partial Award."[78]

India's Arguments

51. India submits that for agricultural uses "to be taken into account in calculating a minimal flow that India must release through the Kishenganga dam, Pakistan must establish two facts: (1) that there was river-dependent agricultural use on the stretch between the LOC [Line of Control] and Nauseri during the critical period established by the Court, and (2) that such use will be adversely affected by the KHEP."[79] In India's view, despite initially claiming large areas under cultivation, Pakistan "has failed to show that there is any such agriculture."[80] India further notes the Court's observation in the ***Partial Award*** that "[i]t appears to the Court that agricultural uses in the Neelum Valley are largely met by the tributary streams that feed the river."[81]

52. As India interprets the Court's ***Partial Award***, any submission with respect to current or future agricultural uses "would not be timely, since it would be beyond the time-frame established in the Treaty, as interpreted in the Partial Award. It would thus be simply too late to be considered in calculating minimum flow, and in fact is irrelevant to such a calculation."[82] In India's view, the Court rejected "Pakistan's contention that 'then existing' means 'future'" with respect to uses in the context of Paragraph 15(iii) of Annexure D to the Treaty.[83] In any event, India considers future uses by Pakistan to be "unidentified, unplanned and unsubstantiated"[84] and

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76 *Ibid.*, para. 4.61; Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), para. 22.

77 Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), para. 22.

78 *Ibid.*, para. 23.

79 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, para. 5.15.

80 *Ibid.*, para. 5.15.

81 *Ibid.*, para. 5.15 fn. 155, ***quoting*** Partial Award, para. 434.

82 *Ibid.*, para. 5.15.

83 India's Comments on the Information Supplied by Pakistan on 21 June 2013, paras. 3.14, 3.16.

84 *Ibid.*, para. 3.13.

submits that Pakistan has ample water for any such development, as "roughly two-thirds of the water at Nauseri enters the river after the KHEP dam site."[85]

E. THE PARTIES' SUBMISSIONS ON THE ENVIRONMENTAL IMPACT OF THE KHEP

53. As requested by the Court, both Pakistan and India have presented data on the effect of a range of flows on the environment below the KHEP. Each Party has also commented on the other Party's environmental submissions.

Pakistan's Arguments

54. Pakistan presents its data on environmental concerns through a revised submission based on the DRIFT methodology ("Downstream Implications of Flow Transformation") employed in its expert submissions earlier in these proceedings.[86] This approach endeavours to estimate the effect of changes to the flow regime through the integrated examination of a large number of indicators related to the hydrology, sediments, hydraulics, geomorphology, water quality, vegetation, macroinvertebrates, and fish of the river.[87] As described by Pakistan's experts, the objective of the analysis is to address the Court's observation that "hydro-electric projects (including Pakistan's projects) must be planned, built and operated with environmental sustainability in mind" and offer guidance on the flow regime that would be environmentally sustainable in the Kishenganga/Neelum.[88]

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85 *Ibid.*, para. 3.17.

86 *See generally* Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), Tab A, Water Matters, Southern Waters, Hagler Bailly Pakistan, Beuster, Clarke & Associates: "Kishenganga Dam Partial Award, Data Sought: Environmental Flows," June 6, 2013 ("Pakistan's Data Submission, Environmental Report, June 2013"). As described by Pakistan,

> [DRIFT] is a holistic approach that employs a multidisciplinary team to analyse the likely effects of a range of flow scenarios. Its aim is to produce predictions of change in the form of three streams of information—ecological, economic and social—that represent the three pillars of sustainable development. It incorporates a custom-built Decision Support System (DSS) that holds all the relevant data, understanding and local wisdom about the river provided by the team of river and social specialists. DRIFT has been used in many transboundary or basin-wide water development investigations over the last 15 years, including the Orange/Senqu (Lesotho and South Africa); the Mekong (Cambodia, Lao PDR, Thailand, Viet Nam); the Pangani Basin (Tanzania); the Zambezi Delta (Mozambique); the Okavango (Angola, Namibia, Botswana); the Cunene (Angola, Namibia); as well as numerous applications in its country of origin, South Africa. It was designed to meet the needs and realities of water-resource planning in developing countries.

Pakistan's Memorial, Vol. 3, Tab D, Hagler Bailly Pakistan, Water Matters, Southern Waters & Beuster, Clarke and Associates, "Kishenganga/Neelum River Water Diversion: Environmental Assessment," May 2011 ("Pakistan's Memorial, Environmental Report, May 2011"), pp. 2-12.

87 For the full list of indicators, see Pakistan's Data Submission, Environmental Report, June 2013, p. 9.

88 *Ibid.*, p. 3, *quoting* Partial Award, para. 454.

55. By comparison with its earlier submissions, Pakistan has expanded its team of experts to include a hydraulics specialist and specialists in sedimentology and geomorphology and has increased its range of indicators in light of the Court's ruling on drawdown flushing in its *Partial Award*.[89] Pakistan's experts have also developed 17 flow scenarios (corresponding to those discussed above in relation to power generation). In addition to the current baseline condition, a maximum diversion scenario, and the 3.94-cumec release identified by India during the merits hearing, Pakistan's experts have evaluated minimum releases between 10 and 100 cumecs (in increments of 10 cumecs),[90] percentage-based scenarios in which between 10 and 90 percent of the flow at the KHEP would be passed downstream,[91] and two variable release scenarios in which the downstream release would vary by season and between dry and normal years.[92] As in previous submissions, each scenario was evaluated for effects at the Line of Control, at the NJHEP site at Nauseri, and at Dudhnial (halfway between the Line of Control and Nauseri).

56. In keeping with the DRIFT methodology and based on the predicted response of the indicators to various flow regimes, Pakistan's experts graded the resultant ecological condition of the Kishenganga/Neelum under the 17 scenarios on a scale from A to F, ranging from pristine to critically modified.[93] The results show that the current baseline condition of the

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89 *Ibid*., p. 8. Previously, in light of the significant uncertainty as to whether the flushing of sediments from the KHEP reservoir would be permitted, Pakistan's experts had dealt with the effects of sediment separately.

90 Using the nomenclature of Pakistan's expert report, in scenario K10 the minimum flow would be 10 cumecs. In scenario K40, the minimum flow would be 40 cumecs.

91 Using the nomenclature of Pakistan's expert report, in scenario KH1E9, 10 percent of the flow would be diverted and 90 percent passed downstream. In scenario KH7E3, 70 percent would be diverted and 30 percent passed downstream.

92 Under scenario KVT1, the dry season release between 11 October and 13 March would be 16 cumecs (or 13 cumecs in a dry year). Under scenario KVT2, the dry season release between 11 October and 13 March would be 14 cumecs (or 11 cumecs in a dry year). Under both scenarios, the shoulder season release between 14 March and 9 April and between 29 August and 10 October would be 52 cumecs (or 39 cumecs in a dry year). Between 10 April and 28 August (when flow in the river is abundant), neither scenario would mandate a minimum release. *See* Pakistan's Data Submission, Environmental Report, June 2013, p. 20.

93 In detail, the A to F categories, which Pakistan considers are "intuitively understood by river specialists," are described as follows:

> Category A: pristine; natural. No development in the basin, or none that affects the river.
>
> Category B: near-pristine; near-natural. There may be areas of slight deterioration, but these are mostly localised and could easily be reversed with better catchment management. An example would be mild sewage pollution from a small village or town.
>
> Category C: moderately modified from natural. Changes will be noticeable, with the loss of some sensitive species, communities and/or habitats. The river could still appear quite attractive but would not be functioning as an optimally efficient ecosystem. If the deterioration was due to water quality changes, for instance, the river would probably not be attaining the level of health expected for recreational use.

Kishenganga/Neelum at the Line of Control is in low category B (near pristine). Various high release scenarios, for example a 20-cumec minimum flow and above, would maintain the river in category C (moderately modified from natural). Other scenarios, including a 10-cumec minimum flow, would achieve high category D conditions (significantly modified from natural), while a minimum flow of 3.94 cumecs and a maximum diversion scenario would reduce the river to low category D.

57. Evaluating these results against international practice, Pakistan maintains that

> The UK, the USA and Australia vary slightly in the numbers they give, but generally they recommend that for the maintenance of good ecological condition in high-gradient rivers, daily flows should never fall below about 70% of natural. This number should increase to 80-90% in the dry season, with the percentage of flow remaining in the river being higher the lower the flow is. African studies suggest that 60-70% or more of natural dry season daily flow is needed to maintain a Category B river while more than 40% is needed for a Category C river. . . . African studies tend to recommend lower percentages than those of the UK, Australia and the USA.
>
> All of the scenarios would meet these recommended standards for wet season flows. K40 to K100, and KH1E9 and KH2E8 would meet the UK, USA and Australian recommendations for dry season flows . . . and K20, KH3E7 and KVT1 would be somewhat below them . . . . These latter three would also meet or come close to meeting the African recommendations for Category B rivers, while K10, KH5E5. KH7E3 and KVT2 . . . . would meet the recommendation for a Category C river. The remaining three scenarios . . . would be well below any of the internationally recognised standards reviewed here for high-altitude, high-gradient, scenic rivers.[94]

58. Pakistan concludes as follows:

> Scenarios K40-100, while offering the best prospects for river condition (high C), provide the lowest amounts of water for diversion to KHEP . . . .
>
> Scenarios KVT1, KVT2. KH3E7 and K20 offer slightly higher levels of diversion and a lower Category C river condition. This condition is lower than would generally be considered appropriate for such a river.
>
> The other scenarios would not generally be seen among river scientists as offering an acceptable condition for such a river.[95]

> Category D: significantly modified from natural. This is a 'working river'. The emphasis could be on the use of the river water for other purposes (e.g. crop irrigation) and so little is available for river maintenance, or it could simply be an ecosystem that has not been considered in urban and rural development plans and so has declined due to lack of care. This would be seen as the lowest level that any river should ever fall to, and would be unacceptable in many areas and under many circumstances.
>
> Category E/F: critically modified. This would be seen as a very degraded and unhealthy river, unacceptable as a future state and requiring urgent remedial action. Alternatively, it could be a canalised or similarly unnatural one.

See Pakistan's Data Submission, Environmental Report, June 2013, pp. 40-41.

94 *Ibid.*, p. 42.

95 *Ibid.*, p. 43.

59. Turning to India's environmental submission, Pakistan is critical. First, in Pakistan's view, India's decision to analyse minimum flows only below 10 cumecs is inconsistent with the Court's request.[96] Second, Pakistan notes that the release of 4.25 cumecs mandated by the Indian Ministry of Environment & Forests "is not supported by any reasoning, either in the October 2012 decision of India's Ministry of Environment and Forests or in India's submission."[97] Finally, Pakistan considers that India's most recent environmental analysis suffers from the same problematic absence of methodology that, in Pakistan's view, characterized India's earlier environmental reports and failed to stand up to scrutiny during the cross-examination of India's experts.[98] Rather than provide new data, Pakistan argues that India has simply tried to "retrieve this situation" through a further report from the same experts, accompanied by additional peer reviews.[99]

60. Examining the results of India's environmental analysis, Pakistan's experts conclude that although India's experts adopted "a sound way to approach the assessment, as far as we can ascertain they do not carry this through into practice."[100] As the first step, Pakistan considers that the Indian model for flows in the Kishenganga/Neelum is ill-suited to assessing low flows and ignores standard practices in the field of ecohydraulics.[101] According to Pakistan, India's experts then consider only the survival of three fish species, and only on the basis of undocumented minimum (rather than optimum) depths for each species.[102] India's experts then

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96 Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), para. 35.

97 *Ibid.*, para. 36.

98 *Ibid.*, para. 37.

99 *Ibid.*, para. 37.

100 Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), Annex E, Water Matters, Southern Waters, Hagler Bailly Pakistan, Streamflow Solutions, Beuster, Clarke & Associates, Fluvius "Kishenganga Dam Partial Award: Comment on the Environmental aspects of the Indian submission of 21 June 2013" (August 2013) (Pakistan's Comments, Environmental Report, August 2013), p. 25.

101 According to Pakistan's report, India "uses a well-established and useful hydrodynamic model called MIKE 11, which is commendable. Execution of the modelling, however, is in our opinion not fit for purpose. First, it appears to be an application more suited for engineering investigation of high and medium flows than an ecohydraulics investigation of low flows." *Ibid.*, p. 25. Pakistan's experts further note that "[i]n terms of conditions that the aquatic life would face through their 30 scenarios, DHI predicts maximum depths of questionable validity; DHI predicts velocities that are not subsequently used; and DHI does not predict at all how much wetted river bed would be left for the organisms to live in." *Ibid.*, p. 12.

102 Pakistan's experts conclude that

> DHI uses one of their own data sets from 2012 and one other reference to define the habitat needs of three fish species. They do not specify the habitat needs of any other aquatic organisms. Their conclusions that a minimum depth of 0.5 m for trout and 0.25 m for loach are sufficient for survival are not supported by the data they present. Even if they are, DHI's targeting of the lowest depths fish were found at, rather than analysing their data to produce optimum depths, is not appropriate and would not promote fish survival.

proceed to link "maximum water depths with minimum fish depth requirements" in an approach that Pakistan's experts consider "obscure, simplistic and misleading."[103]

61. In sum, Pakistan submits that India's

> argument that a release of 4.25 m^3/s will be adequate to avoid serious adverse impacts on the river is based upon selective references to a couple of parameters that give results favourable to India, completely ignoring the recognized methodologies for addressing these questions, and ignoring the obviously dramatic impact on the flows along the river at the LOC [Line of Control].[104]

India's Arguments

62. In approaching the question of the environmental effects of the KHEP, India first notes that the Indian Ministry of Environment & Forests has fixed a minimum flow of 4.25 cumecs for the KHEP.[105] According to India, this figure was set after a process that considers "all the relevant environmental and socio-economic factors" leading to results that vary from project to project.[106] India further notes that the 4.25-cumec minimum was fixed before India was aware that the Court would request further environmental data.[107]

63. India submits that the Parties are substantially in agreement with respect to the effects (or non-effects) that the diversion of the Kishenganga/Neelum at the KHEP would have. According to India, the Parties are in agreement that the KHEP (1) will not have an impact on any threatened species; (2) will not have any significant impact on mammals or birds; (3) will not have any

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Ibid., p. 25.

103 According to Pakistan's Report,

> The terms 'sustain', 'maintain' and 'protect' the river ecosystem appear throughout the reports by DHI and some of their reviewers, linked to the recommended flow of 2.0 m3 s-1 or proposed one of 4.25 m3 s-1, but these are inappropriate conclusions for an ecosystem that would, under a release of about 4 m3 s-1 lose more than 60% of its flow in the dry season; that would experience a dry season that was several weeks to months longer; and that would lose more than a third of the wetted bed in the dry season and more than a third of that remaining would be unsuitable for trout. These would be such profound physical changes that it is unimaginable that there will be only a minimal response from the ecosystem.

Ibid., p. 25.

104 Pakistan's Comments on India's Response dated 21 June 2013 to the Court's Request for Further Information (Made Pursuant to Paragraph 463 of the Partial Award), para. 42.

105 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, para. 4.6.

106 *Ibid.*, para. 4.5.

107 *Ibid.*, para. 4.6.

significant impact on other terrestrial flora or fauna; (4) will not increase the risk of any human disease; and (5) will not have a significant impact on tourism.[108] In India's view,

> The only questions that remain, therefore, are whether the KHEP will cause significant adverse effects on fish and macro-invertebrates below the LOC, and possibly: whether the KHEP will have any significant adverse effects on the Musk Deer National Park if the effects of Pakistan's proposed dams are not considered; and whether the KHEP will cause significant degradation of the aquatic environment in certain stretches of the river (which Pakistan argued and India refuted in earlier pleadings) other than with respect to the alleged impact on fish and macro-invertebrates.[109]

64. In respect of these questions, India's experts conclude that neither changes in the sediment transport patterns nor in the water temperature will be significant enough to affect aquatic life. Although the KHEP will alter the flow of sediment in the Kishenganga/Neelum, the sluicing regime imposed by the Court's *Partial Award* will continue to pass approximately two-thirds of the river's sediment load downstream, and tributaries below the dam will also add sediments. In the view of India's experts, "[t]he reduction in sediment downstream of the KHEP dam resulting from sediment trapping will be minor," and in any event "native species have evolved in a dynamic environment, in which they periodically take refuge from high mainstem sediment concentrations by migrating up tributaries."[110] Similarly, India's experts conclude that because the KHEP has limited pondage and retains water for only a short period of time, "alteration in temperature and its impact becomes negligible."[111]

65. Having eliminated sedimentation and temperature as relevant factors, India's experts proceed to evaluate the flow regime in the reach between the KHEP and the Line of Control under a variety of scenarios. India's experts examined the riverbed profile at 12 sites at one kilometre intervals from the KHEP to the Line of Control. At each site, India estimated the water level for minimum flows from 0 to 3 cumecs (at increments of 1 cumec), at 3.94 cumec, and from 4 to 10 cumecs (at increments of 0.25 cumecs), and replicated each calculation across the 99.99-percent, 90-percent, 75-percent, 50-percent, 25-percent and 10-percent dependable flow values.[112] India's experts then compared these depths to the minimum depths required by three umbrella species of fish: brown trout, snow trout and Tibetan stone loach. Based on these calculations, India's experts conclude that

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108 *Ibid.*, para. 4.18; ***see also ibid.***, paras. 4.9-4.17.

109 *Ibid.*, para. 4.19.

110 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, Tab F, DHI (India) Water & Environment, "Environmental Studies for Assessment of Impacts of Minimum Flow Releases," June 2013 ("India's Data Submission, DHI Environmental Report, June 2013"), p. 21.

111 *Ibid.*, p. 22.

112 See cross-section depth charts at *ibid.*, pp. 73-102.

> The reach between the dam and the first tributary is the most vulnerable to reductions in flow and the site at 6km downstream show the 90th and 99.9th percentile flows as dropping below the minimum 0.5 m depth specified for brown and snow trout. However, ***Triplophysa*** [Tibetan stone loach] would have sufficient depths even with a minimum flow of 2.0 m^3/s. Thus, the analysis indicates depths would drop below minimum depth requirements for trout species about 10 percent of the time in the upper 5.7-km reach below the dam. Downstream of this point, contribution of runoff from the tributaries will dilute the effects of the dam on flow regime.[113]

66. Given these limited effects, India argues that "a minimum flow of 2.0 cumec will suffice to protect the three umbrella species in the stretch down to the LOC [Line of Control]."[114]

67. As to Pakistan's environmental submission, India argues "that Pakistan is urging the Court to require a far greater minimum environmental flow than is actually necessary to protect the riverine environment below the Line of Control."[115] At the broadest level, India objects to the attention that Pakistan devotes to concepts of sustainable development and "development space."[116] In India's view, this goes well beyond anything in the Treaty and attempts to arrogate to the Court an inappropriate and indeterminate role that cannot be reconciled with the precise balancing of rights in the Treaty. According to India, "the Court does not have the mandate to define the development future of India. The test that Pakistan proposes is one for planners and policy-makers of India, not for judges or arbitrators."[117]

68. India similarly objects to the use of the DRIFT methodology, which in its view, is an element of this expansive conception of the Court's role: "[DRIFT] is thus designed as a planning tool, not as a normative instrument."[118] India considers DRIFT to be "inappropriate for the purposes in question here" and considers it significant that DRIFT has not been used extensively in Asia, in light of the importance of local knowledge and expertise in the analytic process.[119]

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113 *Ibid.*, p. 37.

114 India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013, para. 4.35.

115 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 6.4.

116 *Ibid.*, paras. 6.5-6.7.

117 *Ibid.*, para. 6.8.

118 *Ibid.*, para. 6.9.

119 *Ibid.*, paras. 6.9, 6.11. India's expert, Dr Kondolf notes that

> DRIFT assessments are based largely on expert opinion. However, experts require actual data for the river in question, or their expertise may be irrelevant to the questions posed. If the data are sufficient and of good quality and the experts' training and experience are relevant to the river in question, the assessment may be good, but if experts are not experienced in the river system, and/or, most importantly, if data are lacking on which to base expert judgments, there is no reason to expect the assessment to be accurate.

India's Comments on the Information Supplied by Pakistan on 21 June 2013, Tab C, G. Mathias Kondolf, "Environmental Flows for the Kishenganga River Below KHEP," 13 August 2013, p. 5 ("India's Comments, Kondolf Report, August 2013"). In his view, in Pakistan's attempt to implement the

According to India, the DRIFT process employs too many indicators, including some that are not a concern,[120] on the basis of "unsubstantiated" response curves, to generate a single assessment of the river on the basis of "amorphously and arbitrarily described"[121] categories of "ecosystem integrity," a term which is never defined and which has no accepted scientific definition.[122] In India's view, "[e]nvironmental impacts cannot be combined in some sort of environmental cost-benefit analysis," and "summing cumulative impacts based on parameters whose relationships are not defined and unsupported by data is not a statistically, let alone ecologically, valid approach"—in particular in a trans-boundary context.[123] Finally, given the lack of instances in which the DRIFT approach has been previously tested and validated, in particular in Himalayan rivers, India submits that Pakistan's DRIFT software is a "work in progress."[124]

69. Beyond the question of whether DRIFT is an appropriate methodology for application to the Kishenganga/Neelum, India takes issue with a number of aspects of Pakistan's implementation of the approach. First, India objects to Pakistan's consideration of a mix of minimum release, percentage release, and variable release scenarios. As Pakistan makes use of a constant minimum flow on its own dams, India views this as the only permissible approach at the KHEP for, in its view, the Treaty limits the obligations on the Parties to "customary practices followed in similar situations" when assessing what measures must reasonably be taken (for instance, with respect to such matters as environmental pollution).[125] Second, India is of the view that the DRIFT model neglects important factors, including the significant role of tributaries in the ecosystem[126] and additional dams that Pakistan may construct downstream of the Line of

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methodology, "[t]he specialists who developed the 'response curves' relating habitat conditions to flow levels were not knowledgeable about the Kishenganga system (which is utterly different from the South African rivers on which DRIFT was developed), and had to work in the absence of adequate data on the river." India's Comments, Kondolf Report, August 2013, pp. 17-18.

120 India notes, in particular, Pakistan's continued inclusion of otter populations and tourism in the DRIFT model, notwithstanding the Parties' agreement that these are not issues of concern. *See* India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 6.53.

121 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 6.12.

122 *Ibid.*, para. 6.13.

123 *Ibid.*, paras. 6.16, 6.21.

124 *Ibid.*, para. 6.22.

125 *Ibid.*, paras. 6.33-6.34. Although the Treaty does not, of course, address the question of minimum flows, India submits that "[t]here is no reason to believe that this understanding of reasonableness would not also have been adopted by the Parties in relation to minimum flows if they had foreseen that minimum flow releases would be required." India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 6.34. India also submits that anything other than a constant minimum flow would place excessive administrative burdens on India, which would "inevitably require India to respond to Pakistani requests to justify its measurements, calculations and actual releases." India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 6.36.

126 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 6.52.

Control.[127] Third, India submits that Pakistan's study was carried out with inadequate observation and lacked sufficient data to generate reliable response curves, in particular with respect to fish prevalence,[128] sediment transport,[129] and geomorphology.[130] India concludes that "Pakistan had almost no information on which to base a DRIFT approach, not to mention to evaluate it over time."[131]

70. Finally, apart from these shortcomings, India submits that "Pakistan's DRIFT study in fact supports MoEF [the Ministry of Environment & Forests]'s determination that a minimum flow of 4.25 is more than adequate."[132] If one looks not immediately at the Line of Control, but downstream at Pakistan's sites at Dudhnial and Nauseri, India argues, "a minimum flow of 3.94 cumec would result in no substantial impact on fish or macro-invertebrates at either site."[133]

F. MONITORING THE MINIMUM FLOW

Pakistan's Arguments

71. Pakistan submits that "[w]hatever flow regime is ordered by the Court, it is vital that it be accompanied by an adequate monitoring regime."[134] Pakistan therefore requests

> an order from the Court that the flow regime be supported by India providing to Pakistan, on a real time basis, (i) daily flow data from gauges recording the inflow into the KHEP reservoir and the outflow below the KHEP dam, as well as (ii) the reservoir level, and (iii) with regular inspections permitted to Pakistan of the gauging stations.[135]

India's Arguments

72. India objects to Pakistan's request and submits that "such inspection on the territory of another State is unprecedented and beyond the scope of the inspection regime agreed by the Parties in the Treaty."[136]

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127 *Ibid.*, paras. 6.42-6.43.

128 *Ibid.*, para. 6.45.

129 *Ibid.*, para. 6.46.

130 *Ibid.*, para. 6.47.

131 *Ibid.*, para. 6.48.

132 *Ibid.*, para. 6.55.

133 *Ibid.*, para. 6.56.

134 Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462), para. 30.

135 *Ibid.*, para. 32.

136 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 7.3.

73. In India's view, an additional inspection regime would be unwarranted and unnecessary. According to India, the Indus Waters Commission already serves the monitoring role that Pakistan seeks. India notes that "[t]here is no reason to believe on the basis of the historical record that this 'communication within the Commission cannot be relied upon as a means for transmitting accurate data in a timely manner'."[137]

74. The only basis for such a regime, in India's view, would be an assumption of bad faith that is neither justified under the circumstances nor permitted by international law.[138] Far from smoothing relations, the introduction of an additional mechanism "would risk exacerbating tensions between [the Parties]," as it would "override the cooperation mechanisms made available under the Treaty."[139]

75. India maintains that the Parties' exchange of data on flows and water utilization through the Commission under Articles VI and VIII of the Treaty has proceeded regularly and smoothly since its inception.[140]

III. ANALYSIS OF THE COURT

A. SCOPE OF THE PARTIES' SUBMISSIONS

76. As set out above (see paragraphs 17 and 18), each Party has voiced concerns regarding the scope and content of the other's response to the Court's request for the submission of additional data. The Court nevertheless considers both Parties' submissions to be reasonable and appropriate in light of the Court's request. Within the substantive areas laid out in Paragraphs 458-462 of the *Partial Award*, the scope of the data requested by the Court was deliberately left unrestrained, and it was to be expected that the Parties would wish to emphasize and draw attention to different aspects in light of their differing views on the issues remaining for the Court.

77. Thus, the Court does not consider any part of the Parties' submissions made following the *Partial Award* to be inadmissible.

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137 *Ibid.*, para. 7.7.

138 *Ibid.*, para. 7.21 citing *Affaire du Lac Lanoux (France v. Spain)*, Award of 16 November 1957, RIAA Vol. 12, p. 281 (French original), 1974 Yearbook of the International Law Commission, vol. 2, part 2, p. 194 (1976) (English translation) (Annex IN-LX-2).

139 India's Comments on the Information Supplied by Pakistan on 21 June 2013, para. 7.22.

140 *Ibid.*, para. 7.7.

B. DETERMINATION OF THE MINIMUM FLOW

1. Introduction

78. As indicated in paragraphs 455-457 of the *Partial Award*, the purpose of this Final Award is to fix the precise rate of the minimum flow to be preserved downstream of the KHEP.

79. The Court will approach this question by initially recalling the matters already decided in its *Partial Award*. It will then address the Parties' differences regarding the hydrologic data record for the Kishenganga/Neelum. Thereafter, the Court will assess, on the basis of the evidence before it, the effects that the KHEP is likely to have on agricultural and hydro-electric uses by Pakistan and on the downstream environment. The Court will then determine, taking into account these effects, the minimum flow. Finally, the Court will address Pakistan's request that the Court establish a monitoring regime.

2. The Court's *Partial Award* and its present task

80. The Court initially considers it appropriate to recall the key elements of its reasoning as set forth in the *Partial Award*.

81. Paragraph 15(iii) of Annexure D to the Treaty provides that:

> 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.

The Parties differed as to the meaning of this provision and, in particular, as to what would constitute a "then existing Agricultural Use or hydro-electric use by Pakistan." After considering each Party's interpretation of the phrase, the Court considered that the proper interpretation required elements of each Party's approach to be given effect:

> 433. The Court considers that neither of the two approaches to interpretation discussed above—the ambulatory and critical period approaches—is fully satisfactory. Rather, the proper interpretation of Paragraph 15(iii) of Annexure D combines certain elements of both approaches. The Court is guided by the need to reflect the equipoise which the Treaty sets out between Pakistan's right to the use of the waters of the Western Rivers (including the Jhelum and its tributary, the Kishenganga/Neelum) and India's right to use the waters of those rivers for hydro-electric generation once a Plant complies with the provisions of Annexure D.

> 434. Pakistan's relevant uses in this context are, in the Court's view, essentially its hydro-electric uses. As for agricultural uses, the Court notes the observation of India—not contradicted by Pakistan—that there are no significant existing agricultural uses of the Kishenganga/Neelum's main river. It appears to the Court that agricultural uses in the Neelum Valley are largely met by the tributary streams that feed the river.
>
> 435. Accordingly, the Court considers that its interpretative task consists of two principal elements. The Court must first establish the critical period at which the KHEP crystallized. Consistent with Part 3 of Annexure D (particularly the notice provisions of Paragraph 9), and using the same critical period criteria, the Court must then determine whether the NJHEP was an "existing use" that India needed to take into account at the time the KHEP crystallized. As shown below, the Court's determination of the critical period leads to the conclusion that the KHEP preceded the NJHEP, such that India's right to divert the waters of the Kishenganga/Neelum for power generation by the KHEP is protected under the Treaty.
>
> 436. Second, India's right to divert the waters of the Kishenganga/Neelum cannot be absolute. The premise underlying Paragraph 15(iii)—that Pakistan's existing uses are to be taken into account in the operation of India's Plants—remains a guiding principle (albeit not to the preclusive extent of the ambulatory approach). Paragraph 15(iii) protects Pakistan's right to a portion of the waters of the Kishenganga/Neelum throughout the year for its existing agricultural and hydro-electric uses.[141]

82. Pursuant to this interpretation, Pakistan's agricultural and hydro-electric uses are relevant at two distinct times: first, at the time the KHEP crystallized; and, second, on an ongoing basis throughout the operation of India's Plant.

83. With respect to the first point in time, the Court examined the actions and communications of the Parties from 2004-2006 and concluded that "India has a stronger claim to having coupled intent with action at the KHEP earlier than Pakistan achieved the same at the NJHEP, resulting in the former's priority in right over the latter with respect to the use of the waters of the Kishenganga/Neelum for hydro-electric power generation."[142]

84. With respect to the second relevant time and the ongoing accommodation of Pakistan's agricultural and hydro-electric uses in the operation of India's Plants, the Court reasoned as follows:

> 445. India's right under the Treaty to divert the waters of the Kishenganga/Neelum to operate the KHEP is subject to the constraints specified by the Treaty, including Paragraph 15(iii) of Annexure D as discussed above and, in addition, by the relevant principles of customary international law to be applied by the Court pursuant to Paragraph 29 of Annexure G when interpreting the Treaty. As discussed in the following paragraphs, both of these limitations require India to operate the KHEP in a manner that ensures a minimum flow of water in the riverbed of the Kishenganga/Neelum downstream of the Plant.

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141 Partial Award, paras. 433-436 (internal citations omitted).

142 *Ibid.*, para. 437.

> 446. Accepting that the KHEP crystallized prior to the NJHEP under the critical period analysis set out above, Pakistan nonetheless retains the right to receive a minimum flow of water from India in the Kishenganga/Neelum riverbed. That right stems in part from Paragraph 15(iii) of Annexure D, which gives rise to India's right to construct and operate hydro-electric projects involving inter-tributary transfers but obliges India to operate those projects in such a way as to avoid adversely affecting Pakistan's "then existing" agricultural and hydro-electric uses.[653] The requirement to avoid adverse effects on Pakistan's agricultural and hydro-electric uses of the waters of the Kishenganga/Neelum cannot, however, deprive India of its right to operate the KHEP—a right that vested during the critical period of 2004–2006. Both Parties' entitlements under the Treaty must be made effective so far as possible: India's right to divert water for the operation of the KHEP is tempered by Pakistan's right to hydro-electric and agricultural uses of the waters of the Western Rivers, just as Pakistan's right to these uses is tempered by India's right to divert the waters for the KHEP's operation. Any interpretation that disregards either of these rights would read the principles of Paragraph 15(iii) out of the Treaty, to one or the other Party's injury.[143]

[653] The Court notes that it is quite possible, in view of the particular topography of the region, that the KHEP lies at the only location on the Kishenganga/Neelum where an inter-tributary transfer is economically viable (*see* India's Counter-Memorial, paras. 4.23, 4.70; Pakistan's Reply, paras. 1.4-1.10; India's Rejoinder, paras. 2.42). If this is true, the KHEP may be the only instance in which Paragraph 15(iii) becomes problematic, as any other inter-tributary transfer that may be contemplated on other tributaries of the Jhelum would result in returning waters to the Jhelum Main before crossing the Line of Control, thereby causing no adverse effect to any uses that Pakistan may have.

85. The Court further reasoned that "India's duty to ensure that a minimum flow reaches Pakistan also stems from the Treaty's interpretation in light of customary international law."[144] It discussed the role of customary international law, specifically principles of customary international environmental law, as follows:

> 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.[145]

[664] *Case concerning the Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, Judgment, I.C.J. Reports 1997, p. 7, p. 78.

86. The Court then noted both Parties' recognition of the need for a minimum flow of water downstream of the KHEP for environmental sustainability and concluded:

143 *Ibid.*, paras. 445-446.

144 *Ibid.*, para. 447.

145 *Ibid.*, para. 452.

> 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.[146]

87. Taken as a whole, the task facing the Court — now having the benefit of significantly more information and analysis from the Parties — is to determine a minimum flow that will mitigate adverse effects to Pakistan's agricultural and hydro-electric uses throughout the operation of the KHEP, while preserving India's right to operate the KHEP and maintaining the priority it acquired from having crystallized prior to the NJHEP. At the same time, in fixing this minimum flow, the Court must give due regard, in keeping with Paragraph 29 of Annexure G, to the customary international law requirements of avoiding or mitigating trans-boundary harm and of reconciling economic development with the protection of the environment.

88. Finally, as the Court emphasized in its *Partial Award*, the need for "stability and predictability in the availability of the waters of the Kishenganga/Neelum for each Party's use"[147] calls for the Court to fix the precise rate of the minimum flow, even though the operation of the KHEP and the development of Pakistan's agricultural and hydro-electric uses will likely not remain static, possibly changing over time.

3. The Parties' submissions on hydrology

89. Before turning to the place of agriculture, hydro-electric power and the environment in the Court's determination of the minimum flow, the Court must first recall the Parties' submissions on the hydrology of the Kishenganga/Neelum, as these estimates of the river's flow under different conditions underpin all other calculations.

90. Although the Parties have submitted extensive evidence highlighting the differences in methodology between them, what is striking for the Court is how similar the Parties' hydrologic estimates actually are. During the low-flow season, in particular, the Parties' estimates for average monthly flows rarely differ by a significant amount, and indeed Pakistan's data for flows at the Line of Control during the driest months of the year are slightly higher than India's own data. However, significant differences in estimated flows at the Line of Control occur for the very lowest flows. This is not unexpected, given the lack of observations

146 *Ibid.*, para. 455.

147 *Ibid.*, para. 457.

at this point and the limited flow data from nearby sites, and the Court has borne these differences in mind in its determination.[148]

91. At this point, the Court finds it important to comment on one aspect of the Parties' method of gathering hydrological data. The Parties have disagreed as to the appropriateness of using data exchanged monthly (and not later than within three months of measurement) under Article VI of the Treaty, or data subsequently subjected to statistical analysis and quality control, as was done by Pakistan's Surface Water Hydrology Directorate. In the Court's view, there is no requirement that decisions by the Commission, the Neutral Expert, or Courts of Arbitration rendered in relation to the Treaty be based solely on data exchanged pursuant to Article VI(2). Indeed, the Court considers that quality assurance, if done in a transparent manner, is consonant with best practices in the field of hydrology. At the same time, the Court notes that after undertaking such analysis, Pakistan made no effort to share the published, quality-assured data for the Indus basin with India. In this respect, the Court is not satisfied with the suggestion that India can, for a fee, consult the published data in Pakistan's hydrologic yearbooks. The Court commends to the Parties the practice of undertaking quality assurance on hydrologic data collected on tributaries of the Indus and of sharing such data (together with sufficient elaboration to explain variations from data exchanged under Article VI) through the mechanisms of the Permanent Indus Commission.

4. The downstream effects of the KHEP

92. The Court now turns, on the basis of the Parties' submissions, to the effects that the KHEP may have on Pakistan's agricultural and hydro-electric uses and on the environment downstream and past the Line of Control. In the subdivision thereafter, the Court reviews the interplay of those effects with India's rights under the Treaty as laid down in the *Partial Award*. The Court thus adopts a two-step approach: it will first consider the downstream effects of the KHEP in the light of the responses to its request for additional data, and will then decide how the Treaty, as interpreted in its *Partial Award*, should be applied to these facts.

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[148] Taking the monthly average across the full 34-year range submitted by the Parties, India's data indicate average flows in the driest months of October through March of 46.57, 28.24, 22.63, 22.1, 26.14, and 53.72 cumecs, respectively. *See* India's Data Submission, CWC Report, June 2013, Annex IV. Over the same period, Pakistan's data indicate averages in the same months of 45.3, 30.9, 24.4, 23.3, 28.3, and 60.4 cumecs, respectively. *See* Pakistan's Data Submission, NESPAK Power Generation Report, June 2013, Appendix II.

As the task before the Court involves a limitation on a plant being built by India, the Court has elected to use India's flow data in subsequent calculations. For the avoidance of doubt, the Court wishes to make clear that this determination of the minimum flow does not depend on which flow data set is employed.

(a) Pakistan's agricultural uses

93. Pakistan has submitted no data on current or anticipated agricultural uses of water from the Kishenganga/Neelum. Pakistan has, however, stated that future development in the Neelum Valley will be contingent on the increased use of lift irrigation from the river and on a move away from subsistence agriculture. The Parties disagree as to whether such potential future uses are relevant to the determination of the minimum flow.

94. As is shown by the passages in the *Partial Award* set out above (see paragraphs 81 to 84), the Court has already decided that—although no Pakistani agricultural use has been established as of the time at which the KHEP crystallized and acquired priority—Pakistan's Treaty rights in this regard will remain relevant to the continuing operation of the KHEP in conformity with Paragraph 15(iii). In now setting a fixed minimum flow, anticipated future agricultural uses would ordinarily feature in the Court's determination. However, as Pakistan has not submitted even an estimate of the likely scope of such development, much less evidence upon which the Court could rely, the Court is unable to take account of such potential uses and has reached its determination of the minimum flow on the basis of hydro-electric and environmental factors alone. Having done so, the Court is nevertheless confident that the minimum flow it prescribes below on the basis of other factors will ensure sufficient water in the river so as not to curtail significantly agricultural development in the Neelum Valley. In this connection, the Court recognizes the flow contribution to the main river of tributaries that lie downstream from the KHEP and past the Line of Control.

(b) Pakistan's hydro-electric uses

95. On the basis of the data submitted by Pakistan, it is apparent that the operation of the KHEP will reduce the potential energy generated by the NJHEP under nearly any minimum flow scenario. According to Pakistan's figures, even a 100-cumec minimum release at the KHEP would lead to a reduction in energy generation of 2 GWh at the NJHEP.[149] India does not challenge these calculations, but objects to Pakistan's flow scenarios, arguing that each would substantially reduce power generation at the KHEP and undermine the priority accorded to the KHEP in the Court's *Partial Award*.[150]

96. The Court will consider India's observation subsequently when discussing the implications of the priority accorded to the KHEP. With respect to the effects of the KHEP, the Court notes

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149 Pakistan's Data Submission, NESPAK Power Generation Report, June 2013, p. 12.

150 *See generally* India's Comments on the Information Supplied by Pakistan on 21 June 2013, paras. 4.1 to 4.41; India's Comments, CEA Report, August 2013.

only that the NJHEP would be affected by any prescribed minimum flow and that the relationship between flow and energy generation is direct and approximately linear.

(c) The downstream environment

97. The Parties have submitted markedly different assessments of the environmental changes that would occur downstream of the KHEP. As set out in detail above (see paragraphs 54 to 70), Pakistan has undertaken a holistic assessment of the interaction of a range of environmental indicators and predicts moderate to serious changes in the ecosystem at the Line of Control, with the degree of change dependent on the rate of flow in the river.[151] India, in contrast, has based its assessment on the anticipated water depth and its effect on three umbrella species of fish, and concludes that there would be no effect on the aquatic environment with a flow of as low as 2 cumecs.

98. In the Court's view, the differences between the Parties must be viewed in light of the evolving science of predicting the environmental changes that would result from altered flow conditions. Pakistan has undertaken a far more extensive analysis, attempting to capture complex interactions within the river ecosystem. The Court notes that assessments of this nature are increasingly used by scientists and policymakers to bring a deeper understanding of ecology to bear on the management and development of river systems.[152] In contrast, India has carried out a simpler assessment, drawing its conclusions essentially from a single indicator—the habitat available for selected fish species.

99. The Court accepts that there is no single "correct" approach to such environmental assessments. For any given river or project, the correct approach will depend upon the existing state of the river, the magnitude of anticipated changes, the importance of the proposed project, and the

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[151] In this Final Award, the Court refers at various points to a "minimum flow" and to an "environmental flow." For the sake of clarity, the Court notes the differences between these terms: an environmental flow is not necessarily a fixed minimum, affecting only the dry season, but is rather the flow regime anticipated to maintain environmental change resulting from infrastructure and development within the range considered acceptable under the circumstances of the river in question. Environmental flows may therefore be higher or lower, depending on those circumstances, and may include requirements affecting the high flow seasons of a river that cannot reasonably be described as a "minimum." Indeed, Pakistan's proposals of percentage or variable release flow regimes are examples of such environmental flows. It is only the particular characteristics of the Kishenganga/Neelum and the fact that low-season flows appear to be the principal drivers of ecological change that permit the Court to discuss environmental flows in terms of a fixed minimum. At the same time, because the Court's ultimate flow determination is based not solely on the environment, but also on hydro-electric power generation as required under the Treaty, the Court's decision fixes a "minimum flow." Insofar as this minimum flow serves to mitigate significant environmental harm, it also serves as an environmental flow without being synonymous with that term.

[152] See the assessments discussed in Pakistan's Memorial, Environmental Report, May 2011, p. 2-12; and in Pakistan's Data Submission, Environmental Report, June 2013, pp. 27-30.

availability of time, funding, and local expertise. For some situations, a simple assessment may indeed be preferred.

100. Nevertheless, for a project of the magnitude of the KHEP, the Court is of the view that an in-depth assessment of the type that Pakistan has attempted for these proceedings is a more appropriate tool for estimating potential changes in the downstream environment. This does not mean, however, that all of the critiques levelled at Pakistan's assessment are invalid. Certainly, the availability of additional data, more time, and more extensive local familiarity with the Kishenganga/Neelum would have produced a more instructive assessment. But, for the Court, these criticisms go to the degree of certainty to be ascribed to Pakistan's specific results, not to the general value of the attempt to apply contemporary international practices in a challenging setting. In contrast, the Court is not wholly satisfied that India's consideration of the water depths available for fish and its associated analysis offer adequate assurances in light of the complexity of the ecosystem in the Kishenganga/Neelum.

101. The Court acknowledges India's point that the environmental sensitivity that Pakistan urges in these proceedings does not match Pakistan's own historical practices, where the environmental flow has often been set at a low minimum, apparently using a "rule of thumb" approach. The Court will address the issue of the balance to be achieved between the environment and other uses of the Kishenganga/Neelum in subsequent subdivisions. With respect to the information brought to bear on decision-making, however, the Court sees no reason to remain wedded to past practices. On the contrary, more comprehensive and accurate information on the likely impacts of infrastructure projects can only benefit decision-making in both Pakistan and India. The Court urges both Parties to continue or expand their attention to environmental considerations at other projects, including the NJHEP. In the Court's view, such an approach is consistent with the acute need of both Parties for increased production of hydro-power. Indeed, the Court's ultimate decision on the minimum flow is informed by a deep awareness of the critical importance (and shortage) of electricity in both India and Pakistan. Meaningful development in this area need not be at odds with careful consideration of environmental effects.

102. Turning to the results of Pakistan's assessment, the Court notes Pakistan's conclusion that an environmental flow of 40 cumecs or more would offer the "best prospects" for maintaining the river in the "high C" category (in terms of the condition categories discussed above at paragraph 56 and note 93), while a flow of 20 cumecs or a 70-percent release (or one of Pakistan's variable release scenarios) would produce a "lower Category C river condition." In Pakistan's view, "[t]he other scenarios would not generally be seen among river scientists as

offering an acceptable condition for such a river."[153] In the Court's view, the grading of the condition of the Kishenganga/Neelum into categories, while helpful as shorthand, has the potential to suggest mathematical precision, and the Court recalls its earlier comments on the degree of uncertainty inherent in such an exercise. It nevertheless accepts that, if the aim is to moderate changes to the environment at or below the Line of Control, that would require an environmental flow in the Kishenganga/Neelum substantially higher than that which India has proposed in these proceedings.

103. Examining the Parties' hydrological tables alone, the Court also notes the sensitivity of the hydrograph at the Line of Control and, in particular, the flow duration curve to flow releases from the KHEP. For example, based on India's 1971-2004 10-day flow estimates, under current conditions, a flow of 12 cumecs at the Line of Control represents an exceptional event, with just nine occurrences of lower 10-day flows in 34 years. As the release from the KHEP drops below 12 cumecs, however, this exceptional condition would become more common, rising to 16 percent of the time with a release of 9 cumecs, and 30 percent of the time with an 8-cumec release. In other words, as the release falls below 12 cumecs, the lowest flows at the Line of Control progressively become the norm for a significant part of the dry season.

104. The Court provisionally concludes that an approach that takes exclusive account of environmental considerations—assessed in the absence of other considerations—would suggest an environmental flow of some 12 cumecs. The Court so estimates despite its appreciation of the uncertainties inherent in environmental projections in this case, based in part as they are on modelling and expert analysis, supported by limited local data. Since the Parties' data indicate that the effect of the KHEP on dry-season flows is the principal determinant of ecological change, the Court sees no reason to consider a percentage or variable release regime.[154]

5. Maintaining the priority accorded to the KHEP in the *Partial Award*

105. As set out in the preceding section, the effects of the KHEP on the environment and on power generation by Pakistan (including at the NJHEP) both suggest the need for a higher minimum flow than India proposes, though one markedly less than what Pakistan appears to espouse. Taking environmental considerations alone, in the appreciation of the Court, would appear to suggest releasing a flow of some 12 cumecs downstream of the KHEP at all times. And if

153 Pakistan's Data Submission, Environmental Report, June 2013, p. 43.

154 This would, of course, not necessarily be the case with other river conditions, and the Court's decision in this respect should not be interpreted to equate an environmental flow with a fixed minimum flow. Under other circumstances, in particular where the difficulties of cooperation between the multiple State bureaucracies are not present, the appropriate environmental flow could well involve a regime of variable releases.

Pakistan's hydro-electric uses alone were to be taken into account, moderating the KHEP's effect on the NJHEP might entail even higher releases.

106. Assessing the effects of the KHEP, however, is only the first step of the task facing the Court. Two additional factors must be given effect in its determination of the minimum flow.

107. First, as India correctly observes,[155] the *Partial Award* accorded priority to the KHEP, stating as follows:

> having weighed the totality of the record, the Court concludes that India has a stronger claim to having coupled intent with action at the KHEP earlier than Pakistan achieved the same at the NJHEP, resulting in the former's priority in right over the latter with respect to the use of the waters of the Kishenganga/Neelum for hydro-electric power generation.[156]

108. While the Court also held that the KHEP must be operated in such a manner that "[b]oth Parties' entitlements under the Treaty must be made effective so far as possible," it stated clearly that "[t]he requirement to avoid adverse effects on Pakistan's agricultural and hydro-electric uses of the waters of the Kishenganga/Neelum cannot, however, deprive India of its right to operate the KHEP."[157] The right to operate the KHEP is a right to operate it effectively.

109. In balancing India's right to operate the KHEP effectively with the needs of the downstream environment, the Court has decided that, on the basis of the evidence currently available, India should have access to at least half of the average flow at the KHEP site during the driest months. In the Court's view, it would not be in conformity with the Treaty to fix a minimum release above half the minimum monthly average flow for the purpose of avoiding adverse effects on the NJHEP.

110. The Court's *Partial Award* did not make the operation of the KHEP immune from environmental considerations. Here, however, the Court considers that a second factor becomes relevant. As India has recalled to the Court,[158] recourse to customary international law is conditioned by Paragraph 29 of Annexure G to the Indus Waters Treaty, which provides as follows:

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155 India's Submission on Information Requested by the Court in its Partial Award dated 18 February 2013, paras. 3.14, 5.5, 5.10, 5.29, 6.5, 6.11; India's Comments on the Information Supplied by Pakistan on 21 June 2013, paras. 1.15, 1.23, 1.29. 1.33-1.38, 4.8, 4.17, 4.31, 4.37, 6.88.

156 Partial Award, para. 437.

157 *Ibid.*, para. 446.

158 India's Counter-Memorial, paras. 6.97, 6.104; India's Rejoinder, paras. 1.11-1.12, 2.9, 2.180.

> Except as the Parties may otherwise agree, the law to be applied by the Court shall be this Treaty and, whenever necessary for its interpretation or application, but only to the extent necessary for that purpose, the following in the order in which they are listed :
>
> (a) International conventions establishing rules which are expressly recognized by the Parties.
>
> (b) Customary international law.[159]

111. As the Court noted with approval in its *Partial Award*, the Tribunal in the *Iron Rhine Arbitration*, building on the judgment of the International Court of Justice in the *Case concerning the Gabčíkovo-Nagymaros Project*, held that principles of international environmental law must be taken into account even when interpreting treaties concluded before the development of that body of law.[160] In implementing this holding, the Court notes that the place of customary international law in the interpretation or application of the Indus Waters Treaty remains subject to Paragraph 29. Unlike the treaty at issue in *Iron Rhine*, this Treaty expressly limits the extent to which the Court may have recourse to, and apply, sources of law beyond the Treaty itself.

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 in the Treaty, this would no longer be *"interpretation or application" of* the Treaty but the substitution of customary law *in place of* the Treaty. Echoing the Court's caution in the *Partial Award*, the prioritization of the environment above

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159 Treaty, Annexure G, para. 29.

160 Partial Award, para. 452, *citing Arbitration Regarding the Iron Rhine (*"Ijzeren Rijn"*) Railway between the Kingdom of Belgium and the Kingdom of the Netherlands*, Award, 24 May 2005, *PCA Award Series* (2007), para. 59; *Case concerning the Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, Judgment, I.C.J. Reports 1997, p. 7, p. 78.

161 Partial Award, para. 451, *quoting Arbitration Regarding the Iron Rhine (*"Ijzeren Rijn"*) Railway between the Kingdom of Belgium and the Kingdom of the Netherlands*, Award, 24 May 2005, *PCA Award Series* (2007), para. 59.

all other considerations would effectively "read the principles of Paragraph 15(iii) [of Annexure D] out of the Treaty."[162] That Paragraph 29 does not permit.

113. The Court has also examined India's flow estimates, and has noted (see above at paragraph 103) the extreme sensitivity of low flows at the Line of Control to the release from the KHEP. The most severe winter in the 34-year record used by both India and Pakistan to assess impacts was 1974-75. The Court notes that, based on India's data, a minimum flow criterion of 9 cumecs at KHEP is a relatively severe criterion with respect to environmental flow, but would nevertheless be sufficient to maintain the natural flows through the December, January, February period of that winter.[163]

114. Examining the effect that a 9-cumec minimum would have on the KHEP, the Court notes that this would, on average, accord India 51.9 percent of the flow at the KHEP dam site during the month of January, and that India's portion of the flow would increase to more than 60 percent in November and February, and well over 75 percent in October and March. Preserving a minimum flow of 9 cumecs would result in a monthly reduction in energy generation at the KHEP of, on average, 19.5 GWh from October to March.[164] Although such a reduction is quite significant—in percentage terms—during the driest month of January, over the dry season as a whole it would amount to a 19.2 percent average reduction in energy generation.[165] On an annual basis, the average reduction in energy generation at the KHEP would be 5.7 percent. While India has not included an economic model for the KHEP in its submissions in these proceedings, the evidence before the Court does not establish that a 5.7 percent reduction in annual energy generation would render the KHEP economically unviable.

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162 Partial Award, para. 446.

163 The Court notes that Pakistan's environmental analysis, using Pakistan's flow estimates, is based on a classification of 'ecosystem integrity', with categories from A to E, as defined in paragraph 56, above. Pakistan summarises its estimated effects of different flow regimes in Figure 6.1 of its June 2013 submission and argues, based on environmental considerations, that category C (moderately modified from normal) is appropriate. ***See*** Pakistan's Data and Information Submitted in Accordance with the Partial Award (Paragraphs 458-462) at p. 7. The Court agrees that if environmental considerations were the sole consideration, category C would be desirable, and has noted above that a flow of 12 cumecs would be appropriate. However, given the right of India to develop hydropower, and the associated right to operate KHEP effectively, the Court considers that a high category D ('significantly modified from normal') represents an appropriate balance between the needs of the environment and India's rights for power generation.

164 According to the formula for energy generation at the KHEP provided by India, ***see*** India's Submission on the Information Requested by the Court in its Partial Award dated 18 February 2013 at para. 3.10, and an average of India's flow data across the full 34-year range in which data is available, a 9-cumec minimum flow would reduce the KHEP's daily energy generation by 641,250 kWh in comparison with the 4.25-cumec minimum required by Indian law, resulting in a monthly average reduction of 19,451,250 kWh between October and March.

165 The Court's figures for the net and percentage reduction in energy generation are calculated as against the 4.25-cumec minimum flow ordered by the Indian Ministry of Environment & Forests, which the Court takes as the baseline for its determination and for the purposes of this Award.

115. The Court therefore concludes that a minimum flow criterion of 9 cumecs is consistent with Pakistan's analysis of environmental flows, given the need to balance power generation with environmental and other downstream uses, and, based on India's data, would maintain the natural flow regime in the most severe winter conditions.

116. For all these reasons, the Court fixes the minimum flow to be released downstream from the KHEP dam at 9 cumecs.[166]

C. REVIEW MECHANISM

117. As the Court noted in its discussion of Pakistan's environmental submission, a degree of uncertainty is inherent in any attempt to predict environmental responses to changing conditions. In addition, flows at the Line of Control are un-gauged, and understandably subject to estimates which differ between the Parties, at least for the lowest flows. Uncertainty is also present in attempts to predict future flow conditions, and the Court is cognizant that flows in the Kishenganga/Neelum may come to differ, perhaps significantly, from the historical record as a result of factors beyond the control of either Party, including climate change.

118. In its *Partial Award*, the Court stated that "stability and predictability in the availability of the waters of the Kishenganga/Neelum for each Party's use are vitally important for the effective utilization of rights accorded to each Party by the Treaty (including its incorporation of customary international environmental law)."[167] This remains true. Indeed, the Court rejected a fully ambulatory interpretation of Paragraph 15(iii) of the Treaty for this reason. At the same time, the Court considers it important not to permit the doctrine of *res judicata* to extend the life of this Award into circumstances in which its reasoning no longer accords with reality along the Kishenganga/Neelum. The minimum flow will therefore be open to reconsideration as laid down in the following paragraph.

119. The KHEP should be completed in such a fashion as to accommodate possible future variations in the minimum flow requirement. If, beginning seven years after the diversion of the Kishenganga/Neelum through the KHEP, either Party considers that reconsideration of the Court's determination of the minimum flow is necessary, it will be entitled to seek such reconsideration through the Permanent Indus Commission and the mechanisms of the Treaty.

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166 For the avoidance of doubt, if at any time the flow in the Kishenganga/Neelum immediately upstream of the KHEP dam is below 9 cumecs, India is only required to release an amount equivalent to 100 percent of the inflow, until such time as the flow upstream of the KHEP dam again exceeds 9 cumecs.

167 Partial Award, para. 457.

D. MONITORING

120. As recounted in greater detail above (see above at paragraph 71), Pakistan has requested that the Court establish a monitoring regime to permit it to evaluate India's compliance with the minimum flow fixed in this Award.

121. In the Court's view, the appropriate mechanism for the exchange of data and for the monitoring of the Parties' uses on tributaries of the Indus River is the Permanent Indus Commission. The Court recalls, in particular, that Article VI(1) of the Treaty already requires the Parties to exchange "(a) Daily (or as observed or estimated less frequently) gauge and discharge data relating to flow of the Rivers at all observation sites" and "(b) Daily extractions for or releases from reservoirs."[168] The Court is confident that the Parties will continue to do so, and that the data provided by India will include the necessary data relating to the KHEP. The Court further recalls that Article VIII(4) calls for the Commission to "undertake promptly, at the request of either Commissioner, a tour of inspection of such works or sites on the Rivers as may be considered necessary by him for ascertaining the facts connected with those works or sites."[169]

122. In light of the foregoing provisions, it is neither necessary, nor within the Court's purview, to instruct the Commission as to the manner in which it carries out its responsibilities or to mandate a special monitoring regime in implementation of this Award.

IV. COSTS

123. Paragraph 26 of Annexure G to the Treaty provides as follows:

> In its Award, the Court shall also award the costs of the proceedings, including those initially borne by the Parties and those paid by the Treasurer.

124. In the Court's view, this arbitration presents difficult issues of treaty interpretation disputed by the Parties. The Parties' legal arguments were carefully considered, whether or not they prevailed, and the Parties acted with skill, dispatch, and economy in presenting their respective cases. The Court can therefore see no reason to depart from the principle, common in public international law proceedings, that each Party shall bear its own costs. The costs of the Court will also be shared equally.

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168 Treaty, Art. VI(1)(a)-(b).

169 *Ibid.*, Art. VIII(4)(d).

V. DECISION

Having considered the Parties' submissions, the Court of Arbitration unanimously decides:

A. In the operation of the KHEP:

(1) Subject to paragraph (2) below, India shall release a minimum flow of 9 cumecs into the Kishenganga/Neelum River below the KHEP at all times at which the daily average flow in the Kishenganga/Neelum River immediately upstream of the KHEP meets or exceeds 9 cumecs.

(2) At any time at which the daily average flow in the Kishenganga/Neelum River immediately upstream of the KHEP is less than 9 cumecs, India shall release 100 percent of the daily average flow immediately upstream of the KHEP into the Kishenganga/Neelum River below the KHEP.

B. Beginning 7 years after the diversion of water from the Kishenganga/Neelum River for power generation by the KHEP, either Party may seek reconsideration of the minimum flow in paragraph (A) above through the Permanent Indus Commission and the mechanisms of the Treaty.

C. This Final Award imposes no further restrictions on the operation of the KHEP, which remains subject to the provisions of the Treaty as interpreted in this Final Award and in the Court's *Partial Award*.

D. Each Party shall bear its own costs. The costs of the Court will be shared equally by the Parties.

Done at the Peace Palace, The Hague
Dated: 20 DECEMBER 2013

Professor Lucius Caflisch

Professor Jan Paulsson

Judge Bruno Simma

H.E. Judge Peter Tomka

Professor Howard S. Wheater FREng

Sir Franklin Berman KCMG QC

Judge Stephen M. Schwebel
Chairman

Dr. Aloysius Llamzon
Registrar