

PCA Case No. 2023-01

IN THE MATTER OF AN ARBITRATION

-before-

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

-between-

THE ISLAMIC REPUBLIC OF PAKISTAN

-and-

THE REPUBLIC OF INDIA

CERTIFIED TRANSCRIPT
(HEARING FOR THE FIRST PHASE ON THE MERITS)

COURT OF ARBITRATION:

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

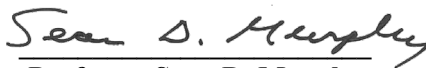
SECRETARIAT:

The Permanent Court of Arbitration

ON BEHALF OF THE COURT OF
ARBITRATION:

CERTIFIED PURSUANT
TO
PARAGRAPH 19 OF ANNEXURE G

9 July 2024



Professor Sean D. Murphy
Chairman

In the matter of an arbitration
pursuant to Article IX and Annexure G
of the Indus Waters Treaty 1960
PCA Case No. 2023-01

Permanent Court of Arbitration
Peace Palace
The Hague
The Netherlands

Day 2

Tuesday, 9 July 2024

Hearing of the First Phase on the Merits

Before:

PROFESSOR SEAN D MURPHY
HE JUDGE AWN AL-KHASAWNEH
DR DON BLACKMORE
MR JEFFREY P MINEAR
PROFESSOR WOUTER BUYTAERT

BETWEEN:

THE ISLAMIC REPUBLIC OF PAKISTAN
-and-
THE REPUBLIC OF INDIA

Transcript produced by Trevor McGowan
Georgina Vaughn and Lisa Gulland

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|--|---|
| <p>09:08 1 Tuesday, 9 July 2024 2 (9.32 am) 3 THE CHAIRMAN: Good morning, everyone. This is the second 4 day of the hearing on the first phase in the proceeding. 5 We finished yesterday with Sir Daniel not quite 6 finished with his opening presentation, so we'll start 7 back up with that, and then proceed. 8 Sir Daniel. 9 Opening submissions on behalf of 10 the Islamic Republic of Pakistan (continued) 11 SIR DANIEL: Thank you very much, Mr Chairman. 12 Mr Chairman, if you see that I'm standing a little 13 bit further away from you, it's not because I'm a little 14 bit more distant: it's just because a much bigger screen 15 has been put in front. And for those of us who are 16 vertically challenged, we can't exactly see the bottom 17 of the screen from close proximity. I won't be using 18 that, but Mr Fietta and others will be doing so. 19 Mr Chairman, members of the Court, I, yesterday, was 20 almost through my submissions, and the last part of my 21 submissions was dealing with the genesis of the present 22 dispute, the opposition of the parties on the key 23 issues, and the relevance of the Kishenganga and 24 Baglihar decisions. I had addressed the genesis of the 25 dispute and the opposition of the parties, and I hope</p> <p style="text-align: center;">Page 1</p> | <p>09:34 1 addressing the Baglihar and Kishenganga decisions, will 2 also address the Court's question (a), which related to 3 the weight and authority of previous decisions. And 4 I don't propose to trespass unduly onto his issues, but 5 only anticipate one point: the Baglihar Neutral Expert 6 determination of February 2007 was dispositive of the 7 differences in contention between the parties with 8 respect to the Baglihar plant. 9 This follows from paragraph 11 of Annexure F, which 10 we touched upon yesterday. I don't think I need to take 11 you to it, but it's there. This provides that: 12 "The decision[s] of the Neutral Expert on all 13 matters within his competence shall be final and 14 binding, in respect of the particular matter[s] on which 15 the decision is made, both upon the Parties and upon any 16 Court of Arbitration ..." 17 So it's quite clear that this provision is 18 unambiguous. The Court in the Kishenganga arbitration 19 accepted that the Baglihar determination of 2007 was 20 dispositive in respect of the Baglihar plant. And 21 insofar as the Court took issue -- as they did, very 22 heavily -- with the Neutral Expert's determination in 23 Baglihar, they did so for systemic purposes, but not 24 with regards to Baglihar. And it is no part of 25 Pakistan's contention in these proceedings to reopen the</p> <p style="text-align: center;">Page 3</p> |
| <p>09:33 1 that that point also had dealt with some of the issues 2 that had arisen in questions over pondage. 3 I have got just some very brief submissions to 4 conclude from yesterday, about the relevance of the 5 Baglihar determination and the Kishenganga award for 6 these proceedings, and then I will take on my role as MC 7 and just address what you're going to be hearing for the 8 rest of the day. 9 On the question of the relevance of the Baglihar 10 determination and the Kishenganga award for these 11 proceedings, this is a point that is expressed at 12 paragraphs 1.18 to 1.24 of Pakistan's Memorial, but it 13 informs the analysis in the Memorial more widely. And 14 I note in particular, for the record, paragraphs 8.50 to 15 8.55 of chapter 8 of the Memorial, which also addresses 16 this issue. 17 But, as I say, the Baglihar/Kishenganga dimension 18 infuses all of the submissions. And when you come to 19 hear in particular from Dr Miles and Professor Webb, who 20 will be dealing with the paragraph 8 aspects in response 21 to the questions that you posed in advance of the 22 hearing, we will be introducing, even more than we have 23 done in the written Memorial, a reference to India's 24 submissions both in Baglihar and in Kishenganga. 25 Mr Fietta in particular, in his submissions tomorrow</p> <p style="text-align: center;">Page 2</p> | <p>09:36 1 Baglihar determination or to contest the application of 2 the Baglihar determination to the Baglihar plant. 3 Determinations of Neutral Experts of the questions 4 of -- and here I'm quoting -- "whether or not the design 5 of a Plant conforms to the criteria set out in 6 Paragraph 8" are plant-specific, and that follows from 7 the language of paragraph 11 of Annexure D. 8 So we've got multiple paragraph 11s here. 9 Paragraph 11 of Annexure F talks about the "final and 10 binding" quality of Neutral Expert decisions. But 11 paragraph 11 of Annexure D is the provision which is the 12 gateway into dispute settlement in the context of 13 disputes over design. 14 You will recall that Mr Shah yesterday drew 15 attention to paragraph 9, which was the provision of 16 information. Paragraph 10 of Annexure D is the 17 objection that Pakistan may make. And then paragraph 11 18 of Annexure D contemplates a process for addressing 19 differences that arise in respect of the design criteria 20 of a plant. 21 So this reference to "a Plant", the Neutral Expert 22 determination in respect of "a Plant", follows from the 23 coincidence of two provisions: paragraph 11 of 24 Annexure D, which is cast in terms of "the design of 25 a Plant"; and then paragraph 1, subparagraph 11 of</p> <p style="text-align: center;">Page 4</p> |

09:38 1 Annexure F, which is the Neutral Expert's competence.
 2 I'm just looking at members of the Court: would you
 3 like me to take you through those provisions, or are you
 4 content that those are on the record and you have the
 5 interaction of all of these provisions? I would be very
 6 happy to take you to them if it would help.
 7 THE CHAIRMAN: I think we reasonably understand the
 8 progression, so no need to take us through them. Thank
 9 you.
 10 SIR DANIEL: Thank you. I should say that with a little bit
 11 of bright sunlight behind you, you are in a comfortable
 12 haze, so I'm not quite sure whether I'm reading facial
 13 expressions entirely correctly.
 14 So paragraph 1, subparagraph 11 of Annexure F
 15 affords the Neutral Expert competence in respect of
 16 differences over conformity with the paragraph 8 design
 17 criteria and essentially provides that they do not have
 18 wider effects beyond the plant-specific. So Neutral
 19 Expert determinations are not generic statements of
 20 interpretation. They do not apply beyond the plant that
 21 they address.
 22 It follows from that, of course, that Neutral Expert
 23 determinations do not have any presumptive systemic
 24 interpretative effect. Whether a Neutral Expert
 25 determination will have any wider influence will

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09:41 1 of the Court if this is too broad a brush stroke, that
 2 would benefit from further unpacking and explanation,
 3 but this is something that Mr Fietta will be dealing
 4 with tomorrow when he responds to the Court's
 5 question (a).
 6 The point that I would like to leave you with -- and
 7 this is almost the conclusion of my opening
 8 observations -- the point that I would like to leave you
 9 with is straightforward.
 10 Pakistan considers that the Baglihar Neutral Expert
 11 determination was fundamentally flawed in both its
 12 methodology and its outcomes. You've heard this from us
 13 before, you've seen it in our Memorial: it's not
 14 a surprise. While the Baglihar determination has
 15 binding effect in respect of the Baglihar plant, it has
 16 no presumptive effect beyond that plant, and will only
 17 be relevant insofar as you may be persuaded by the
 18 detail of its analysis.
 19 On this, we hope to persuade you that the Neutral
 20 Expert determination in 2007 is critically unsafe and
 21 unreliable, and failed to approach the interpretation of
 22 the Treaty in a manner that was consistent with the
 23 terms of the Treaty, with its object and purpose, and
 24 with the bargains that were struck by the parties in
 25 1960. And certainly this was the view of the

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09:39 1 therefore depend on the persuasiveness of the analysis
 2 that underpins that determination.
 3 Of course we are not at all saying, you will
 4 appreciate, that you should not look at Raymond
 5 Lafitte's Neutral Expert determination in Baglihar. Of
 6 course you must do so. Were you to be persuaded that
 7 his analysis is correct, then of course it is within
 8 your scope of competence to echo that analysis and adopt
 9 it. If you were persuaded that his analysis is faulty,
 10 then it is within your competence and remit to declare
 11 that it is faulty and that it will not apply on
 12 a systemic basis. And indeed, that is exactly what the
 13 Court in the Kishenganga arbitration did with respect to
 14 drawdown flushing: it doubted and rejected the Neutral
 15 Expert's determination and moved on.
 16 So this position with regard to the reach and
 17 authority of Neutral Expert determinations contrasts
 18 materially with the weight and effect of findings of the
 19 Court of Arbitration. The findings of a Court of
 20 Arbitration -- the Kishenganga Court; in due course, the
 21 findings of this Court with respect to systemic views of
 22 interpretation -- will have systemic implications and
 23 are more widely authoritative and dispositive insofar as
 24 they reach findings of general interpretative effect.
 25 My apologies in particular to the non-legal members

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09:42 1 Kishenganga Court, which expressly rejected key elements
 2 of the Baglihar methodology and conclusions.
 3 India's position is to essentially ignore the
 4 Kishenganga Court's analysis and conclusions in favour
 5 of adopting the Baglihar determination. And India
 6 persists in insisting that drawdown flushing -- the
 7 depletion of dead storage -- is permitted under the
 8 Treaty for sediment management, and that it can construe
 9 the paragraph 8 design criteria in a manner that will
 10 allow it to design HEPs that will thereafter be able to
 11 flush. And it has adopted the Baglihar approach to the
 12 calculation of maximum allowable pondage.
 13 Mr Chairman, members of the Court, the parties are,
 14 once again, in fundamental dispute about these issues.
 15 This is why we are here. This is the reason that
 16 Pakistan, through the then PCIW, concluded in
 17 February 2016 that the only way to resolve the dispute
 18 between the parties, this long-running dispute, was not
 19 to refer the matter to a Neutral Expert but to refer the
 20 matter to a Court. Because the issues in dispute
 21 between the parties were not just technical design
 22 issues associated with the Kishenganga plant or the
 23 Ratle plant, but they were much wider questions of
 24 systemic interpretation that went to the interpretation
 25 and application of Article III and paragraph 8 of

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09:44 1 Annexure D.
 2 So that, as it were, puts its arms -- or at least
 3 I hope it does so -- around the whole of the case.
 4 So Mr Chairman, members of the Court, I come to my,
 5 as it were, concluding observations of the opening
 6 observations. This is not intended to be Churchillian:
 7 this is not the end, it's not even the beginning of the
 8 end, it's just the end of the beginning. Almost
 9 everything that I have to say will be revisited,
 10 unpacked and elaborated upon by my colleagues, and
 11 we will spend a good deal of time addressing you on the
 12 detailed issues of interpretation of Article III and
 13 paragraph 8 of Annexure D of the Treaty.
 14 We have approached our submissions like a pyramid,
 15 with a broad foundation leading to a pinnacle. The
 16 pinnacle, of course, will be the detailed submissions on
 17 the interpretation of the subparagraphs of paragraph 8,
 18 which you will hear on Thursday and Friday. But the
 19 pinnacle is only a pinnacle because it rests on a broad
 20 foundation, and the pyramid can only be climbed from
 21 below, which is why we are building up systematically.
 22 Let me, with that, turn to my MC role and just
 23 sketch out what you are going to be hearing for the rest
 24 of today. But before I do so, Mr Chairman, perhaps
 25 I should just pause there, as that draws a line under my

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09:47 1 straddle the lunch break.
 2 Then the day will be completed by Dr Gregory Morris,
 3 who is not in the room just at the moment because he is
 4 responding on paper to questions that were posed
 5 yesterday and just adjusting his script. And he will
 6 address you on Himalayan run-of-river and HEP design and
 7 operation issues from an engineering perspective.
 8 It may be that, to the extent that there are
 9 a considerable number of questions from the Court, which
 10 we will certainly try and accommodate in the course of
 11 the proceedings today, rather than simply defer them to
 12 the second round, it may be that Dr Morris, who has
 13 a formal presentation to make, but it may be that we
 14 will hold some of that over until tomorrow morning.
 15 I make just two observations there, before I just
 16 give you a little summary of the issues that will be
 17 addressed.
 18 The first observation is that each of those who will
 19 be making submissions during the course of today will
 20 endeavour to pick up at least some of the questions that
 21 were posed yesterday that fall within their remit. So
 22 what we have found as we've been preparing overnight is
 23 that the anticipated timing of the submissions may
 24 perhaps be a little bit longer than the outline that
 25 I gave you yesterday. I think, for example, we

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09:46 1 substantive submissions, and enquire whether there are
 2 any questions from the Court or issues that I can help
 3 you with at this point.
 4 THE CHAIRMAN: No, I think there are no questions
 5 Sir Daniel. So please proceed with your master of
 6 ceremonies role.
 7 SIR DANIEL: I can tell that the Court is eager to get into
 8 the detail of the issues.
 9 (9.46 am)
 10 Day 2 Overview
 11 SIR DANIEL: So let me then just turn briefly to give you
 12 the menu for what will follow today, and to situate the
 13 submissions within the overall framework of Pakistan's
 14 case.
 15 You will have four submissions today, all laying the
 16 foundations for the interpretative exercise that will
 17 begin in earnest tomorrow.
 18 You will hear first from Ms Laura Rees-Evans, who
 19 will address you on the negotiations that led to the
 20 conclusion of the Indus Waters Treaty and its travaux
 21 préparatoires. She will be followed by Professor Webb,
 22 who will address you on principles of treaty
 23 interpretation. Professor Webb will then be followed by
 24 Mr Stephen Fietta, who will make submissions on water
 25 usage and sustainability. His submissions are likely to

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09:48 1 indicated that Professor Webb would be speaking for
 2 about 45 minutes: probably that will go up a little.
 3 But we are comfortable that we are in the framework of
 4 the scheme.
 5 The second point is just to anticipate something
 6 that will come to you perhaps around about the coffee
 7 break. In response to a question from Dr Blackmore
 8 yesterday, Dr Morris proposes to address a number of
 9 issues around sedimentation and the dams in the
 10 Himalayas, and is proposing to reference some publicly
 11 available information from a number of dams to
 12 illustrate the point. This is all publicly available.
 13 I think that there are two instances of additional
 14 exhibits that we would like to put on the record, and
 15 we will apply to do so, in response to Dr Blackmore's
 16 question. But that will come to you in writing during
 17 the course of the morning, in advance of Dr Morris's
 18 presentation.
 19 So I'm not proposing to anticipate the takeaway
 20 points that each of the advocates will be making during
 21 the course of today, but let me just briefly situate
 22 their submissions within the overall scheme of
 23 Pakistan's case, so that you have a sense of how it all
 24 fits together.
 25 As I addressed from a 10,000-foot level yesterday,

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| <p>09:50 1 the Treaty has to be interpreted holistically. The 2 paragraph 8 mandatory design criteria must be construed 3 in the light of the let-flow and non-interference 4 provisions of Article III. Article III must, in turn, 5 be interpreted in the light of the Treaty bargain, in 6 which Pakistan was given unrestricted use of the waters 7 of the Western Rivers, while India was given the 8 unrestricted use of the waters of the Eastern Rivers. 9 That's the Treaty bargain. And then the Treaty bargain 10 in turn has to be construed in the light of the broader 11 settlement that was pursued and achieved by the Treaty, 12 the delimitation of the waters that flowed across the 13 partition land, and that's the peace bargain. 14 These three interlocking bargains which I addressed 15 yesterday -- the hydro bargain, Article III and 16 Annexure D; the Treaty bargain, in shorthand, Article II 17 and Article III; and then the peace bargain, the 18 settlement of the dispute, which is also reflected in 19 Annexure A -- all interlock. 20 The circumstances of the conclusion of the Treaty 21 and its preparatory works are the start of this 22 narrative, and this is what will be the subject of 23 Ms Rees-Evans's submissions in just a moment. As 24 Professor Webb, who will follow Ms Rees-Evans, will 25 subsequently explain, settled principles of treaty</p> <p style="text-align: center;">Page 13</p> | <p>09:53 1 Her submissions will provide not only the legal 2 framework that applies to the interpretation of treaties 3 but, importantly, she will also address the relationship 4 between, for interpretative purposes, the primary rule 5 and the exceptions to the rule. And that's the 6 relationship between the headline provision in 7 Article III -- let flow, unrestricted use, 8 non-interference and no storage -- and the exception for 9 hydroelectric power and pondage sufficient to provide 10 for firm power, which are found in Annexure D. So 11 there's the primary rule, Article III; then there are 12 the exceptions to the rule, which are essentially found, 13 or detailed, in Annexure D. 14 Professor Webb will also address you on the 15 interpretative approach to terms that are given 16 a special meaning. I anticipated a little bit of this 17 yesterday when I drew your attention to paragraph 2 of 18 Annexure D, and that a number of the provisions -- for 19 example, pondage, dead storage level and so on -- are 20 given a bespoke meaning in the Treaty. And 21 Professor Webb will address you on the interpretative 22 approach to terms that are given a special meaning. 23 She will also address the issue of subsequent 24 agreements and subsequent practice that were the subject 25 of enquiry yesterday from you, Mr Chairman. She will</p> <p style="text-align: center;">Page 15</p> |
| <p>09:51 1 interpretation provide that the circumstances of the 2 conclusion of a treaty and its preparatory works, its 3 travaux préparatoires, can be used as a supplementary 4 means of interpretation. 5 Ms Rees-Evans will therefore take you through these 6 preparatory works and the circumstances of the 7 conclusion of the Treaty. She will be filling out and 8 making solid the elements that I addressed yesterday 9 when I laid out the three bargains embodied in the 10 Treaty. And she will also be responding to a number of 11 points that were raised in the submissions yesterday. 12 If Ms Rees-Evans will begin the exercise of laying 13 the bricks of the structure of Pakistan's case -- mine 14 is the design, we then move to the construction -- 15 Professor Webb will provide you with the mortar that 16 will be necessary to keep the bricks in place and ensure 17 that the structure is secure. And she will address the 18 bespoke and well-settled rules and principles of treaty 19 interpretation that will guide you in your task. 20 And importantly, and I hope usefully for your 21 purposes, she will root those general principles of 22 interpretation also in the practice of the Kishenganga 23 Court. Because the Kishenganga Court, at various stages 24 in its various decisions and awards, referenced these 25 settled principles in some detail.</p> <p style="text-align: center;">Page 14</p> | <p>09:54 1 also pick up on a number of other themes from yesterday, 2 including the relevance of the special character of the 3 Treaty. 4 Mr Fietta, who will follow Professor Webb, will 5 address you in some detail on the critically important 6 issue of water usage and sustainability. I note that 7 this is a very broadbrush headline, but it's a headline 8 title that he will use to take you into the basis of the 9 Treaty bargain that was struck in 1960 and the peace 10 bargain framework for doing so. 11 His submissions will, of course, be given through 12 the lens and the voice of a lawyer, but they are not 13 principally submissions on legal issues, as he will 14 explain the basis for the Treaty bargain division of 15 rights between the Eastern Rivers and the Western 16 Rivers. You will recall that I said yesterday that this 17 division was not a Solomonic exercise of simply cutting 18 the baby, but was actually based on foundation, on the 19 watershed, on the flow of the rivers, and he will 20 address that. 21 He will also address the critical importance to 22 Pakistan of the unrestricted flow of the waters of the 23 Western Rivers, and Pakistan's acute vulnerability to 24 the interference in the flow of those waters. So his 25 submissions will therefore be providing you with the</p> <p style="text-align: center;">Page 16</p> |

09:56 1 policy and the hydrological underpinnings of the Treaty.
 2 And I use the word "hydrological" with a sense of
 3 caution, because I'm not intending to label
 4 an engineering hydrological mantle for Mr Fietta, but
 5 he's going to be talking about all of those issues.
 6 Finally, we will come to Dr Morris's presentation,
 7 providing an opportunity for an authentic engineering
 8 voice in the discussion. You heard in the Neelum-Jhelum
 9 site visit a lot of Pakistan's expert engineers
 10 obviously not talking about the Treaty, but giving you
 11 an insight into the operation of run-of-river dams. And
 12 this will be an opportunity for an authentic engineering
 13 voice actually addressing the dispute and the Treaty.
 14 The Treaty, although it is a legal instrument and
 15 one of constitutional importance, was critically
 16 informed in its negotiation by engineers. As we have
 17 addressed in our Memorial, the World Bank team that held
 18 the ring in the negotiations of the Treaty was led,
 19 amongst others, by Raymond Wheeler, the engineering
 20 advisor to the World Bank from 1949 to 1964.
 21 As formerly Lieutenant General Raymond Wheeler,
 22 Mr Wheeler had been the Chief of Engineers of the United
 23 States Army in the period before his appointment to the
 24 World Bank, his retirement from the army. So he was
 25 an expert engineer of longstanding experience, who was

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09:59 1 non-Pakistani dams -- also Pakistani dams, but a number
 2 of other non-Pakistani dams -- to address Dr Blackmore's
 3 enquiry.
 4 Dr Morris is also a veteran of the Kishenganga
 5 arbitration, so he brings a measure of institutional
 6 memory from those proceedings.
 7 Mr Chairman, members of the Court, before I hand
 8 over to Ms Rees-Evans, which I will do in 60 seconds,
 9 I have one concluding observation to make.
 10 As I addressed yesterday, while the origins of the
 11 present dispute are to be found in the Kishenganga
 12 dispute, which was crystallised in 2006, with the first
 13 correspondence identifying that it was a dispute for
 14 purposes of Article IX, the roots of the parties'
 15 systemic dispute, of which you are seized, go back much
 16 deeper: to Pakistan's objection to India's Baglihar Dam
 17 proposals in 1992. And I referenced the letter in which
 18 Pakistan cited a number of the paragraph 8 subparagraphs
 19 in 1992, in which it objected to India's Baglihar
 20 proposal.
 21 That objection particularised Pakistan's concerns
 22 over India's interpretation of the paragraph 8 design
 23 criteria of run-of-river HEPs. That dispute has never
 24 been resolved or gone away, other than with respect to
 25 the binding determination concerning the Baglihar plant

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09:57 1 at the helm of the negotiations of the Treaty on the
 2 technical engineering side, from their inception to
 3 their conclusion. His period at the World Bank [was]
 4 from 1949 all the way through to 1964.
 5 As you will also appreciate from Pakistan's
 6 Memorial, the US Army Corps of Engineers standards and
 7 guidance published over the years is a hugely important
 8 resource in this field.
 9 As I mentioned just a moment ago, Dr Morris has
 10 a structured presentation to give you. But the purpose
 11 of his submissions is not only to make the structured
 12 presentation but to provide an opportunity for the Court
 13 to engage with Dr Morris on issues arising from the
 14 Neelum-Jhelum site visit that you may have wanted to
 15 raise with him in the course of the site visit but,
 16 because of the Site Visit Protocol, were not able to do
 17 so.
 18 You will know that Dr Morris is a leading authority
 19 on sediment management. Amongst his many other virtues,
 20 he also has a deep experience across the whole of the
 21 Himalayan region, being intimately familiar not only
 22 with Pakistani dams but also with other large dams
 23 across the Himalayas. And one of the responses that
 24 Dr Morris will give to the enquiry raised by
 25 Dr Blackmore will reference a number of other

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10:00 1 alone, following the Neutral Expert's determination of
 2 February 2007. The contours of the systemic
 3 interpretative dispute that are now before you are
 4 largely the same as they were going back to 1992. There
 5 has been some variation, there has been some
 6 circumstantial change, but it's largely the same
 7 dispute.
 8 The Kishenganga Court gave binding interpretations
 9 with systemic effect in respect of a number of matters,
 10 including the preclusion of drawdown flushing. India
 11 continues to contest this. And as we heard from
 12 Pakistan's Commissioner yesterday, India flushes its
 13 Western River HEPs, including without notification to
 14 Pakistan, and India refuses to come to these
 15 proceedings. And as both Pakistan's Deputy Agent and
 16 I noted yesterday, India cannot, by its absence from
 17 these proceedings, strengthen a fundamentally flawed
 18 case by the device of simply not making it.
 19 Mr Chairman, with that, unless there's anything
 20 further with which I can help you, may I ask you to
 21 invite Ms Rees-Evans to the podium to continue
 22 Pakistan's submissions.
 23 THE CHAIRMAN: Thank you, Sir Daniel. I don't think there
 24 are any questions we have for you at this time.
 25 So I invite Ms Rees-Evans to take to the podium.

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10:02 1 Thank you very much.
 2 (10.02 am)
 3 Submissions on Negotiating the Treaty
 4 MS REES-EVANS: Thank you, Mr Chairman, members of the
 5 Court. It's an honour to appear before you again this
 6 morning to represent the Islamic Republic of Pakistan.
 7 Today I will address you on aspects of the negotiating
 8 history of the Indus Waters Treaty that are relevant to
 9 this phase of the proceedings.
 10 Before I do, I'd like to pick up on a point that
 11 Mr Minear raised in a question to Mr Shah yesterday in
 12 his examination. This was in the transcript at Day 1,
 13 page 167, lines 16 to 19. Mr Minear asked:
 14 "... under Article VII(2), does Pakistan, as
 15 a downstream riparian, ever have occasion or obligation
 16 to notify India of its engineering works that might
 17 materially affect India?"
 18 Mr Shah answered:
 19 "I don't think so."
 20 We just wanted to pick up on this response by
 21 reference to the terms of Article VII(2) of the Treaty.
 22 Under Article VII(2), the information-sharing
 23 obligations apply to both parties. It provides that:
 24 "If either party plans to construct any engineering
 25 work which would cause interference with the waters of

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10:05 1 circumstance where I wondered if Pakistan would provide
 2 advance notice, since the early construction of
 3 Neelum-Jhelum could have preempted or prevented the
 4 construction of Kishenganga.
 5 That was the thought that motivated my question.
 6 I'm not looking for a particular answer on that at this
 7 point, but I just wanted to clarify why I asked that
 8 question.
 9 MS REES-EVANS: Okay. That's helpful to know, thank you.
 10 We will check whether there is any clarification we need
 11 to make on that, and revert if there is.
 12 MR MINEAR: Thank you.
 13 MS REES-EVANS: (Slide 2) So with that, I will turn now to
 14 my presentation. The purpose of the presentation --
 15 situated, as it is, at the beginning of Pakistan's
 16 submissions -- is to highlight for you the key features
 17 of the historical context that lies behind the Treaty.
 18 And it will take three parts.
 19 First of all, I will look at the historical origins
 20 and circumstances of conclusion of the Treaty. Then
 21 I will go through the negotiation of the Treaty in the
 22 critical period between 1954 and 1960. Then finally,
 23 I will draw some conclusions in my third section on the
 24 travaux and the interpretation of Article III
 25 Annexure D. And it's in this section that I will return

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10:04 1 any of the Rivers and which in its opinion, would affect
 2 the other Party materially, it shall notify the other
 3 Party of its plans and shall supply such data relating
 4 to the work as may be available and as would enable the
 5 other Party to inform itself of the nature, magnitude
 6 and effect of the work."
 7 So it's mutual: both parties are under the
 8 obligation. Pakistan has the same obligation as India.
 9 But Pakistan hasn't had occasion -- in your words,
 10 Mr Minear -- to notify under Article VII(2). And the
 11 obligation is of more limited relevance, therefore, to
 12 Pakistan, because there are limited circumstances in
 13 which Pakistan would be capable of constructing
 14 engineering work which would cause interference with the
 15 waters and would affect India materially.
 16 So it's this practical reality that was reflected in
 17 Mr Shah's answer to you, but we wanted to ensure that
 18 the legal position was clear on the record.
 19 MR MINEAR: Thank you, Ms Rees-Evans. (Pause) Sorry for the
 20 delay in my question, Ms Rees-Evans.
 21 The basis for my question, just so I'm clear on
 22 this, is the situation such as Pakistan's planned
 23 construction of the Neelum-Jhelum Dam and hydropower
 24 plant. That construction could have affected India's
 25 plans with respect to Kishenganga. And it's in that

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10:07 1 to, Mr Minear, one of your questions on the travaux to
 2 Mr Shah yesterday afternoon.
 3 (Slide 3) So turning to the first of these three
 4 topics.
 5 Mr Chairman, members of the Court, as you will by
 6 now know well, the events that led to the negotiation
 7 and conclusion of the Treaty are not just a point of
 8 historical interest. Appreciation of those events is
 9 essential to understanding the text of the Treaty and
 10 its operation in practice to this day.
 11 Sir Daniel referred you yesterday to the partition
 12 of British colonial India into what are now independent
 13 states of Pakistan and India by an act of the British
 14 Parliament in 1947. As he said yesterday and this
 15 morning, the act divided the land, but failed to address
 16 the allocation of waters. It left parts or all of the
 17 upper reaches of the six main rivers of the Indus system
 18 in what is now Indian-controlled Kashmir, with their
 19 downstream stretches flowing through Pakistan.
 20 As the Deputy Agent said in his opening remarks
 21 yesterday:
 22 "... since the independence of the Islamic Republic
 23 of Pakistan in 1947, Pakistan, being the lower riparian,
 24 has lived in insecurity."
 25 That was yesterday, the Day 1 transcript, page 13,

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10:08 1 lines 4 to 6.
 2 You were referred yesterday to the events of
 3 April 1948, the so-called "water dispute". This
 4 incident left deep and long-lasting scars in the
 5 memories of the people of Pakistan, and Pakistan has
 6 lived ever since in the shadow of the insecurity of the
 7 1948 rupture.
 8 That shadow is well encapsulated in an article
 9 written by Mr David Lilienthal and published in
 10 Collier's magazine just three years after the water
 11 dispute, in 1951 (P-233). If you're familiar with
 12 Appendix A of Pakistan's Memorial, where we set out the
 13 travaux in quite some extensive detail, you'll be
 14 familiar with Mr Lilienthal, whose name appears
 15 throughout it. He was the founding chairman of the
 16 Tennessee Valley Authority, a public corporation, whose
 17 purpose was, among other things, to supervise a vast
 18 system of navigation, flood control and electricity
 19 generation in Tennessee and parts of several surrounding
 20 US states.
 21 In 1951, the Governments of India and Pakistan
 22 invited him to visit India and Pakistan. His article
 23 summarised the findings of his trip and made proposals
 24 for the resolution of the water dispute. He observed
 25 with his own eyes a temporary reduction in the flow of

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10:10 1 could go back to the one that we just had (slide 4).
 2 I'm still not clear how best to interpret what's
 3 being said here. As indicated yesterday, I think India,
 4 in one of its memorials in the Kishenganga proceeding,
 5 argued that the cut-off was not of all the water flowing
 6 from India into Pakistan, all six rivers, if you will;
 7 instead, it was of two canals. And so when I read this
 8 kind of quote, where it says, "during ... negotiations
 9 [regarding] allocation of water for irrigation, India
 10 cut off most of the supply of water", is that to be
 11 interpreted as two particular canals were cut off, or
 12 the entire water supply was cut off?
 13 MS REES-EVANS: Well, we looked into this after your
 14 question yesterday and I have deliberately not gone into
 15 too much detail about this today because the reality is
 16 that what matters is [that] the impression that was left
 17 in Pakistan was this impression of extreme fear, and the
 18 rupture stayed in the minds of the negotiators
 19 thereafter, and in Pakistanis to this day. So the
 20 feeling among Pakistanis caused by this incident was of
 21 India being an extreme threat in terms of its control
 22 over the waters.
 23 In terms of the specifics of what happened in the
 24 incident, India has taken the position that you
 25 described yesterday in its counter-memorial. Pakistan

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10:09 1 water from India, in a source of water that supplied
 2 Lahore and the surrounding farming country near the
 3 border. Pakistanis were, in his words, "furious". He
 4 put their visceral reaction down to the 1948 dispute.
 5 That dispute, as you can see in the quote on slide 4
 6 now, at the very end, "makes Pakistan fearful of the
 7 future".
 8 As early as 1951, Mr Lilienthal saw firsthand
 9 India's expansive canal-building and irrigation
 10 programme. He commented that:
 11 "Most of this new withdrawal of water will come from
 12 rivers or canals within India which would otherwise flow
 13 on to Pakistan."
 14 That's Exhibit P-233 at page 8.
 15 At the same time, India was proudly promoting its
 16 extensive hydroelectric plants for its "vast resources
 17 of large rivers and high mountains". That's
 18 Exhibit P-409, page ii.
 19 This existential and ever-present threat of Indian
 20 interference with waters on which Pakistan was reliant
 21 was, in his view, one of the most important elements of
 22 the dispute between the two countries.
 23 THE CHAIRMAN: Ms Rees-Evans, sorry to cut in relatively
 24 early in your presentation, but since you have this
 25 particular slide on the screen -- or at least if we

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10:12 1 describes a different situation in -- I think it's
 2 a publication of 1952. And I can find the reference for
 3 you: I think it might be P-150, but we can confirm that
 4 [P-350].
 5 Pakistan sets out in that publication its version of
 6 events of the 1948 dispute in quite some detail, but it
 7 doesn't pick up on these two canals that India referred
 8 to in its submissions. It refers to a more general
 9 impact on a wide area within Pakistan.
 10 So if you would like us to return to that question
 11 and set out in any more detail the specifics of exactly
 12 what happened in 1948, we can certainly do that. But
 13 I think as Sir Daniel said yesterday, the main takeaway
 14 from it is the impact that it had in the minds of
 15 Pakistanis and how it influenced their approach to the
 16 negotiations during this period from 1948 to 1960.
 17 THE CHAIRMAN: Thank you.
 18 MS REES-EVANS: So Mr Lilienthal observed -- this is at
 19 slide 5, and this is the description that Mr Lilienthal,
 20 a third-party neutral observer, had of what was
 21 happening there at this time -- that:
 22 "No army, with bombs and shellfire, could devastate
 23 a land as thoroughly as Pakistan could be devastated by
 24 the simple expedient of India's permanently shutting off
 25 the sources of water that keep the fields and the people

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| <p>10:14 1 of Pakistan alive." 2 This is Exhibit P-233, pages 7 to 8. 3 In other words, he is describing the power of India 4 to weaponise the water. It was then, as it still is 5 now, a very real one. And the risk of weaponisation of 6 water lay, both then and now, at the heart of the 7 dispute between the parties. 8 He described then that "The starting point" of the 9 settlement of the dispute -- this is at slide 6 -- 10 "should be ... to set to rest Pakistan's fears of 11 deprivation and a return to desert". That should be the 12 starting point of the solution to the Indus Waters 13 problem. 14 Mr Lilienthal's article was the catalyst that 15 prompted the World Bank's intervention. In 1951, having 16 seen the article, the then President of the World Bank, 17 Mr Eugene Black, wrote to India and Pakistan. He 18 offered them the Bank's good offices to develop 19 an approach to the management of the Indus Waters 20 resources. His letters are at P-354 and P-355. 21 The proposal put forward was based on that set out 22 in Mr Lilienthal's article. It envisaged cooperative 23 development of the water resources of the basin. The 24 proposal itself is set out in Exhibits P-356 and P-357, 25 and again they are letters from Mr Black to the</p> <p style="text-align: center;">Page 29</p> | <p>10:16 1 an independent and separate supply, and this would help 2 to "minimiz[e] friction between the two countries". 3 Justifying this fundamental principle of 4 independence, the Bank stated that it was "desirable", 5 in its view: 6 "... so far as practicable, to avoid control by 7 India over waters on which Pakistan will be dependent, 8 and to enable each country to control the works 9 supplying the water allocated to it and [to] determine 10 in its own interests the apportionment of waters within 11 its ... territories." 12 That's at paragraph 22 of the 1954 proposal. 13 Just as Mr Lilienthal had envisaged, this would help 14 to allay Pakistan's fears of deprivation and, in his 15 words, "return to desert". 16 The 1954 proposal further explained that mutual 17 independence would be achieved by: 18 "... locati[ng] ... works serving each country on 19 territories under its control, and [by the provision of] 20 assurances against interference by either country with 21 the supplies on which the other depends ..." 22 These mechanisms, the Bank proposed, would "reduce 23 the chances of disputes", and would "promote the 24 development of the entire basin". That's at P-130, 25 paragraphs 41 and 42.</p> <p style="text-align: center;">Page 31</p> |
| <p>10:15 1 Prime Ministers of Pakistan and India respectively. 2 Two years of negotiations based on his proposal 3 failed to yield any agreement. The poor prospects of 4 a smooth-running joint administration were part of the 5 problem. Another part of the problem was the 6 fundamentally different approaches of Pakistan and India 7 to how each side's existing uses of water should be 8 serviced. 9 It was this latter problem, the existing uses, that 10 the Bank attempted to solve with its February 1954 11 proposal, and that's in Exhibit P-130. This proposal 12 gained traction with the negotiating states, and 13 ultimately it came to underpin the grand bargain 14 reflected in the Treaty. 15 Slide 7 has now got the 1954 proposal on it, and it 16 embodied two fundamental principles. The first was 17 that: 18 "... historic withdrawals [of waters] must be 19 continued, [but] not necessarily ... from existing 20 sources." 21 The second was the principle of "mutual 22 independence". It was to be achieved by dividing 23 control of the waters: Western Rivers to Pakistan, 24 Eastern Rivers to India. The division of control of the 25 Western and Eastern Rivers would give each</p> <p style="text-align: center;">Page 30</p> | <p>10:18 1 The basic scheme of the 1954 proposal survived 2 essentially unaltered in the subsequent years of 3 negotiations. 4 With that background context, I now turn to the 5 second part of my presentation, which is a more detailed 6 run-through of the critical negotiating period between 7 1954 and 1960. And there are two main themes that arise 8 from this period: first, the pivotal importance to 9 Pakistan of India's non-interference with or control of 10 the waters of the Western Rivers; second, that 11 exceptions to the principle of India's non-interference 12 with or control of the waters of the Western Rivers, in 13 particular the generation of hydroelectric power, were 14 fiercely contested. Because of that, ultimately they 15 were tightly constrained. 16 So I return just for a moment back to the basis of 17 the negotiations over this period, which is the 1954 18 proposal of the Bank. The key details of that proposal 19 were set out in four simple paragraphs, shown on this 20 and the next slide, slides 9 and 10. 21 The first paragraph is the early progenitor of 22 India's let-flow obligation. This is an obligation that 23 would ultimately be crystallised in Article III(1) of 24 the Treaty. It provided that: 25 "The entire flow of the Western rivers (Indus,</p> <p style="text-align: center;">Page 32</p> |

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| <p>10:19 1 Jhelum and Chenab) would be available for the exclusive 2 use and benefit of Pakistan, and for development by 3 Pakistan, except for the insignificant volume of Jhelum 4 flow presently used in Kashmir." 5 India's share of the bargain, as it was envisaged in 6 1954, was reflected in the second paragraph. It 7 provided that: 8 "The entire flow of the Eastern rivers (Ravi, Beas 9 and Sutlej) would be available for the exclusive use and 10 benefit of India, and for development by India ..." 11 Except during a specified transition period. 12 (Slide 10) The third paragraph provided that the 13 transition period was to be calculated based on the time 14 needed to effect the replacement of supplies for 15 Pakistan's historic withdrawals from the Eastern Rivers. 16 The fourth paragraph addressed the construction and 17 cost of the works required to effect the replacement of 18 supplies from India. 19 The Bank argued that its 1954 proposal provided 20 a "fair division" of the waters, and secured each state 21 mutual independence. India swiftly accepted the Bank's 22 proposal. 23 Pakistan was more cautious. It saw the Bank's 24 proposal as involving, in its words, "great sacrifices". 25 And that's in the letter from Foreign Minister Zafrullah</p> <p style="text-align: center;">Page 33</p> | <p>10:22 1 extending into early April ... of a degree, duration and 2 frequency which the Bank Group could not regard as 3 'tolerable!.' 4 That's in the 1956 aide-mémoire, Exhibit P-131, 5 paragraph 6(c)(iii). TAMS's findings led to 6 an adjustment to the proposal, which was set out in the 7 aide-mémoire from the Bank of May 1956. 8 The aide-mémoire also recorded India's claim "that 9 some part of the flow of the Jhelum and Chenab should be 10 reserved for future development", involving "relatively 11 insignificant consumptive uses", in the State of Jammu 12 and Kashmir. That's at paragraph 7(b) in Exhibit P-131. 13 That was an issue deferred for discussion until much 14 further down the track, presumably on basis that given 15 the "insignificance" -- to use the terms of the 16 aide-mémoire -- of such uses, it would not ultimately 17 affect the fundamental balance set out in the 1954 Bank 18 proposal. 19 The next major landmark in the negotiations came in 20 May 1957. The Bank conveyed to India and Pakistan "some 21 suggestions" for a heads of agreement based on the 1954 22 proposal, as adjusted by the 1956 aide-mémoire. 23 (Slide 11) The May 1957 head of agreement -- this is 24 at P-0362 -- built upon the division of the waters and 25 exclusivity advanced in the 1954 proposal. It recalled</p> <p style="text-align: center;">Page 35</p> |
| <p>10:20 1 Khan to Mr Black of 28 July 1954, Exhibit P-383 at 2 paragraph 3. 3 Pakistan had two principal concerns. They were set 4 out in a letter from Prime Minister Ali to Mr Black of 5 May 1954; that's Exhibit P-382. Pakistan's first 6 concern was that the Bank proposal did not in fact 7 guarantee supplies for Pakistan's existing uses. 8 Second, Pakistan was concerned about the proposal to cut 9 off the supplies which Pakistan has traditionally 10 received from the Eastern Rivers, even if as a way to 11 operationalise the goal of avoiding Indian control over 12 supplies on which Pakistan would be dependent. 13 After some months of discussion, Pakistan accepted 14 the 1954 proposal. Its acceptance was subject, among 15 other things, to the condition that it receive 16 assurances that Pakistan's existing uses supplied by the 17 Eastern Rivers, and the planned requirements of Gudu and 18 Sukkur, could be met from the flow of the Western 19 Rivers. That's Exhibit P-383, paragraphs 2 to 3. 20 Pakistan was right to hesitate. The Bank's 21 consultants, a firm called TAMS, subsequently concluded 22 that the 1954 proposal would lead to: 23 "... consistent shortages [of water] in Rabi ..." 24 That is, winter crop season: 25 "... occasionally beginning in late September or</p> <p style="text-align: center;">Page 34</p> | <p>10:23 1 again the central tenet of the 1954 proposal: the 2 division of the control of the "entire flow" of the 3 Western and Eastern Rivers to Pakistan and India 4 respectively. This is now in paragraph 1, now shown on 5 the slide. 6 (Slide 12) The May 1957 heads of agreement also 7 introduced for the first time the concept of 8 a Commission. The functions of the Commission would 9 include overseeing proposals concerning: 10 "... construction of the works on the Indus or on 11 the Jhelum or on the Chenab, outside the boundaries of 12 Pakistan, which are likely to interfere with the timing 13 of the natural flow into Pakistan of the waters of any 14 of these Rivers." 15 This is at point (h), now shown underlined on the 16 slide. 17 This provision caused Pakistan concern. The 18 fundamental basis of the 1954 proposal was "to avoid 19 control by India over waters on which Pakistan will be 20 dependent": that's in the 1954 proposal at P-130, 21 paragraph 22. And Pakistan would fiercely contest any 22 attempt to encroach on this. 23 (Slide 13) Pakistan raised its concerns on 24 paragraph 10(h) with the Bank. Pakistan said it assumed 25 that the provision was:</p> <p style="text-align: center;">Page 36</p> |

10:25 1 "... not meant to ... increase Indian control over
2 the Western Rivers including their upstream
3 tributaries."
4 Pakistan noted that:
5 "... any development on these rivers upstream of
6 Pakistan would have to have the consent of the
7 Government of Pakistan. It is not sufficient to have
8 the Commission ascertain that the proposed works are not
9 likely to interfere with the timing or amount of the
10 natural flow into Pakistan."
11 That's Exhibit P-410, pages 2 to 3.
12 So it seems that paragraph 10(h) in the draft
13 May 1957 heads of terms was likely what provoked the
14 first discussions between the parties over India's plans
15 to construct run-of-river HEPs on the Western Rivers.
16 And this is what followed, in slide 14.
17 At a meeting at the Bank at the end of May 1957,
18 Mr Gulhati, the head of the Indian delegation, confirmed
19 that "India would wish to be free to construct
20 run-of-the-river plants". But he reassured the Bank
21 that:
22 "... India would certainly be prepared to undertake
23 not to construct live storage on any of those rivers or
24 to interfere with the timing of the natural flow ..."
25 That's Exhibit P-411, page 1.

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10:26 1 Pakistan remained firm. In discussions with the
2 Bank in mid-June 1957, Pakistan reaffirmed that it was
3 "not prepared to acquiesce in any interference by India
4 on the River Chenab". This is Exhibit P-412,
5 paragraph 4(1). Its fears of Indian interference with
6 or control over the waters also led Pakistan to take
7 a firm line on Indian HEP-building on the Western
8 Rivers. Pakistan informed the Bank that it "could not
9 agree to the control by India of the Western Rivers even
10 through works for the generation of Hydro-electricity".
11 That's Exhibit P-363, paragraph 6.
12 Following these discussions, the Bank produced
13 a revised set of heads of terms, the June 1957 heads of
14 terms. The following month Pakistan's chief negotiator,
15 Mr Mueenudin, wrote to Mr Iliff. In his letter, he
16 identified eleven "principles" of the Bank's 1954
17 proposal and the 1956 aide-mémoire.
18 The importance Pakistan placed on India's
19 non-interference with or control of the waters of the
20 Western Rivers is plain. Mr Mueenudin's letter
21 emphasised that "the entire natural flow" of the Indus
22 system of rivers historically reaching Pakistan -- that
23 is, aside from the Eastern Rivers -- was to be
24 "available for the exclusive use and benefit of
25 Pakistan". It also affirmed that:

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10:27 1 "Works may not be constructed outside the boundary
2 of Pakistan which might interfere or make it possible to
3 interfere with the natural flow into Pakistan of the
4 Western Rivers."
5 This is at P-416, paragraphs 4.A and B, shown on the
6 slide.
7 Pakistan reiterated in subsequent correspondence its
8 firm opposition to the construction of any works outside
9 the boundary of Pakistan that might interfere, or make
10 it possible to interfere, with the natural flow of the
11 Western Rivers.
12 In a letter to Mr Iliff of September 1957, shown now
13 on slide 15, Pakistan's chief negotiator set out in
14 clear terms the motivations behind its position. In
15 short, it saw this as encroachment on the promises of
16 non-interference and mutual independent embodied in the
17 1954 proposal and 1956 aide-mémoire.
18 Pakistan observed that, as the "lower riparian, [it]
19 alone is vulnerable to interference by India". It saw
20 the introduction for the first time of an "unrestricted
21 right to develop hydro-electric power" as India having
22 its cake and eating it: securing exclusivity of control
23 over the Eastern Rivers, while at the same time denying
24 Pakistan its independence by attempting to secure rights
25 to interfere, or make it possible to interfere, with the

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10:29 1 natural flow of the waters of the Western Rivers.
2 That's Exhibit P-420, paragraph 3, and appendix, general
3 head 1, paragraph 3.
4 The subsequent negotiations up to March 1959 focused
5 almost exclusively on the nature and financing of the
6 works required to effect the division of waters. Even
7 during this time, Pakistan's firmly held position on
8 non-interference was a common theme. As Dr Alam
9 observes in his PhD thesis on the Indus Waters Treaty:
10 "... Pakistan ... refuse[d] India's plans ..."
11 That is, for replacement works:
12 "... because they often involved a continued
13 dependence upon it for Pakistan's water. This is
14 something Pakistan was no longer willing, after
15 April 1948, to countenance."
16 That's Exhibit P-245 at page 143.
17 Ten years later, the ghosts of that crisis still
18 haunted Pakistan and the scars still ran deep in the
19 psyche of its negotiators. The only solution to effect
20 the division of waters could therefore be one in which
21 all the works necessary to divert from the Western
22 Rivers supplies to replace those that Pakistan had
23 historically enjoyed from the Eastern rivers were under
24 Pakistan's control. This was, therefore, necessarily
25 one of the linchpins of the proposals that the Bank set

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| <p>10:30 1 out in its March 1959 settlement plan at Exhibit P-439. 2 Another linchpin of the settlement plan was 3 a ten-year transition period to carry out the 4 replacement works. Those works would be largely funded 5 by contributions from friendly governments. In talks 6 held in New Delhi and Karachi in the spring of 1959, 7 Pakistan and India agreed to those foundational 8 principles. 9 Despite the broad success of these talks in spring 10 1959, the issue of India's use of the Western Rivers for 11 hydroelectric purposes emerged as a significant issue of 12 divergence. Pakistan maintained the position that India 13 should not be permitted to construct works for the 14 generation of hydroelectric power on the Western Rivers 15 in India. India insisted that its uses while in Indian 16 territory "must include" such "non-consumptive uses". 17 That's Exhibit P-450. 18 The Bank aligned with India. It informed Pakistan 19 that it could "not support" Pakistan's absolute 20 opposition "to build even 'run of the river' 21 hydro-electric works on any of the Western Rivers". It 22 recognised in internal correspondence, however, that the 23 negotiations were going to have what they called 24 "a tough passage" on that point. That's in 25 Exhibit P-451.</p> <p style="text-align: center;">Page 41</p> | <p>10:33 1 treaty. India's use of the Western Rivers for the 2 generation of hydroelectric power was a core part of 3 these discussions, which are recorded in very cursory 4 detail, or high level, we can say, in the World Bank 5 archives minutes from this period. 6 On 10 August 1959, Pakistan and India each put 7 forward their own draft heads of agreement. Both drafts 8 envisaged that India's hydroelectric uses of the Western 9 Rivers would be a type of non-consumptive use. Pakistan 10 offered India its standing consent to India's use of the 11 Western Rivers for such purpose. However, it was 12 subject to a proviso, that: 13 "Such use does not involve construction of any work 14 which can be operated to interfere with the rate, 15 quantity or quality of the natural flow of the river or 16 its tributaries." 17 Pakistan gave as an example of such a work "any 18 structure which holds up the river flow temporarily or 19 stores it for a certain period of time for use in 20 subsequent periods". Pakistan's draft also provided for 21 "full details" of the scheme to be provided in advance 22 of construction of such works. That's in Exhibit P-133, 23 paragraphs 3(b)(i) and (ii). Pakistan recognised from 24 an early stage that information-sharing would be 25 critical.</p> <p style="text-align: center;">Page 43</p> |
| <p>10:31 1 Pakistan was forced by the Bank to soften its 2 position on Indian HEP-building on the Western Rivers, 3 but it remained clear that no such uses could be 4 accepted if they were to interfere with the supplies of 5 these rivers. Its concerns were summarised in a letter 6 from Mr Iliff to Mr Gulhati of June 1959, shown on 7 slide 16. 8 While Pakistan "accept[ed] the general principle 9 that India should be entitled to reserve on the Western 10 Rivers ... Hydel Uses not involving consumptive use of 11 water", it "expressed concern that the works that India 12 constructed might interfere with the timely flow of 13 water in the low-water season, and emphasised that they 14 would look for some protection on that point". That's 15 Exhibit P-452 at paragraphs 8 and 10. 16 (Slide 17) A message from Mr Mueenudin to Mr Iliff 17 the following month conveyed the same sentiment in even 18 stronger terms: "India should not", he said, "have 19 a stranglehold on the Pak economy". That's 20 Exhibit P-453. 21 (Slide 18) So I'm going to turn now to the last 22 important phase of negotiations, which commenced in 23 August 1959 and took place in London, when the 24 negotiating parties held the first detailed negotiations 25 on the heads of agreement for an international water</p> <p style="text-align: center;">Page 42</p> | <p>10:34 1 Over the subsequent days and weeks of the London 2 negotiations, the parties continued to discuss and 3 exchange proposals surrounding India's use of the 4 Western Rivers for the generation of hydroelectric 5 power. The detailed history is set out in 6 paragraphs 121 to 134 of Appendix A to Pakistan's 7 Memorial, so I can spare you that today. 8 At the heart of Pakistan's position in this period 9 were its concerns over Indian interference with the 10 natural flow of the waters on which Pakistan would be 11 reliant. As Pakistan's chief negotiator explained at 12 the time: 13 "... we do not want any works to be built which 14 [give] India the power to hurt us ..." 15 That's Exhibit P-365. 16 These sentiments were repeated in contemporaneous 17 internal Pakistan correspondence sent around the close 18 of the negotiations in September 1959, and these are 19 shown on slide 18 now. 20 In a letter from Pakistan's chief negotiator to 21 Mr Sheikh, Secretary of the Ministry of Works, 22 Irrigation and Power, Mr Mueenudin confirmed he had made 23 it clear that: 24 "... our Government cannot possibly agree to 25 storages which, if malevolently operated, would make</p> <p style="text-align: center;">Page 44</p> |

10:35 1 an appreciable difference to our economy."
 2 And that:
 3 "... Pakistan would not agree to giving India
 4 a stranglehold over her economy."
 5 That's Exhibit P-475, paragraph 5.
 6 In a subsequent letter, Mr Mueenudin confirmed again
 7 that he had made it clear that Pakistan:
 8 "... would not, under any circumstances, agree to
 9 the construction of works which would give India the
 10 power to do us effective harm."
 11 That's Exhibit P-134, paragraph 6.
 12 The London talks ultimately led to the Bank's
 13 preparation of a new draft heads of agreement dated
 14 15 September 1959. That's Exhibit P-136. The heads of
 15 agreement 1959 set out the basic scheme of the division
 16 of waters and the let-flow obligation on India as
 17 regards the Western Rivers. I've set out the relevant
 18 provisions on this slide 19. The heads of agreement
 19 also attempted to address Pakistan's concerns regarding
 20 the Indian storage on the Western Rivers.
 21 Annex B of the heads of agreement encapsulated the
 22 detailed provisions that had been discussed between the
 23 parties in the London negotiations as to the use of the
 24 Western Rivers for the generation of hydroelectric
 25 power. It provided a definition of "run-of-river"

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10:37 1 plants. It also set out detailed design and operational
 2 constraints in respect of run-of-river HEPs constructed
 3 by India on the Western Rivers. Annex B is the
 4 forerunner of what became Annexure D to the Treaty and
 5 there are close parallels between them.
 6 MR MINEAR: Excuse me, Ms Rees-Evans. The language "let
 7 flow", was the origin of that language the Bank's, or do
 8 we know if it came from some other source?
 9 MS REES-EVANS: Thank you, Mr Minear, for the question.
 10 I don't think we know where that came from, because
 11 I think it was introduced for the first time in the
 12 December 1959 heads of agreement, but it wasn't
 13 discussed in those terms in a way that comes out of the
 14 minutes of the August 1959 minutes.
 15 So the answer, as with much of the questions that
 16 we have about the travaux, is unclear. It doesn't come
 17 out of the documents.
 18 MR MINEAR: As I recall from your Memorial, it's quite
 19 distinctive language. Is that correct? It doesn't
 20 appear in other similar treaties involving water rights?
 21 MS REES-EVANS: I think that's right. I don't think
 22 we found comparable language in other international
 23 treaties. It's one of the things that obviously, when
 24 we looked through the travaux, we were very keen to see
 25 whether there was an explanation for why that particular

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10:38 1 language was used, and disappointed to find that there
 2 was not much in the way of answer there.
 3 MR MINEAR: Thank you.
 4 MS REES-EVANS: So as I said, the archives contain
 5 a reasonable collection of the various drafts that came
 6 after the 1959 heads of agreement, but the context
 7 around them, and certainly why they changed over time,
 8 is completely lacking in the archives. So I'll take you
 9 through the drafts and explain some of this lack of
 10 context as I go through.
 11 (Slide 20) The first draft of the Treaty presented
 12 to the governments was that of 9 December 1959, in
 13 Exhibit P-139. Draft Article III set out in detail
 14 India's obligation to "let flow" the Western Rivers.
 15 The provision was significant for a number of reasons.
 16 First, it articulated the "let flow" obligation in
 17 clear terms and matched it with a prohibition on
 18 "interference" by India with the waters of the Western
 19 Rivers.
 20 Second, it marked a shift in the language regarding
 21 India's use of the Western Rivers for the generation of
 22 hydroelectric power. The language of India's
 23 "entitlement" to such use, as it was under Annex B of
 24 the heads of agreement 1959, became a statement of
 25 obligation subject to a defined exception in the 1959

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10:40 1 draft.
 2 Third, the only exception it envisaged to the
 3 prohibition on storage for India on the Western Rivers
 4 was that specifically envisaged in Annexure E of the
 5 Treaty. HEPs could not, therefore, incorporate storage,
 6 save as permitted by Annexure E.
 7 The December 1959 draft therefore clearly emphasised
 8 the primacy of the let-flow obligation, and the limited
 9 character of any exceptions to that obligation. And
 10 Pakistan's chief negotiator reported to his government
 11 that "by and large", the December 1959 draft "safeguards
 12 Pakistan's interests". That's Exhibit P-140.
 13 Notwithstanding this apparent progress, by
 14 March 1960 the parties were still unable to reach
 15 agreement on Western Rivers uses, including storage,
 16 among other issues. Progress in the negotiations was
 17 stymied by India's ever-increasing demands for use of
 18 the Western Rivers. The parties' exchanges over this
 19 period are set out in paragraphs 159 to 168 of
 20 Appendix A to Pakistan's Memorial.
 21 The common -- and by now, recurring -- thread of
 22 this period was, on the one hand, India's
 23 ever-increasing demands over the Western Rivers and, on
 24 the other, Pakistan's imperative to "avoid control by
 25 India over waters on which Pakistan will be dependent".

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10:41 1 As Pakistan's Ambassador to the US recalled in his
 2 memorandum to the President of the Bank in April 1960,
 3 Pakistan had:
 4 "... agreed to ... permit[] India as much power
 5 development as it desires from run-of-the-river plants
 6 ... [and also to] 0.5 MAF of storage for irrigation ...
 7 [which could also] be used for hydro-electric power as
 8 well."
 9 He emphasised that any proposals the Bank should put
 10 forward to Pakistan for further Indian storage should:
 11 "... keep in view ... that it is politically
 12 essential for Pakistan's irrigation system to be as
 13 independent as possible and works that could cause
 14 interference should be minimal ..."
 15 This is P-483, enclosure pages 5 to 6, on slide 21.
 16 In a further conversation, the Ambassador warned
 17 Mr Iliff that Pakistan would be very reluctant to ignore
 18 the basic assumptions of the Bank's 1954 proposal
 19 regarding mutual independence and Western uses. This is
 20 at Exhibit P-484, paragraph 6.
 21 These exchanges were directed primarily at
 22 negotiations surrounding what became Annexures C and E,
 23 so they're not directly relevant to D. But they do
 24 provide important context to Pakistan's position on
 25 exceptions to India's let-flow obligation, including on

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10:42 1 hydroelectric power generation.
 2 The Bank produced a revised draft of the Treaty in
 3 April 1960 -- that's at P-476 -- together with a set of
 4 draft annexures, including D, that's Exhibit P-476, and
 5 E, at Exhibit P-489. The archives provide no context
 6 over any of the changes made in the April 1960 draft as
 7 against the December 1959 draft. Nor do the archives
 8 provide any transparency regarding the process leading
 9 up to the June 1960 draft and its annexures. The final
 10 text of the Indus Waters Treaty was ultimately agreed on
 11 6 September 1960.
 12 It is clear from this negotiating history of the
 13 Treaty that the final balance struck was hard-fought.
 14 The constant that remained from the Bank's 1954 proposal
 15 was the division of control over the Western and Eastern
 16 Rivers, and the mutual independence that that assured.
 17 It was not a perfect solution for Pakistan.
 18 As Pakistan's Foreign Minister said in 1954, the
 19 original proposal on which it was based involved "great
 20 sacrifices" for Pakistan. That's P-383, paragraph 3.
 21 But it was acceptable on the basis -- and indeed, on the
 22 condition, as Pakistan repeatedly emphasised during the
 23 negotiations -- that it would protect Pakistan against
 24 control over waters on which it would be reliant. It is
 25 for that reason that the detailed parameters

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10:44 1 constraining India's use of the Western Rivers for
 2 hydroelectric power, in Mr Iliff's words after the
 3 conclusion of the Treaty, he said, "tie India up very
 4 tightly". That's at Exhibit P-515.
 5 I'm now going to turn to the third part of my
 6 presentation; unless, Mr Minear, you wanted to jump in
 7 with a question?
 8 MR MINEAR: I apologise, I do have a question here with
 9 respect to Exhibit P-483.
 10 There is the statement here that:
 11 "... [Pakistan] has agreed to meet these needs by
 12 permitting India as much power development as it desires
 13 from run-of-the-river plants."
 14 Is that statement, do you think, reflective of
 15 Pakistan's policy with regard to power generation, that
 16 there were no limits on the amount of power that India
 17 might produce, as long as it came from a run-of-river
 18 plant?
 19 MS REES-EVANS: I think what Pakistan had in mind here was
 20 that there was no limit, as you say. In some ways, it
 21 was quite a broad consent to India to develop the
 22 Western Rivers for power development. But at the same
 23 time, it had in mind very much run-of-river plants with
 24 no storage other than this 0.5 MAF of storage that could
 25 use be used for hydropower.

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10:45 1 But I think it's clear from the correspondence at
 2 this time that Pakistan envisaged very much plants that
 3 involved no consumptive use of water, didn't affect the
 4 timing or quantity of the natural flow of the water.
 5 And what subsequently came through, obviously, in the
 6 detailed provisions of Annexure D, was how to ensure
 7 that Pakistan's concerns over the timing -- no
 8 interference with the timing and quantity of the natural
 9 flow of the water -- could be regulated and ensured.
 10 So provided that those two things could be ensured,
 11 that the timing of the water and the quantity of it
 12 couldn't be interfered with, Pakistan came to accept
 13 that India could develop the Western Rivers for
 14 hydroelectric power at that time.
 15 MR MINEAR: Thank you.
 16 MS REES-EVANS: (Slide 22) Turning to the final part of my
 17 presentation. In this part of my submission I'm going
 18 to highlight four specific conclusions from the
 19 travaux préparatoires regarding the evolution of the key
 20 provisions at issue in this proceeding, namely of
 21 Article III and various paragraphs of Annexure D.
 22 As Professor Webb will go on to explain, the travaux
 23 can, in certain circumstances, be an important factor in
 24 the interpretation of the Treaty pursuant to the
 25 customary rules of treaty interpretation reflected in

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|--|---|
| <p>10:47 1 Article 32 of the Vienna Convention on the Law of 2 Treaties. 3 (Slide 23) The first conclusion is that the let-flow 4 principle was deliberately fortified over time to its 5 final incarnation as an obligation on India to let flow 6 all the waters of the Western Rivers. This reflected 7 Pakistan's firmly held and oft-expressed concerns 8 regarding any threat of Indian control over the waters 9 on which it was due to be reliant. 10 Articles II and III of the Treaty are the 11 operationalisation of the 1954 proposal's foundational 12 principle of the division of the waters. The language 13 it uses, of the entire flow of each of the Western and 14 Eastern Rivers being "available for" the exclusive use 15 of Pakistan and India, respectively, was mirrored in the 16 1957 heads of agreement. This is P-362 and P-413. 17 From the summer of 1959, the language moved towards 18 that of obligation. The heads of agreement of 1959 19 provided that "India shall let flow the water[s] of the 20 Western Rivers free from any interference", save for 21 certain exceptions. That's in Article IV at 22 Exhibit P-136, shown now on slide 23. 23 The December 1959 draft went further still. This is 24 on slide 24 now. It spelt out explicitly India's 25 "obligation to let flow all the waters of the Western</p> <p style="text-align: center;">Page 53</p> | <p>10:50 1 that it would not object to India's use of the Western 2 Rivers for the non-consumptive generation of 3 hydroelectric power. That's at P-133. 4 (Slide 27) The 1959 agreement was couched instead in 5 permissive language, providing at Article IV(2) that: 6 "India shall be entitled to generate hydro-electric 7 power on the Western Rivers in accordance with the 8 provisions of Annex 'B'. 9 That's the precursor to Annexure D. 10 (Slide 28) The permissiveness of the 1959 heads of 11 agreement was then corrected in the first full draft 12 provided to the Governments of India and Pakistan as the 13 December 1959 draft. It provided that India "shall not 14 permit any interference with the waters" of the Western 15 Rivers except for the defined list of uses, which 16 included the generation of hydroelectric power. This 17 shift in language is significant. It points to the 18 primacy of the pivotal let-flow obligation and, by 19 implication, the limiting character of the exception. 20 Further reinforcing this conclusion is the 21 introduction as from the December 1959 draft of the 22 Treaty of the clear prohibition, subject to the 23 exceptions set out in Annexures D and E, on India's 24 storage of any water or construction of any storage 25 works on the Western Rivers. This is at Article III(4)</p> <p style="text-align: center;">Page 55</p> |
| <p>10:48 1 Rivers". This is at Article III(2). 2 (Slide 25) Then between the December 1959 draft and 3 the final Treaty, the main substantive change to 4 Article III of the Treaty was to strengthen Pakistan's 5 rights to receive all those waters of the Western Rivers 6 which India is under an obligation to let flow. That 7 change was effected through the removal of the words "be 8 entitled to" in the June 1959 draft. In the June 1959 9 draft [as] in the final version, the Treaty simply 10 provides that Pakistan "shall receive" those waters. 11 This is visible in the red-line shown now on slide 25. 12 (Slide 26) The second conclusion is that India's 13 ability to utilise the Western Rivers for the generation 14 of hydroelectric power was deliberately couched as 15 an exception to India's positive and binding obligation 16 to let flow. This in itself represented a concession by 17 Pakistan. 18 Pakistan's opening position, reflected in its 19 comments to the May 1957 heads of agreement, was that: 20 "... any development on [the Western] rivers 21 upstream of Pakistan would have to have the consent of 22 the Government of Pakistan." 23 That's Exhibit P-410. 24 Under pressure from India and the Bank, Pakistan 25 eventually, in 1959, conceded, subject to conditions,</p> <p style="text-align: center;">Page 54</p> | <p>10:51 1 of the final Treaty. This provision remained largely 2 constant from December 1959 to the final version of the 3 Treaty. 4 It is evident from the intense exchanges between the 5 negotiating parties in the final months of negotiations 6 that India's attempts to expand on the storage allocated 7 to it was fiercely fought. For that reason, the 8 negotiating history supports a narrow construction of 9 these exceptions to India's let-flow obligation. 10 (Slide 29) The third conclusion is that the 11 requirement that India provide Pakistan with information 12 about its run-of-river HEP plants was a constant feature 13 of the drafts. I think Mr Shah yesterday referred to 14 "the wisdom of the framers of the Treaty" in this 15 respect (Day 1, page 163, line 9). 16 As early as the May 1957 heads of terms in P-362, 17 now shown on slide 29, the parties recognised that 18 information-sharing was absolutely vital to the 19 permission that the Treaty was to give to India. 20 (Slide 30) The fourth conclusion from the travaux is 21 that unfortunately, as I've said before, they provide 22 little assistance in providing context to certain 23 aspects of the Treaty. And most notably, I think that's 24 around some of the key provisions at Annexure D. 25 Negotiations of those provisions appear largely to</p> <p style="text-align: center;">Page 56</p> |

10:53 1 have taken place in the London meetings in August 1959,
 2 but they don't give much detail in the minutes of those
 3 meetings. And there are then likely to have been
 4 further detailed negotiations in the run-up to the
 5 April 1960 draft of Annexure D. But again, there's no
 6 detail of the negotiations at all in the archives in
 7 that period.
 8 Pakistan has summarised the evolution of aspects of
 9 the relevant provisions of Annexure D in paragraphs 50
 10 to 52 of Appendix A of its Memorial. I intend to focus
 11 my remarks on that which can be gleaned about the term
 12 "pondage" and related terms, in response to the question
 13 that you asked, Mr Minear, of Mr Shah yesterday.
 14 Mr Minear observed -- and this is the Day 1
 15 transcript, page 215, lines 10 to 14 -- that:
 16 "... Pakistan initially suggested a pondage
 17 determination based on a minimum load factor, and
 18 I would be interested in knowing what relevance that
 19 might have to the position that was ultimately
 20 formulated in the Treaty."
 21 It is helpful, in answering this question, to go
 22 through, with your indulgence -- and this will be the
 23 end of my presentation -- the chronology of the drafts
 24 on this particular point.
 25 It appears that the term "pondage" was first

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10:54 1 introduced by Pakistan in a draft of 15 August 1959.
 2 That's Exhibit P-365, enclosure 2, at paragraph 2(b).
 3 I've set out the provision on the slide and it's
 4 highlighted in 2(b).
 5 In Pakistan's August 1959 draft, it used the term
 6 "pondage" in one of a number of considerations that
 7 "shall govern the design, construction and operation" of
 8 hydroelectric power plant works. And it stipulated that
 9 the pondage shall be that which is:
 10 "... adequate only to cater for the weekly load
 11 factor of the power plant (daily load factor in the case
 12 of a power house involving the construction of a dam on
 13 the main stem of the Chenab River)."
 14 At this stage, a pondage determination based on
 15 a load factor was put forward as a design criterion.
 16 So then the next time it appears is in the heads of
 17 agreement of 1959 (P-136). There, it is described in
 18 paragraph 2 -- on slide 31 now -- as:
 19 "... the [live] storage in the operating pool ...
 20 required to meet fluctuations in the discharge of the
 21 turbines arising from variations in the daily or weekly
 22 load of the power plant."
 23 Then paragraph 3(b) of the heads of agreement 1959
 24 is the precursor to paragraph 8(c) of Annexure D. And
 25 again, this provision was included on Pakistan's

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10:55 1 proposal. Paragraph 3(b) set out a design criterion
 2 which required that the "volume between the maximum and
 3 minimum levels of the operating pool shall not exceed
 4 that required to meet the daily or weekly load
 5 fluctuations as the case may be".
 6 So we think that Pakistan clearly intended, with its
 7 proposed addition, to establish a limit on India's
 8 allowable pondage. So at that stage they were working
 9 out how to establish that limit.
 10 This isn't the end of the story, because then we
 11 have the, essentially, gaping hole in the negotiating
 12 records. We know next to nothing about why the draft of
 13 the Treaty evolved as it did between the heads of
 14 agreement 1959 and the April 1960 draft of Annexure D.
 15 All that we know is from the subsequent drafts
 16 themselves.
 17 (Slide 32) So if we look at the April 1960 draft, we
 18 see that it introduces a formal definition of "pondage",
 19 which is largely consistent with the description in the
 20 heads of agreement of 1959. It provides that:
 21 "'Pondage' means storage of only sufficient
 22 magnitude to meet fluctuations in the discharge of the
 23 turbines arising from variations in the daily and weekly
 24 load of the plant."
 25 This is P-476, draft paragraph 5(c).

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10:57 1 But the equivalent of paragraph 3(b) of Annex B of
 2 the heads of agreement -- so this is the design
 3 criterion -- no longer refers to the concept of "load".
 4 Instead it is linked to "firm power". This is at
 5 paragraph 7(c). It provided that:
 6 "The maximum Pondage in the Operating Pool shall not
 7 exceed twice the Pondage required for Firm Power."
 8 So at this point the concept of "load" is confined
 9 solely to the definition and the concept of "firm power"
 10 is introduced. The concept of "load" is removed
 11 completely from the design criterion for new
 12 run-of-river plants.
 13 We can only speculate about why this was, because
 14 again, as I said, we don't have the records of the
 15 negotiations. But if we were to speculate, we might say
 16 that it's a reflection that the parties didn't want the
 17 design criterion to be linked to something as subjective
 18 as load or demand, so how much power the operator wants
 19 to generate from the plant. But the travaux don't
 20 confirm either way.
 21 What we do know, however, is that from this point
 22 on, the parties clearly recognised the significance of
 23 the term "firm power". So while the definition of the
 24 term "pondage" stayed almost entirely constant in the
 25 April 1960 [and] June 1960 drafts and the final Treaty,

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10:58 1 the definition of "firm power" evolved. So that's what
 2 they were looking at. This is described in paragraph 49
 3 of Appendix A, and is captured clearly in the red-line
 4 showing the changes made to the April 1960 draft of
 5 Annexure D in the final version, submitted at P-522.
 6 So to conclude the answer to Mr Minear's question,
 7 it's difficult to know really what was going on because
 8 the record in this period is so sparse. But if you have
 9 to draw a conclusion, it's the marginalisation of load
 10 as a relevant factor in the calculation of pondage, and
 11 the steadily increasing importance of firm power. And
 12 in transitioning from the relevance of load factor to
 13 firm power, it made the pondage more restricted.
 14 That brings me to the end of my presentation, unless
 15 there are any further questions from the Court.
 16 Questions from THE COURT
 17 DR BLACKMORE: I noticed the agreement was designed for its
 18 time, so I accept all of that. I was just wondering,
 19 given you studied it very closely, what would happen to
 20 emerging technologies that might impact on the
 21 agreement, that haven't been canvassed by the agreement
 22 but could still have an impact? I'll leave global
 23 warming out, as a sort of generic issue. But would
 24 something like cloud seeding, for example, be deemed
 25 an engineering work? That's a question.

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11:01 1 your presentation, but I just wanted to flag this
 2 question for one of your future presenters.
 3 MS REES-EVANS: Sorry, could you give me the paragraph
 4 reference?
 5 MR MINEAR: Yes: it's paragraph 21 of Annexure E.
 6 MS REES-EVANS: Paragraph 21, okay.
 7 MR MINEAR: I can read it to you if you'd like.
 8 MS REES-EVANS: No, I have that, thank you.
 9 I think we'll come back to that then, yes. Thank
 10 you.
 11 MR MINEAR: Yes.
 12 THE CHAIRMAN: So I have a question that I think does fall
 13 within the scope of your presentation, which is that at
 14 Appendix A, starting at paragraph 26, there is
 15 a discussion of what does or does not constitute the
 16 travaux préparatoires, with references to statements
 17 made by Professor Crawford and Professor Lowe in the
 18 Kishenganga proceeding. That discussion seemed to be
 19 suggesting that it was important to discern what
 20 constitutes a part of the travaux and what does not.
 21 But then at paragraph 31, Pakistan says that even
 22 non-travaux materials fall within the scope of VCLT
 23 Article 32.
 24 Can you clarify why it's important to determine what
 25 is and what is not travaux?

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11:00 1 MS REES-EVANS: I think I might leave that to be taken up by
 2 one of the subsequent presentations, if I may. It
 3 certainly isn't addressed in what I've seen of the
 4 travaux. I haven't seen anything in the travaux that
 5 pays very close attention to how developments in
 6 technology will be addressed by the text that is
 7 currently under negotiation as at 1959/1960.
 8 DR BLACKMORE: Thank you. I just wanted to see whether
 9 there was somewhere a cubbyhole that had an ability to
 10 start a conversation about those things. But apparently
 11 not. So thank you.
 12 MS REES-EVANS: It's certainly something that will be
 13 addressed in subsequent submissions. But as I say, the
 14 travaux just don't provide very much guidance on how the
 15 Treaty will be responsive to future developments in
 16 technologies.
 17 MR MINEAR: I just would like to flag an enquiry that might
 18 arise later. I don't think it falls within your
 19 presentation, but it seems an appropriate point to
 20 make it.
 21 In Annexure E, paragraph 21(a), there's a reference
 22 to "firm power" there as well, and I would be curious if
 23 that definition of "firm power" is the same as used in
 24 Annexure D.
 25 I don't believe, as I say, that this falls within

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11:03 1 MS REES-EVANS: Well, yes, I think certainly the discussion
 2 of this in Kishenganga is a little bit confusing
 3 because, as you say, it seems to take two separate
 4 tacks: on the one hand, there's a discussion about
 5 whether something is formally characterised as travaux;
 6 and on the other hand, there's this acceptance that in
 7 any case it can be taken into account under Article 32.
 8 I think the reference that you cited in paragraph 31
 9 is to a footnote in the partial award where the Court
 10 effectively is saying, we, the Court in Kishenganga,
 11 don't think that the distinction is actually all that
 12 important because either way we think that this material
 13 from the record can be taken into account under
 14 Article 32.
 15 So I think where the Court came out, after having
 16 this discussion during the course of the -- I believe it
 17 was the hearing on the merits -- yes, in the hearing on
 18 the merits -- I think where the Court came out was that
 19 it didn't need to pay too strict attention necessarily
 20 to the distinction, because actually it could take into
 21 account materials under Article 32 even if they weren't
 22 strictly defined as travaux.
 23 But I suspect that part of the reason it reached
 24 that conclusion was because it wasn't necessary in that
 25 case for the Court to take a very rigid, formal approach

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11:05 1 because it actually didn't rely on the travaux
 2 particularly extensively in its award. There's a couple
 3 of aspects where they do rely on the travaux, but in
 4 general they don't form a huge part of the Court's
 5 award. So I suspect that's why the Court, in its
 6 partial award, didn't end up entertaining this
 7 distinction too much in its analysis.
 8 But it may be also worth saying that if something
 9 can be characterised as "travaux", I think for a Court
 10 it is easier to give that weight than something that
 11 doesn't strictly fall within the concept of "travaux".
 12 And so it's a question of really the weight which you
 13 give the materials that you're looking at. And you
 14 would give something that formally constitutes travaux
 15 more weight than something that doesn't, obviously as
 16 a reflection of the negotiating positions of the
 17 parties.
 18 THE CHAIRMAN: So there's a range of materials that we could
 19 take into account as a part of a supplemental means of
 20 interpretation, but perhaps the travaux préparatoires --
 21 defined, perhaps, as the materials that form a part of
 22 the negotiating record of the Treaty -- might be given
 23 more weight than those other materials because they
 24 speak more to the intent of the parties; is that the way
 25 you understand it?

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11:07 1 of the parties was aware of the particular document that
 2 was generated.
 3 So I think that the overarching point here was that
 4 the Bank had been very good in its approach to the
 5 parties and very transparent with both parties. So as
 6 a general approach, you could say you can take the
 7 documents produced by the Bank as travaux for that
 8 reason, because they were transparent with both sides.
 9 But I can't think of a particular example. But if
 10 there is an example where really this is a record of
 11 a conversation with one party, which at the time the
 12 other party was completely unaware of, for instance,
 13 I think it is more questionable whether you could
 14 characterise that as part of the travaux.
 15 THE CHAIRMAN: So let's take as an example an issue that
 16 you've raised in the Memorial and also today, which is
 17 the idea of the let-flow principle operating. And in
 18 Appendix A at page 8, subparagraph (a), you say:
 19 "... throughout the negotiations, the pivotal 'let
 20 flow' principle remained relatively constant."
 21 And you have that also at paragraph 41, I think.
 22 And today you've reiterated that, and I think I heard
 23 you say it was fortified over time as part of the
 24 negotiating history.
 25 It seems clear that Pakistan took that type of

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11:06 1 MS REES-EVANS: Yes, I think that's right, although just
 2 a slight clarification on one of the points that you
 3 made, because in this case we're obviously looking at
 4 a negotiating record that wasn't entirely generated by
 5 the parties, and in fact largely it was not generated by
 6 the parties.
 7 So formally speaking, I think as we've set out in
 8 these paragraphs here, you're not giving such weight to
 9 materials that were produced by a third party. So the
 10 materials that were produced by the negotiating parties
 11 are formally the travaux, and then you've got to look at
 12 the specific circumstances surrounding documents
 13 generated by third parties -- so in this case the
 14 Bank -- to determine whether those materials should
 15 properly be described as reflecting the parties' views,
 16 and therefore whether they constitute travaux.
 17 THE CHAIRMAN: So in this instance, would you view the
 18 materials generated by the World Bank as a part of the
 19 travaux, or would you say that it's not actually part of
 20 the travaux because it's not the parties expressing
 21 their own views?
 22 MS REES-EVANS: I don't think it's possible to give
 23 a general answer to that; I think it depends on the
 24 specific document. Because as we set out, I think, in
 25 these paragraphs, it depends on the extent to which each

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11:09 1 approach throughout the negotiations. It seems
 2 relatively clear to me that India did not take that
 3 approach throughout the negotiations; that they began
 4 with an idea of existing uses within India need to be
 5 preserved and maintained, and then over time they moved
 6 towards an approach of: non-consumptive uses should be
 7 permissible, and then eventually we get the exception
 8 that we currently have in the Treaty. And I think
 9 you've recognised in Appendix A and in your statement
 10 today that Pakistan was, as you put it, forced to accept
 11 ultimately this idea that there would be uses of the
 12 waters that in some sense impede the flow of the
 13 Western Rivers.
 14 So when I look at that, I see one party perhaps
 15 channelling a let-flow concept, even if those words
 16 themselves weren't used at the outset, but the other
 17 party not so much accepting that.
 18 So if we then go to the World Bank's statements and
 19 perhaps give them some weight, it doesn't appear to be
 20 the case that in the World Bank's statements there's
 21 an indication that the purpose in this Treaty was to
 22 ensure that there would be an absolute let-flow of the
 23 rivers. There's references throughout the materials to
 24 at least some uses of the upper part of the rivers by
 25 India. But when I look at Mr Black's letters of

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11:11 1 September 1951 or November 1951, I see principles being
 2 articulated there, but I don't see the let-flow
 3 principle. And when I look at the subsequent
 4 correspondence of the Bank with the two Prime Ministers,
 5 I don't see a let-flow principle being articulated.
 6 And when I look at that 1954 proposal that you
 7 pointed out to us, which, as you indicated to us,
 8 Pakistan resisted initially, there's certainly language
 9 about avoiding control by India over waters on which
 10 Pakistan is dependent. That's not quite the same thing
 11 as a let-flow principle. Instead it seems like there is
 12 the introduction there of the concept of an "entire
 13 flow", but with exceptions. In that instance, there's
 14 reference to "insignificant use", I think. But still,
 15 it's not an absolute let-flow. Likewise, in the [1956]
 16 aide-mémoire, I don't see that principle being
 17 articulated.
 18 All that to just say: it feels like we're getting to
 19 a point where, rather than a fortification of a let-flow
 20 principle, we have an increasing, perhaps, fortification
 21 of a Pakistan position of wanting relatively
 22 unrestricted, if not completely unrestricted, flows, and
 23 an Indian position that there do need to be exceptions,
 24 and eventually an acceptance that there would be
 25 exceptions, in the form of hydroelectric power and

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11:14 1 beyond just that period between August 1959 and the
 2 final Treaty, I think it would be useful for us to come
 3 back to you on that.
 4 THE CHAIRMAN: Yes, certainly feel free to do that.
 5 I suppose I was pressing you a bit on this idea that
 6 throughout the negotiations the let-flow principle was
 7 pivotal, because that latter bit doesn't speak to the
 8 broader story of the negotiations. But even on that
 9 latter bit, the shift from the 1959 heads of agreement
 10 to the 1959 draft, it looks somewhat as though there is
 11 a fortification of a let-flow concept, a right for this
 12 to happen, but also a fortification, a drilling-down on
 13 what are the exceptions going to be -- what rights, if
 14 you will, India has with respect to hydroelectric
 15 plants -- and thus a hardening, if you will, on both
 16 sides of the equation.
 17 MS REES-EVANS: Yes, I can see your point, and I think
 18 we will address it sort of in longer time.
 19 But in relation to the first point, I suppose one
 20 thing that certainly comes out from, as you say, the
 21 Pakistan materials is that Pakistan simply wouldn't have
 22 entered into this Treaty but for the kind of overarching
 23 obligation of India to let the waters of the Western
 24 Rivers through to Pakistan. That was really the
 25 fundamental premise. That was really the fundamental

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11:13 1 certain other uses on the upper parts of the river.
 2 So I just advance all of that to invite you to tell
 3 me where perhaps that recounting of what happened in the
 4 negotiating history may not be entirely correct.
 5 MS REES-EVANS: I think just in a sort of brief answer to
 6 that -- but I think it would be useful for us to go away
 7 and look at some of the documents you specifically
 8 referred to and come back maybe with a longer answer
 9 with more time. But just as a sort of high-level
 10 response to that.
 11 I suppose the fortification, as we say, of the
 12 let-flow obligation is as I set out, I think, in some of
 13 the -- I can find the slides -- but some of the slides
 14 I set out today, which is essentially the movement in
 15 the language as between the 1959 heads of agreement to
 16 the final terms of the Treaty, and the recognition
 17 during that evolution in the language of India of the
 18 way that the terms are couched. So initially I think we
 19 have a description of the waters being "available for
 20 the use", and then we have India "shall make the waters
 21 available", and then we have India is "under
 22 an obligation to". So there is that evolution, which,
 23 over time, incrementally fortifies, we say, the let-flow
 24 obligation.
 25 But I think to your wider question, which goes

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11:16 1 premise of Pakistan's agreement to the bargain as
 2 a whole.
 3 THE CHAIRMAN: Judge Al-Khasawneh.
 4 JUDGE AL-KHASAWNEH: Thank you, Mr Chairman.
 5 I don't really see the "let flow" expression as
 6 anything more than a shorthand for a principle that had
 7 already existed. And we can probably trace the
 8 beginning to one of the earlier drafts, where there was
 9 talk of allowing historic withdrawals to continue, for
 10 example. So it's not a new principle; it's just one way
 11 of expressing the thing. That's how I look at it. Of
 12 course I would be very happy to look at further
 13 information.
 14 The other thing that I wanted to say is: the
 15 question of the travaux préparatoires, this is a very
 16 old debate. I remember the first time I was in the
 17 Sixth Committee, there was a debate as to what
 18 constitutes travaux préparatoires, and there was
 19 a statement by the late Shabtai Rosenne that I still
 20 remember. So I don't think we can really settle it
 21 here. Anyway, the Neutral Expert thought that
 22 everything was clear and there was no need for
 23 supplementary means of interpretation.
 24 So this is what I thought. But I don't have a very
 25 firm position on this. I would be very happy to hear

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11:18 1 and to look at any further information. Thank you.
 2 THE CHAIRMAN: Judge Al-Khasawneh just prompts one further
 3 question and I think we'll let you go.
 4 Is it the case that from the outset of the
 5 negotiations on through to the end, there was
 6 an acceptance on both sides that historical use should
 7 be preserved; that is, that there were uses by India
 8 upstream for certain purposes, Pakistan downstream for
 9 certain purposes -- I'm talking of the Western Rivers --
 10 and that these should be preserved as we move along in
 11 the negotiations? Is that correct?
 12 MS REES-EVANS: I think that's right. I think it's referred
 13 to as "existing uses" in both cases, the term "existing
 14 uses" is used. Certainly that was one of Pakistan's
 15 concerns about the 1954 proposal, whether existing uses
 16 were in fact protected by that proposal. But
 17 I believe -- and we will double-check that -- but
 18 I believe that that was a concept that applied equally
 19 to both sides.
 20 THE CHAIRMAN: Great. Well, thank you very much,
 21 Ms Rees-Evans. That was very helpful.
 22 So I think we will now take our coffee break, and
 23 why don't we plan to come back at 11.45.
 24 MS REES-EVANS: Thank you.
 25 (11.19 am)

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11:49 1 This was provided for and cited in paragraph 29 of
 2 Annexure G of the Treaty. I'm going to come back to
 3 this in detail.
 4 (Slide 3) So I will proceed in four parts. I'm
 5 going to set out the key principles, engage with the
 6 issues raised in the discussion so far, and lay the
 7 groundwork for Pakistan's analysis of the Treaty in the
 8 coming days.
 9 So first I'm going to look at what's called the
 10 "general rule" of treaty interpretation, Article 31.
 11 And I'm going to develop some of the points that
 12 Sir Daniel has highlighted: the special meaning given to
 13 terms, the principle that an exception to a rule is to
 14 be interpreted restrictively, and I will address the
 15 issue of subsequent agreements and practice.
 16 Second, I'll look at supplementary means under
 17 Article 32 of the Vienna Convention, building on what
 18 Ms Rees-Evans has set out on the travaux préparatoires.
 19 Third, I will come to paragraph 29 of Annexure G,
 20 and I will show that recourse by the Court to relevant
 21 rules of international law is possible, but only when
 22 necessary for the interpretation or application of the
 23 Treaty. And in this context I will address, among other
 24 things, the question of climate change and the Treaty.
 25 Fourth, I will look at the interpretation of peace

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11:19 1 (A short break)
 2 (11.48 am)
 3 THE CHAIRMAN: Professor Webb, the floor is yours.
 4 Submissions on Principles of Treaty Interpretation
 5 PROFESSOR WEBB: Thank you very much. And if my
 6 presentation could be shown. Thank you.
 7 Mr Chairman, members of the Court, it's an honour to
 8 appear before you on behalf of Pakistan. I will be
 9 addressing you three times during this first round, and
 10 today I will covering the principles of treaty
 11 interpretation. For some members of the Court, this
 12 will be very familiar, almost instinctual; but for
 13 others it is relevant because these are well-established
 14 rules and they differ from the interpretation of
 15 domestic law or contracts.
 16 I'm also going to address questions that arose
 17 yesterday and this morning, in the course of where they
 18 arise during my presentation.
 19 (Slide 2) The starting point is the Indus Waters
 20 Treaty itself. As the Court observed in its Competence
 21 Award, the primary source for this Court to interpret
 22 and apply is the Treaty. Whenever necessary for the
 23 Treaty's interpretation and application, however, the
 24 Court may apply international conventions and customary
 25 international law.

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11:50 1 and boundary treaties. And in response to the
 2 discussion yesterday, I will develop the points made by
 3 Sir Daniel, and distinguish the Indus Waters Treaty from
 4 treaties that have been determined by international
 5 courts to be living instruments. And I will also set
 6 out how these arguments were addressed and dealt with in
 7 the Baglihar and Kishenganga proceedings.
 8 (Slide 4) So turning first to the general rule.
 9 This is laid out in Article 31 of the Vienna Convention.
 10 I'm not going to read out the text, but I will be going
 11 through it in sequence.
 12 (Slide 5) I'm going to be spending most of my time
 13 on that first paragraph, Article 31(1). And it has four
 14 elements: ordinary meaning, context, object and purpose,
 15 and good faith. The Vienna Convention does not
 16 establish an order of priority among these criteria, and
 17 the consistent case law has been that they are to be
 18 considered as a whole.
 19 (Slide 6) So turning first to "ordinary meaning",
 20 Article 31(1) provides that:
 21 "A treaty shall be interpreted ... in accordance
 22 with the ordinary meaning to be given to the terms ..."
 23 The ICJ has dealt with this a number of times
 24 recently in the preliminary objections judgment in
 25 Qatar v UAE. It emphasised that interpretation must be

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11:52 1 based, above all, upon the text of the treaty.
 2 The Kishenganga Court followed this approach by
 3 commencing its interpretation of paragraph 15(iii) of
 4 Annexure D with the statement (PLA-3, paragraph 402):
 5 "... the text of Paragraph 15, and specifically with
 6 the ordinary meaning of the terms there used."
 7 (Slide 7) There's an important temporal point to
 8 highlight here: the "ordinary meaning" is generally the
 9 meaning attributed to the terms at the time the Treaty
 10 is concluded. This is the principle of contemporaneity.
 11 Sir Gerald Fitzmaurice, who was a special rapporteur for
 12 the ILC's work on treaties, defined that principle as
 13 follows (PLA-63):
 14 "The terms of a treaty must be interpreted according
 15 to the meaning which they possessed, or which would have
 16 been attributed to them, and in the light of current
 17 linguistic usage, at the time when the treaty was
 18 originally concluded."
 19 (Slide 8) The International Law Commission said this
 20 requirement is one of both common sense and good faith.
 21 And the principle has been confirmed by the ICJ and
 22 other international courts and tribunals, and I will
 23 just illustrate this with two examples.
 24 The first is the case of the Rights of Nationals of
 25 the United States of America in Morocco, a dispute

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11:53 1 between France and the United States. And the word
 2 there that was being interpreted was "dispute", that
 3 appeared in treaties concluded in 1787 and 1836. And
 4 the court said (PLA-64, page 189):
 5 "It [was] necessary to take into account the meaning
 6 of the word 'dispute' at [those] times when the two
 7 treaties [were] concluded."
 8 And the result of that is that they found that
 9 "dispute" covered both civil and criminal proceedings.
 10 The second case is an arbitration between Argentina
 11 and Chile concerning the frontier line at a certain
 12 point. And here the word was "water-parting", and it
 13 was used in a treaty of 1881, with an 1893 protocol
 14 concerning the boundary dispute between them. As you
 15 can see, the tribunal concluded (PLA-67, paragraph 130)
 16 that:
 17 "... the concept of 'water-parting' ... is not
 18 susceptible of ... subsequent change through usage,
 19 evolution of the language, or acts or decisions of one
 20 of the Parties to the dispute."
 21 (Slide 9) So the terms of the Indus Waters Treaty
 22 must be given their ordinary and natural meaning,
 23 understood at the time of the conclusion of the Treaty.
 24 The exception to that is if a special meaning is
 25 intended, and that's also addressed in Article 31 of the

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11:55 1 Vienna Convention in paragraph 4.
 2 At the time the Treaty was negotiated -- and we've
 3 heard about the sequence in the previous presentation --
 4 the drafters of the Treaty, and in particular the expert
 5 engineers on both sides and for the World Bank, were
 6 well aware of contemporary usage of the terms that they
 7 were including in the text, including the contemporary
 8 publication, for example, of Creager & Justin in 1950.
 9 Yet, as Sir Daniel mentioned and as Pakistan's
 10 Memorial sets out, some of the Treaty's terms depart
 11 from their conventional contemporaneous usage and they
 12 have a distinct and unique meaning. We will be
 13 addressing these in context when we go through the
 14 paragraph 8 criteria. But I just wanted to give
 15 an example, and it goes to a question that Mr Minear
 16 asked before the break.
 17 (Slide 10) So this is the meaning of "Firm Power".
 18 And here I'm talking about it in the context of
 19 Annexure D, where the ordinary meaning would be: power
 20 calculated by reference to demand, plotted on a load
 21 curve; power intended to have assured availability to
 22 the customer to meet their agreed needs and
 23 requirements.
 24 However, the Treaty defines it with a special
 25 meaning, in paragraph 2(i) of Annexure D, as:

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11:56 1 "... the hydro-electric power corresponding to the
 2 minimum mean discharge at the site of a plant ..."
 3 So it is calculated by reference to the flow of the
 4 river.
 5 Now, Mr Minear asked whether the reference to "firm
 6 power" in paragraph 21(a) of Annexure E has the same
 7 meaning. And we say that it does not, and that is in
 8 a very lawyerly way: because it doesn't have capital
 9 letters. It is clear from that provision in 21(a) that
 10 "Pondage" is intended to have the special meaning: it is
 11 capitalised, it is cross-referenced to Annexure D. But
 12 "firm power" is used in the ordinary meaning, we say, in
 13 that provision.
 14 MR MINEAR: Professor, sorry to interrupt you so early in
 15 your presentation.
 16 PROFESSOR WEBB: Not at all.
 17 MR MINEAR: I do have a question though that goes
 18 specifically to this question of special meanings. My
 19 question is whether there is an analogue to a domestic
 20 rule that's followed in the interpretation of statutes
 21 in the United States, and that is -- I'll quote the
 22 statement:
 23 "In settling on a fair reading of a statute, it is
 24 not unusual to consider the ordinary meaning of
 25 a defined term, particularly when there is a dissonance

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11:58 1 between that ordinary meaning and the reach of the
 2 definition."
 3 This comes from a case called *Bond v United States*,
 4 which was interpreting a statute that implemented the
 5 Chemical Weapons Convention. And the point that was
 6 made in this case was: "chemical weapons" had
 7 a meaning -- the Treaty meaning and the statutory
 8 meaning was very, very broad, but it could be read more
 9 restrictively based on the general sense of "chemical
 10 weapons".
 11 The same principle was applied in another case
 12 called *Sackett v EPA*, and in that case the term
 13 "navigable waters" was defined as "waters of the United
 14 States".
 15 PROFESSOR WEBB: Yes.
 16 MR MINEAR: And the question was: does "navigability" still
 17 provide some insight into that definition?
 18 Now, in both of those cases, the ordinary meaning
 19 was used to restrict what was a very broad defined
 20 meaning.
 21 PROFESSOR WEBB: Yes.
 22 MR MINEAR: My question is simply this: is there a similar
 23 principle in international treaty interpretation? This
 24 might be something peculiar to the United States law,
 25 and I just wonder if this is present in treaty

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11:59 1 interpretation, in your experience.
 2 PROFESSOR WEBB: So the particular way in which we explain
 3 that the ordinary meaning has restricted the defined
 4 meaning is not a core principle of treaty interpretation
 5 in international law, and I would say it would be fairly
 6 unusual. I can't think of examples now.
 7 But I think the two cases that you cite, and the
 8 process that's gone through, we do see a broad analogue
 9 with the process of treaty interpretation under the
 10 Vienna Convention, but not restricted to ordinary
 11 meaning and special meaning, that binary choice, but in
 12 terms of the holistic analysis that I mentioned at the
 13 beginning.
 14 So it sounds like -- and not being familiar with the
 15 cases, but from your summary of them -- it sounds like
 16 the principle of effectiveness played a role there, that
 17 that narrowed the meaning, or perhaps the context or the
 18 object and purpose, all of which are familiar concepts
 19 in international law and could have led to a similar
 20 outcome, but not just through this contrast between
 21 ordinary and special meaning.
 22 MR MINEAR: Thank you. I just want to make sure I'm not
 23 importing principles that I'm familiar with into the
 24 international context.
 25 PROFESSOR WEBB: Yes, I think we have to be careful of that.

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12:00 1 MR MINEAR: Thank you.
 2 THE CHAIRMAN: Professor Webb, before we let you continue,
 3 you've set up this idea that Article 31 of the Vienna
 4 Convention, in paragraph 1, when it speaks of "ordinary
 5 meaning", is essentially speaking of a static
 6 interpretation of terms. Of course, Article 31,
 7 paragraph 1 itself doesn't say that. And it does seem
 8 to be the case that separate from Article 31,
 9 paragraph 4, there is the possibility of an evolutive
 10 interpretation of terms within a treaty, and there are
 11 cases, of course, that would support that: the *Aegean*
 12 *Sea case*, the *Navigational Rights case* and so on.
 13 So I'm wondering if you accept that there is not
 14 necessarily a static approach in Article 31,
 15 paragraph 1; and if so, whether your argument is going
 16 to be that a treaty as a whole is either static or
 17 evolutive, or whether you would accept that terms within
 18 any given treaty might be viewed as having been intended
 19 to have either a static or an evolutive interpretation.
 20 PROFESSOR WEBB: I'm going to be coming to those exact cases
 21 in the fourth part of my presentation. So I'll answer
 22 now, but I will come back to more detail on why the
 23 treaties in those cases can be distinguished.
 24 But in answer to your question now, it is true that
 25 "ordinary meaning" as defined in paragraph 1 is not

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12:02 1 a static meaning. But the starting point, going back to
 2 Fitzmaurice and the drafting of this treaty, is that
 3 "ordinary meaning" is associated with its meaning at the
 4 time.
 5 Now, that may be displaced by other factors of
 6 treaty interpretation, object and purpose, or the
 7 express intention of the drafters as expressed in the
 8 treaty, the character of the treaty itself: that can
 9 displace that starting point. But what I'm saying is
 10 that that is the starting point based on the drafting of
 11 the Vienna Convention.
 12 And then --
 13 THE CHAIRMAN: Well, if I could just respond on that.
 14 PROFESSOR WEBB: Yes.
 15 THE CHAIRMAN: Fitzmaurice was not the final rapporteur in
 16 the project and it's a question as to whether his views
 17 worked their way into what became the Vienna Convention,
 18 including the ILC's commentary. So it may be worth
 19 looking at that.
 20 PROFESSOR WEBB: Yes.
 21 THE CHAIRMAN: But the reason why I did raise this now --
 22 I realise you're going to, in your final part of your
 23 presentation, address this. But it seemed to me that in
 24 the Memorial, there was this approach to static
 25 interpretation, and then: oh, by the way, at a later

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12:03 1 point in time, let's acknowledge that there's evolutive,
 2 but that's to be limited to very specific kinds of
 3 treaties.
 4 PROFESSOR WEBB: Yes.
 5 THE CHAIRMAN: I think Sir Daniel yesterday referred to the
 6 living instrument-type treaty.
 7 I'm just curious whether you would accept that it is
 8 a part of a possibility of an Article 31, paragraph 1
 9 interpretation that's not treaty-dependent; it may be
 10 provision-dependent.
 11 PROFESSOR WEBB: Yes, I would accept that. And I think the
 12 character of the treaty as a whole or the specific
 13 provisions could each be subject to evolution. And as
 14 I said, I'll come back to the features that may show
 15 that, including the object and purpose or the
 16 intentional use of generic terms, as in the
 17 Navigational Rights case.
 18 But I think there is a consistency in our approach
 19 in the Memorial and what we're saying now, which is that
 20 this is a Treaty that has limited its ability to be
 21 interpreted by incorporating extraneous sources and by
 22 departing too much from what was very much the bargain
 23 of the parties in 1960.
 24 THE CHAIRMAN: So there would be some provisions of the
 25 Treaty that perhaps are more generic in nature -- "sound

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12:06 1 interpretation. The first is the role as an "immediate
 2 qualifier" of the ordinary meaning of the terms used in
 3 the Treaty. The Kishenganga Court used this type of
 4 context in interpreting paragraph 15 of Annexure D, and
 5 it observed (PLA-3, paragraph 407) that:
 6 "A review of the context of Paragraph 15 makes clear
 7 that the provision is placed within a continuum of
 8 design, construction and operation that cannot properly
 9 be separated into watertight compartments."
 10 And given that context, the Court went on to say
 11 (PLA-3, paragraph 409) that:
 12 "... the various paragraphs contained in ...
 13 Annexure D must be interpreted in a mutually reinforcing
 14 manner ..."
 15 (Slide 12) I'm not going to read it out, but I'm
 16 just going to bring to your attention the paragraph of
 17 the partial award (PLA-3, paragraph 407) where the Court
 18 applied that contextual interpretation, and also brought
 19 in this idea of not "render[ing] ineffective" certain
 20 provisions.
 21 So that's the first aspect: an immediate qualifier.
 22 (Slide 13) The second aspect is looking at the
 23 structure of the treaty as its context, so looking at
 24 the preamble and the annexes and any agreements
 25 concluded in connection with the conclusion of the

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12:04 1 and economical design" or "customary practice", whatever
 2 the term is --
 3 PROFESSOR WEBB: "Customary and accepted practice".
 4 THE CHAIRMAN: -- that you would say could be regarded as
 5 evolutionary in nature, but other terms that are not?
 6 PROFESSOR WEBB: I wouldn't say it as definitively as that.
 7 I would say that looking at the terms "sound and
 8 economical" -- and this will become more real when
 9 Dr Miles and I go through each of these provisions and
 10 how these terms have been interpreted and applied, and
 11 should be interpreted and applied.
 12 But "sound and economical" we wouldn't say is
 13 a completely generic term in the way that "commerce" was
 14 in Navigational Rights, because it is still impacted by
 15 paragraph 29(g), by the object and purpose of the
 16 Treaty, by the travaux préparatoires, by the three
 17 bargains underpinning the Treaty, and all of that
 18 restricts what you can do in terms of defining what
 19 "sound and economical" is, in a way that "commerce" in
 20 Navigational Rights was not so restricted.
 21 THE CHAIRMAN: Very good. Thank you.
 22 PROFESSOR WEBB: (Slide 11) So now coming to the next aspect
 23 of Article 31(1), which is looking at the terms of the
 24 Treaty in their context.
 25 There are two main roles for context in treaty

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12:07 1 treaty. And the Kishenganga Court also looked at that
 2 second type of context in its Treaty interpretation,
 3 specifically considering the permissibility of depletion
 4 of the dead storage level, referring to looking at the
 5 context of the Treaty as a whole.
 6 (Slide 14) So then we come to what could -- if
 7 Article 31 is the general rule, you could say object and
 8 purpose is the golden rule because it has so many
 9 knock-on effects to treaty interpretation. And as
 10 foreshadowed by Sir Daniel, the three bargains at the
 11 heart of the Treaty -- the peace bargain, the Treaty
 12 bargain and the hydro bargain that I will be turning to
 13 tomorrow -- are crucial to the identification of the
 14 object and purpose.
 15 So the reference to "object and purpose" has
 16 two related implications. First, it brings into the
 17 interpretation process the principle of effectiveness
 18 that I already mentioned in response to Mr Minear. So
 19 this is the idea that you do not pursue
 20 an interpretation that would render parts of the treaty
 21 superfluous or diminish its practical effect.
 22 And the second aspect is that object and purpose
 23 requires that account be taken not only of the rights
 24 and obligations created by the treaty, but also of the
 25 general result that the parties wanted to achieve. And

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12:08 1 we've heard about that from Ms Rees-Evans in the context
 2 of the travaux.
 3 (Slide 15) So turning to the preamble of the Indus
 4 Waters Treaty. First of all, unusually again for
 5 a treaty, and part of the very comprehensive framework
 6 it creates, is Article XII(1), which defines the
 7 preamble as being an integral part of the Treaty.
 8 Then we come to the preamble itself. And I won't
 9 read it out, but I'll just highlight what was the
 10 position of the parties in Kishenganga and what would,
 11 I assume, be India's position today.
 12 So India's argument in the Kishenganga proceedings
 13 was that the most important part of this preamble, and
 14 therefore what defined the object and purpose of the
 15 Treaty, were the orange highlighted words: that the
 16 parties were "equally desirous of attaining the most
 17 complete and satisfactory utilisation of the waters".
 18 Pakistan, in contrast, read the preamble as a whole
 19 and emphasised the importance of what follows in the
 20 yellow:
 21 "... therefore, of fixing and delimiting, in
 22 a spirit of goodwill and friendship, the rights and
 23 obligations of each in relation to the other concerning
 24 the use of these waters ..."
 25 The word "therefore", in Pakistan's submission at

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12:12 1 That Treaty of Amity, Freedom and Commerce was for the
 2 purpose of encouraging mutually beneficial trade and
 3 investments, and closer economic intercourse, and
 4 regulating consular relations. And the court held that
 5 immunities did not fall within that object and purpose.
 6 So it therefore defined the "requirements of
 7 international law", that phrase, more narrowly: as the
 8 minimum standard of protection for property belonging to
 9 one party's nationals and companies.
 10 (Slide 16) The object and purpose of the Indus
 11 Waters Treaty has been considered by the Kishenganga
 12 Court, and as you've heard, its findings are
 13 dispositive. I'm just going to run through what they
 14 have said in the partial award (PLA-3) on the object and
 15 purpose, and I won't read out everything, just the
 16 emphasised points.
 17 So in the context of interpreting and applying
 18 paragraph 15(iii) of Annexure D, the Court said the
 19 following in terms of how the object and purpose
 20 influenced its interpretation of that provision. It
 21 said (paragraph 407):
 22 "The deliberate division and allocation of the six
 23 main watercourses of the Indus system of rivers between
 24 the Parties is a defining characteristic of the Treaty."
 25 And it went on to say:

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12:10 1 the time and now, meant that it was only by fixing and
 2 delimiting the allocation of the waters that the object
 3 could be achieved. And I'm going to come back to this
 4 idea of delimitation when I look at peace and boundary
 5 treaty analogies in my fourth part.
 6 So drawing this together, how does the object and
 7 purpose relate to the text of the Treaty?
 8 An interpretation of a provision that does not align
 9 with a treaty's object and purpose is unlikely to be
 10 accepted or to be justified. At the same time, the
 11 relevance of the treaty's object and purpose is limited
 12 by the ordinary meaning of the text of the treaty. So
 13 it has this dual effect.
 14 Let me give you an example to illustrate that. In
 15 the Certain Iranian Assets case between Iran and the
 16 United States -- you don't need to turn it up, but to
 17 have the reference, that's at PLA-0041 -- the ICJ had to
 18 interpret the provisions of the 1955 Treaty of Amity.
 19 And the key phrase here was "requirements of
 20 international law" in Article IV(2) of that treaty.
 21 Iran argued that "requirements of international law"
 22 imported into the treaty all of the rules of customary
 23 international law concerning sovereign immunity. The
 24 ICJ rejected that interpretation as not consistent with
 25 the more limited object and purpose of that Treaty.

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12:13 1 "The right is subject to expressly enumerated Indian
 2 uses on the Western Rivers, including the generation of
 3 hydro-electric power to the extent permitted by the
 4 Treaty."
 5 And finally:
 6 "... although the chapeau of Annexure D confirms
 7 India's right to generate hydro-electric power on the
 8 Western Rivers in language similar to that of Pakistan's
 9 unrestricted 'let flow' right, it is circumscribed by
 10 the terms of Annexure D itself."
 11 (Slide 17) And the Court added (paragraph 418), with
 12 respect to the object and purpose relevant to the
 13 interpretation of Article III and Annexure D, that:
 14 "The Treaty allocates the use of the waters of the
 15 Western Rivers ... to Pakistan, curtailing, sometimes
 16 quite severely, India's freedom to utilize the waters of
 17 the Western Rivers for the generation of hydro-electric
 18 power ..."
 19 (Slide 18) The Kishenganga Court also made a number
 20 of determinations regarding the object and purpose of
 21 the Treaty as part of its decision on drawdown flushing.
 22 And there it said (paragraph 504):
 23 "... one of the primary objectives of the Treaty is
 24 to limit the storage of water by India on the Western
 25 Rivers ..."

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12:14 1 And it noted that this was "a careful balance
 2 between the Parties' respective negotiating positions",
 3 reflecting the role of travaux préparatoires in
 4 interpretation.
 5 It also said (paragraph 506) that:
 6 "... in many instances the Treaty does not simply
 7 restrict the Parties from taking certain actions, but
 8 also constrains their entitlement to construct works
 9 that would enable such actions to be taken."
 10 And that is a key principle for each criteria that
 11 we are going to be assessing under paragraph 8.
 12 (Slide 19) So the Court was very aware of the
 13 careful balance that is struck in the Treaty, the peace
 14 treaty and hydro bargains. And it pointed out
 15 (paragraph 522) that:
 16 "It is not for the Court to apply 'best practices'
 17 in resolving the dispute ... any exercise of design
 18 involves consideration of a variety of factors -- not
 19 all of them technical. Hydrologic, geologic, social,
 20 economic, environmental and regulatory considerations
 21 are all directly relevant, and the Court considers the
 22 Treaty restraints on the construction and operation by
 23 India of reservoirs to be such a regulatory factor."
 24 And in a very key finding, the Court said:
 25 "... the optimal design and operation of

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12:16 1 a hydro-electric plant is that which can be practically
 2 achieved within the constraints imposed by the Treaty."
 3 The Court reiterated this finding in its decision on
 4 India's request for clarification or interpretation,
 5 saying that "it is for India to secure appropriate
 6 locations and to draw appropriate designs for its
 7 Run-of-River Plants", bearing in mind the "constraints
 8 that are part of the Treaty's essential bargain"
 9 (PLA-21, paragraph 34).
 10 (Slide 20) So I now turn to the restrictive
 11 interpretation of exceptions to a rule. Now, this is
 12 not there in terms in Article 31 or 32 of the Vienna
 13 Convention. But during the travaux préparatoires of
 14 that treaty, the Vienna Convention, there was
 15 an understanding that exceptions to general rules should
 16 be strictly interpreted in order to promote the
 17 stability and security of treaties. And I would just
 18 refer you to our Memorial, paragraph 8.29, which clearly
 19 shows a number of delegations reiterating this rule.
 20 (Slide 21) But it even predates the negotiation of
 21 the Vienna Convention. Nearly a century ago, the
 22 Permanent Court of International Justice, in the Certain
 23 German Interests in Upper Silesia case, held that the
 24 liquidation of rural estates pursuant to treaties was
 25 an exception to a general rule of international law and

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12:17 1 has to be interpreted restrictively. So the Permanent
 2 Court said (PLA-22, page 76):
 3 "... the liability to expropriation of rural
 4 property constitutes, under the Geneva Convention,
 5 an exception; in case of doubt as to the scope of this
 6 exception, its terms must therefore be strictly
 7 construed."
 8 (Slide 22) In 1960, the same year as the Indus
 9 Waters Treaty was concluded, the International Court of
 10 Justice gave an Advisory Opinion on the Constitution of
 11 the Maritime Safety Committee of the Inter-Governmental
 12 Maritime Consultative Organisation. The question there
 13 was whether that committee, which had been elected the
 14 previous year, had been constituted in accordance with
 15 the convention. And the court was interpreting the
 16 meaning of the word "elected" there. And it looked at
 17 the context in which it was used, it looked at the
 18 object and purpose, and it said:
 19 "If the context requires a meaning which connotes
 20 a wide choice, it must be construed accordingly, just as
 21 it must be given a restrictive meaning if the context in
 22 which it is used so requires."
 23 So in that case, the context of that convention was
 24 that the largest ship-owning nations should dominate the
 25 committee, and therefore the court concluded that the

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12:18 1 committee was not constituted correctly because Liberia
 2 and Panama were not included.
 3 (Slide 23) The object and purpose of a treaty will
 4 sometimes call for a restrictive interpretation, where
 5 the rule purportedly derogated from is of particular
 6 importance to the parties' agreement. And that is
 7 an ICSID case, Enron v Argentina, which said (PLA-92,
 8 paragraph 331) that:
 9 "... [an] interpretation resulting in an escape
 10 route from the obligations defined cannot be easily
 11 reconciled with that object and purpose. [And]
 12 a restrictive interpretation of any such alternative is
 13 mandatory."
 14 (Slide 24) So in this case, we have a relationship
 15 between the object and purpose of the Indus Waters
 16 Treaty, the rule, and the exception, which is to be
 17 interpreted restrictively.
 18 This brings me to the Chairman's question in the
 19 previous session on "let flow". There was some
 20 discussion about the role of "let flow" and exceptions.
 21 And I would just like to take this opportunity to say
 22 that Pakistan accepts that we have a rule and
 23 exceptions. And whether rooted in the text of the
 24 Treaty or the travaux préparatoires, we are not saying
 25 that there are no exceptions, evidently, to the let-flow

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12:20 1 obligation. But we can't look at the phrase "let flow"
 2 detached from what is also said in Article III:
 3 "unrestricted use" and non-interference. Those concepts
 4 operationalise the idea of "let flow".
 5 I'll be setting this out in more detail in the
 6 presentation tomorrow on the hydro bargain. But just to
 7 say, as is evident on the slide, that we do see this
 8 very much as a relationship, not one rule with no
 9 exceptions, but exceptions that do have to be
 10 interpreted restrictively.
 11 THE CHAIRMAN: Thank you, Professor Webb, for that
 12 explanation. Let me just ask you about this principle
 13 of exception being construed narrowly.
 14 There is arguably a different story one could tell
 15 in this regard, which is that that particular canon of
 16 interpretation is one that was considered by the
 17 International Law Commission along with a number of
 18 other canons of interpretation, one of which is the
 19 opposite to it -- I will dust off my Latin from grammar
 20 school -- generalia specialibus non derogant, which is
 21 the idea that the general should not derogate from the
 22 special, if you will.
 23 And I believe it was the final rapporteur for the
 24 ILC, Sir Humphrey Waldock, who looked at these competing
 25 canons of interpretation and said: these are certainly

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12:22 1 tools of the trade for lawyers, and perfectly reasonable
 2 to employ in legal argumentation; but as a general
 3 proposition, aren't core canons that should work their
 4 way into what became Vienna Convention Articles 31 and
 5 32; that the core canons of "Look at the treaty
 6 language, look at the object and purpose" and so on,
 7 these are the ones that, if you will, should be applied
 8 systematically when one does the interpretative process.
 9 So I suppose that's just a general way of asking
 10 whether there is a story here that would say: there is
 11 a competing canon of interpretation, it's obviously not
 12 the one that Pakistan thinks should be employed in this
 13 context, but that perhaps if India was here, it would
 14 make the argument that we've got an exception that is
 15 relatively detailed in nature, and that the core of what
 16 we need to be doing is interpreting that exception in
 17 and of itself, without regard to some idea that it needs
 18 to be narrowly construed.
 19 PROFESSOR WEBB: Thank you. I'll just say that we will go
 20 back to Humphrey Waldock and look specifically at that
 21 point.
 22 But I would say that using what is in Article 31,
 23 what is completely undisputed in international law,
 24 which is ordinary meaning, good faith, context and
 25 object and purpose, all of that in this case, applied to

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12:23 1 this Treaty, also affirms the restrictive interpretation
 2 of the paragraph 8 criteria. And an argument -- as
 3 you've put forward on behalf of India -- that you would
 4 only look at the detailed criteria and interpret them
 5 sort of in a vacuum would be completely contrary to the
 6 general rule of the Vienna Convention and contrary to
 7 what the Kishenganga Court held, how the Kishenganga
 8 Court approached these questions.
 9 THE CHAIRMAN: So I'll just follow up. If you do go back,
 10 I think it's Waldock's third report, in 1964. But let
 11 me pursue it a little further.
 12 Is the principle you're advocating for, that we
 13 should construe exceptions narrowly, applicable only in
 14 a situation where you have multiple possible
 15 interpretations of the exception -- that is, you've
 16 looked at the exception and you've determined that there
 17 is two or three or more possible interpretations, and we
 18 should pursue the one that's the narrowest because of
 19 the principle that you're advocating for -- or even if
 20 you've settled upon what you think is the proper
 21 interpretation, you somehow should be trying to pursue
 22 an even narrower approach to the text at hand?
 23 PROFESSOR WEBB: So it would arise in a scenario where there
 24 are multiple possible interpretations, but it would not
 25 only arise in that scenario. And I think the examples

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12:25 1 that we have given of Upper Silesia, of the Constitution
 2 of the Maritime Safety Committee, of Enron v Argentina,
 3 and also we referred in our Memorial to Whaling in the
 4 Antarctic, are all cases that have approved of the
 5 restrictive interpretation.
 6 There have been varied reasons for adopting it.
 7 Once again, going back to Article 31, it might be that
 8 the parties' agreement clearly hinged on this
 9 restrictive interpretation, that was Enron v Argentina;
 10 or it could be the context, that was in the Constitution
 11 of the Maritime Safety Committee; or it might be more
 12 a sense of the object and purpose; or it might go back
 13 to the travaux.
 14 So I think there are multiple routes to
 15 a restrictive principle. And it is a principle -- as
 16 I said, we will go back to what Waldock said in his
 17 third report. But since then, it is a principle that
 18 has been accepted and applied multiple times.
 19 THE CHAIRMAN: Thank you.
 20 PROFESSOR WEBB: (Slide 25) So turning to the fourth aspect
 21 of Article 31, paragraph 1, which is good faith. This,
 22 as we know, is a cornerstone principle of international
 23 law: it is to be applied to every aspect of the process
 24 of interpretation.
 25 (Slide 26) It is reinforced by Article 26 of the

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12:26 1 Vienna Convention, which refers again to good faith as
 2 part of -- and now I can bring up some Latin -- pacta
 3 sunt servanda. This means that as long as a treaty
 4 remains in force, it must be observed as it stands, and
 5 good faith would not be served by interpreting a treaty
 6 as broadly as possible. And in the case of uncertainty
 7 or of divergent interpretations, good faith calls on the
 8 interpreter and the decision-maker to look to the
 9 proposal that led to the text of the treaty and the good
 10 faith of the parties in negotiating on that basis.
 11 (Slide 27) So I now move on from the first paragraph
 12 of Article 31 to the third paragraph, which is
 13 subsequent agreements and subsequent practice.
 14 Now, what constitutes an agreement or practice is
 15 not always clear. But a similar test applies, which is:
 16 in order to be "taken into account" -- the language of
 17 Article 31(3) -- it has to be a practice or agreement
 18 that embraces all the parties to the original treaty and
 19 a practice that occurs in the application of that
 20 treaty.
 21 Now, yesterday, in the Court's exchange with
 22 Pakistan's Commissioner, three agreements that were made
 23 subsequent to the Indus Waters Treaty were identified.
 24 And I'm just going to now place these in the context of
 25 Article 31(3), building on what Sir Daniel said

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12:30 1 Treaty.
 2 (Slide 30) The third agreement was the 1989
 3 arrangements about communication of flood flows (P-331).
 4 So it was codified in 1989 and then renewed annually for
 5 20 years. And as Pakistan's Commissioner explained
 6 yesterday, this was an arrangement for the
 7 implementation of the Treaty in a very specific aspect;
 8 it is not a position regarding a changing interpretation
 9 of the Treaty.
 10 So we would say that these three agreements do not
 11 need to be taken into account for the interpretation of
 12 the provisions of the Treaty in these proceedings.
 13 Mr Chairman, yesterday you noted that India pointed
 14 to hydroelectric plants constructed between 1968 and
 15 1990 and Pakistan did not protest the same method of
 16 calculating pondage as it later protested in the context
 17 of the Baglihar proceedings. I just wanted to come back
 18 to you on that. I have three points in that regard.
 19 So first, over the decades there have been extensive
 20 discussions in the Permanent Indus Commission, and it
 21 may be -- and it has been -- that disagreements about
 22 the compliance of certain HEP designs with the Treaty
 23 reoccur over the years, being discussed in various
 24 meetings, and then fade away. In our submission, that
 25 would be unlikely to constitute conduct in the

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12:28 1 yesterday.
 2 (Slide 28) So the first is the 1976 agreement. This
 3 is a new document, but we did explain its content
 4 yesterday.
 5 The context for this is that on 31 March 1967, the
 6 Permanent Indus Commission submitted to both parties
 7 a report on five disputes concerning Article IX(1) of
 8 the Treaty. And the two states appointed negotiators
 9 and they held four meetings and resolved all five
 10 disputes about the functioning of Article IX(1), and
 11 they were distilled into this resolution.
 12 Now, these disputes were about clarifying the role
 13 of the Commission; they are not relevant to the
 14 provisions of the Treaty that we are looking at in these
 15 proceedings. Just to give you an example of one of
 16 them, "Can the Commission examine a claim for financial
 17 compensation?", and the answer was "Yes".
 18 (Slide 29) The next agreement was the 1978 agreement
 19 regarding the design of the Salal plant, and that's at
 20 PLA-0053. As was said by Pakistan's Commissioner
 21 yesterday, this is a plant-specific agreement; it is
 22 very much under the auspices of the Treaty. So I've
 23 extracted Article III and Article IV there that clearly
 24 state that this is not changing the Treaty, this is not
 25 developing the Treaty; it is very much governed by the

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12:31 1 application of the Treaty or an agreement between the
 2 parties on an interpretation of the Treaty.
 3 The second point is a practical one, which is that
 4 five of the six plants that fell within that period had
 5 very small pondage: between 0.1 and 0.9 million
 6 cubic metres. So it may be that they just didn't rise
 7 to the level of importance to create any subsequent
 8 practice.
 9 (Slide 31) And finally, the absence of protest by
 10 Pakistan cannot be considered acquiescence, let alone
 11 a subsequent practice. And this is reinforced by the
 12 provision that Sir Daniel referred to yesterday,
 13 Article IV(14) of the Treaty, which states that:
 14 "In the event that either Party should develop a use
 15 of the waters of the Rivers which is not in accordance
 16 with the provisions of this Treaty, that Party shall not
 17 acquire by reason of such use any right, by prescription
 18 or otherwise, to a continuance of such use."
 19 THE CHAIRMAN: Thank you, Professor Webb, for that follow-up
 20 on the question I asked yesterday. It's very helpful.
 21 My own reaction on this particular provision that
 22 you have on the screen, Article IV, paragraph (14), is
 23 that it's a bit circular. We're trying to determine
 24 what the Treaty requires. And to the extent that the
 25 parties, through their practice, have determined that

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12:33 1 there's a particular interpretation that's appropriate,
 2 then that's what we are trying to determine, and
 3 it doesn't trigger this particular provision.
 4 You're correct that I asked in the context of the
 5 Baglihar proceedings, where India, in its
 6 counter-memorial, pointed to several hydroelectric plant
 7 constructions. But at the risk of giving you more
 8 homework, it does strike me that in your Memorial at
 9 Appendix C1, you do provide a list of 54 completed
 10 hydroelectric plants on the Western Rivers.
 11 Now, some of those may have existed at the time of
 12 the Treaty, in which case they wouldn't be so relevant,
 13 but presumably some number of them were constructed with
 14 the understanding by Pakistan that they were occurring.
 15 They would have included some amount of pondage within
 16 them; they would have included outlets of one kind or
 17 another; they would have included a freeboard of some
 18 sort.
 19 It may be in all instances you would say that
 20 it sheds no light on the parties' interpretation of the
 21 Treaty. But it just feels as though there should be
 22 some degree of practice operating here that the parties
 23 were in relative harmony on, up until the point where
 24 you get to Baglihar. And if that's true, then it seems
 25 like it should give us some insights into how the

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12:36 1 with what she said about: the next question, once it
 2 falls within Article 32, is what weight you give to it,
 3 which will really be on a document-by-document basis.
 4 The use of supplementary means of interpretation is
 5 not restricted to such cases in which the result of the
 6 application of the general rule under Article 31 would
 7 be ambiguous, obscure, or lead to an absurd or
 8 unreasonable result. As you can see in the chapeau to
 9 Article 32, it is also to determine the meaning or
 10 confirm the meaning, and that is where it can play
 11 a role in illuminating what was the intention.
 12 The Kishenganga Court had recourse to supplementary
 13 means to confirm its interpretation of Article IX of the
 14 Treaty and paragraph 15(iii) of Annexure D; and this
 15 Court also had recourse to supplementary means in
 16 interpreting and applying Article IX of the Treaty.
 17 (Slide 33) So I'm now going to turn to paragraph 29
 18 of Annexure G, the applicable law provision.
 19 So the meaning of paragraph 29 of Annexure G is that
 20 while a court seised of a dispute concerning the
 21 interpretation or application of the Treaty may look
 22 beyond the terms of the Treaty, it may do so only when
 23 this is "necessary" for the interpretation or
 24 application of the Treaty, and "only to the extent
 25 necessary for that purpose". So this is a restrictive

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12:35 1 parties were jointly interpreting the treaties up until
 2 that point.
 3 So if you were able to look at that issue as well,
 4 I'd welcome that. Perhaps the answer will still be that
 5 the pondage was minimal; perhaps that there were no
 6 issues of the kind that are at stake in this proceeding.
 7 But it feels as though there's a bit of a gap in our
 8 understanding of this element of the way in which
 9 we might be interpreting the Treaty.
 10 PROFESSOR WEBB: Certainly, and we will come back to you on
 11 that.
 12 I would just say that this is also part of the
 13 exercise of document disclosure that Sir Daniel
 14 addressed yesterday, and we very much have this point in
 15 mind as we're reviewing all of these materials,
 16 including the pre-Baglihar materials.
 17 (Slide 32) So this now brings me to Article 32,
 18 "supplementary means" of interpretation. And you've
 19 heard from Ms Rees-Evans on the travaux préparatoires.
 20 I would just make the point, reflecting on the
 21 discussion that you had near the end of Ms Rees-Evans's
 22 presentation on non-travaux materials from the time,
 23 that these may fall within Article 32, as she stated,
 24 because preparatory work is just one example of
 25 a so-called "supplementary means". And I fully agree

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12:38 1 provision on bringing in rules of customary and
 2 conventional international law.
 3 And this is consistent with the approach of this
 4 Court in its Competence Award. It recognised that
 5 resort to the customary rules of treaty interpretation
 6 that we've been discussing was possible only because it
 7 was necessary for interpreting the Treaty.
 8 Here I want to come to the Court's questions about
 9 climate change and the Treaty that arose yesterday, and
 10 I'm also going to come to Dr Blackmore's question about
 11 innovation and cloud seeding at the end of this section.
 12 And I'm going to take you to the analysis of the
 13 Kishenganga Court in its final award, which Pakistan
 14 submits is correct and dispositive.
 15 So Mr Fietta will soon -- after lunch -- develop the
 16 idea of water usage and sustainability and make the
 17 point that Pakistan and India are vulnerable to the
 18 effects of climate change. Climate change can be taken
 19 into account in the interpretation and application of
 20 the Indus Waters Treaty, but within two parameters.
 21 The first is that climate change does not require
 22 a different interpretative approach from what I've set
 23 out and from what the Kishenganga Court adopted; it does
 24 not require an evolutionary interpretation. And second,
 25 we do not need to amend the Treaty through

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12:39 1 interpretation; indeed, that would be impermissible.
 2 In Kishenganga, the Court found it necessary --
 3 going through the gateway of paragraph 29 -- for its
 4 interpretation and application of the Treaty to
 5 determine the minimum flow, and in this respect it had
 6 regard to the customary requirement of mitigating
 7 significant harm to the environment in a transboundary
 8 context. This was necessary. But the Court said that
 9 going further than that, and starting to enter into the
 10 precautionary approach and starting to enter into
 11 a balancing exercise between environmental
 12 considerations and express treaty obligations, would
 13 impermissibly put the Court in the role of policy-maker.
 14 So it restricted itself, based on paragraph 29, to the
 15 requirement of mitigating significant harm.
 16 (Slide 34) So I'm just going to take you to the
 17 emphasised lines in the key paragraphs of the final
 18 award on this point. So in paragraph 87, the Court
 19 noted that:
 20 "... in fixing this minimum flow, the Court must
 21 give due regard, in keeping with Paragraph 29 of
 22 Annexure G, to the customary international law
 23 requirements of avoiding or mitigating trans-boundary
 24 harm and of reconciling economic development with the
 25 protection of the environment ..."

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12:42 1 that point, prescription by the Court is not only
 2 unnecessary, it is prohibited by the Treaty. If
 3 customary international law were applied not to
 4 circumscribe, but to negate rights expressly granted in
 5 the Treaty, this would no longer be 'interpretation or
 6 application' of the Treaty but the constitution of
 7 customary law in place of the Treaty ... That
 8 Paragraph 29 does not permit."
 9 (Slide 36) And in applying this, in paragraph 115 it
 10 concluded that a minimum flow of 9 cumecs was the right
 11 outcome.
 12 This brings me to Dr Blackmore's question about
 13 whether there is room for innovation in the Treaty, and
 14 you gave the example of cloud seeding. You also noted
 15 that the Treaty is of its time and dealing with very
 16 specific issues. There are issues that the Treaty does
 17 not address: either deliberately, or could not address
 18 because they did not exist yet.
 19 There is scope for innovation, but within the
 20 constraints of the Treaty. So if sound and economical
 21 design or satisfactory construction calls for such
 22 innovation -- and we will, as I said, make this real
 23 during our analysis of the paragraph 8 criteria -- then
 24 that is acceptable under the Treaty.
 25 Now, evidently cloud seeding is not mentioned in the

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12:41 1 And in paragraph 111:
 2 "... the Court notes that the place of customary
 3 international law in the interpretation or application
 4 of the Indus Waters Treaty remains subject to
 5 Paragraph 29. Unlike the treaty at issue in
 6 Iron Rhine ..."
 7 And I'm going to come to that shortly:
 8 "... this Treaty expressly limits the extent to
 9 which the Court may have recourse to, and apply, sources
 10 of law beyond the Treaty itself."
 11 (Slide 35) The key paragraph is paragraph 112 of the
 12 final award. And just to emphasise again, Pakistan
 13 submits this is the correct approach to paragraph 29 and
 14 customary rules:
 15 "... the Court does not consider it appropriate, and
 16 certainly not 'necessary', for it to adopt
 17 a precautionary approach and assume the role of
 18 policymaker in determining the balance between
 19 acceptable environmental change and other priorities, or
 20 to permit environmental considerations to override the
 21 balance of other rights and obligations expressly
 22 identified in the Treaty -- in particular the
 23 entitlement of India to divert the waters of a tributary
 24 of the Jhelum. The Court's authority is more limited
 25 and extends only to mitigating significant harm. Beyond

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12:44 1 Treaty and we cannot read it into the Treaty through
 2 interpretation. That's an example of a new technology
 3 or a new technique that would have to be addressed in
 4 further negotiations between the parties, a protocol or
 5 a new agreement.
 6 But the more important point is that this exercise
 7 of interpretation is not innovation in the abstract.
 8 Whether innovation is required for a provision of the
 9 Treaty will depend on the specific wording of those
 10 provisions.
 11 So in the disputes before this Court, which concern
 12 paragraphs 8(a), (c), (d), (e) and (f) of Annexure D, it
 13 is not apparent that climate change requires a new
 14 approach to interpreting these provisions. And as we
 15 will explain, the components covered by these provisions
 16 reflect the means by which a HEP operator can control
 17 water that has been stored, and we don't see at the
 18 moment a clear link there to climate change. There may
 19 be other provisions of the Treaty in which a climate
 20 change analysis could play a role, such as
 21 information-sharing requirements.
 22 (Slide 37) So paragraph 29 of Annexure G is not
 23 a licence to import customary international law. It
 24 circumscribes the circumstances in which this Court may
 25 have regard to sources of law external to the Treaty,

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12:45 1 and it should be viewed as a *lex specialis*.
 2 We can turn here to the Kishenganga order on interim
 3 measures (PLA-42, paragraph 130), which was looking at
 4 the relevance of broader practice on provisional
 5 measures, including Article 41 of the ICJ Statute. And
 6 it found that paragraph 29 is "a kind of *lex specialis*"
 7 that makes it unnecessary to impose further requirements
 8 that you may find in statute or custom outside of the
 9 Treaty.
 10 So I now come to this idea of a boundary treaty,
 11 a delimitation treaty, a treaty akin to a peace
 12 agreement. Paragraph 29 reflects the Treaty's status as
 13 akin to these types of treaties.
 14 Mr Chairman, yesterday you observed it may not be
 15 obvious that one can extend the reasoning of the Temple
 16 of Preah Vihear to this Treaty, and you asked: how far
 17 can we go in the idea of a treaty for stability? And
 18 I want to answer those concerns now, including how this
 19 was addressed in Baglihar and Kishenganga.
 20 (Slide 39) But let me just go back to the Temple of
 21 Preah Vihear statement which Sir Daniel brought you to
 22 (PLA-101, page 34), which is saying that if you have
 23 a treaty that is establishing something stable and
 24 permanent, like a frontier, then you cannot have
 25 "a continuously available process" that can be calling

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12:48 1 this in his determination. This is at page 14 of his
 2 determination, and I'm going to read from again near the
 3 bottom:
 4 "Sovereign rights cannot be exercised without
 5 consideration of the limits imposed by the Treaty. In
 6 this context, it is not appropriate for the NE to
 7 qualify the Treaty as, *inter alia*, a 'delimitation' or
 8 a 'boundary' Treaty. The task of the NE with respect to
 9 the present difference is not to qualify the Treaty but
 10 to decide on a question posed by Pakistan with respect
 11 to Annexure D, Part 3 of the Treaty which deals with
 12 New Run-of-River Plants."
 13 As we have already stated, and was clearly dealt
 14 with in the Competence Award, the Neutral Expert has no
 15 competence to enter into systemic issues of treaty
 16 interpretation. So any comment that he makes about
 17 a boundary treaty analogy cannot be given any weight.
 18 But in any event, reading this paragraph in context, it
 19 seems that Monsieur Lafitte was actually recognising
 20 that it was not appropriate to his task to qualify the
 21 Treaty, whether as a boundary treaty or something else.
 22 So Pakistan's argument in that respect was not touched.
 23 (Slide 43) Turning to the Kishenganga proceedings,
 24 Pakistan and India did exchange and engage arguments on
 25 the boundary analogy. And this comes from the

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12:47 1 that agreement into question.
 2 (Slide 40) Building on that in the Bay of Bengal
 3 case, which was not dealing with land but with maritime
 4 delimitation, the tribunal accepted and followed that
 5 reasoning, saying (PLA-102, paragraph 216) that:
 6 "... maritime delimitations, like land boundaries,
 7 must be stable and definitive to ensure a peaceful
 8 relationship between the States concerned in the long
 9 term."
 10 The Indus Waters Treaty is also a kind of
 11 delimitation treaty. This is expressed in the preamble
 12 that I showed you earlier.
 13 (Slide 41) And this precise point was made by
 14 Pakistan in its reply in the Baglihar proceedings. And
 15 I'm just going to read from the second half of this
 16 paragraph:
 17 "The Preamble to the Treaty itself records that the
 18 parties intended to achieve the development of the Indus
 19 basin not through cooperative development but through
 20 the 'fixing and delimiting' of each other's rights and
 21 obligations. It is this statement of intent which
 22 self-evidently governs the whole Treaty, not any other."
 23 (Slide 42) India did not address the point in
 24 Baglihar in its written pleadings. But as Mr Minear
 25 pointed out yesterday, the Neutral Expert did refer to

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12:50 1 transcript.
 2 The first extract is from P-0488, and this is
 3 quoting Professor Crawford, as he then was. I am going
 4 to quote it in full because I think this makes the point
 5 real:
 6 "The fact is -- and this is the point of the word
 7 'therefore' in the preamble -- it was only by fixing and
 8 delimiting the allocation of waters that the agreement
 9 had ... a reasonable chance of success, a reasonable
 10 chance to survive. And central to that delimitation,
 11 a sort of hydraulic boundary treaty, was the obligation
 12 on India to let flow the waters of the Western Rivers
 13 subject only to the expressly permitted uses as per
 14 Annexures C, D and E. That is what the second part of
 15 the preamble refers to, the part of the preamble that
 16 India doesn't like and won't read.
 17 ... it says 'most complete'.
 18 That's referring to "most complete ... utilisation
 19 of the waters":
 20 "The fact is there isn't enough water to go around,
 21 and therefore there is some need for compromise. The
 22 question was whether the compromise was to be achieved
 23 through the ongoing work of an executive commission,
 24 with presumably tie-breaking rules, and so on, or
 25 whether it was done by a priori, by delimitation.

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12:51 1 That's why I describe the Treaty as a hydraulic boundary
2 treaty."
3 In his closing statement, which is at P-0129,
4 he said:
5 "I said in opening that the Indus Waters Treaty was
6 like a hydraulic boundary treaty, and I come back to
7 that idea. Its concern was to delimit the uses of the
8 Western Rivers, and of course to give to India the very
9 considerable benefit of the use of the Eastern Rivers,
10 which has been taken to its full extent."
11 Mr Nariman, for India, replied during the closing,
12 he said that:
13 "Professor Crawford [has] also stated in rebuttal
14 that the treaty was a hydraulic boundary treaty; his own
15 assessment. I respectfully submit it is not, see
16 Article XI: it is a treaty for water uses, not
17 a boundary treaty."
18 Article XI(1) of course says that:
19 "It is ... understood that ... this Treaty governs
20 the rights and obligations of each Party in relation to
21 the other with respect to the use of the waters of the
22 Rivers ..."
23 Of course, we would say this has to be seen in the
24 light of the object and purpose, context and travaux of
25 the Treaty.

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12:53 1 Now, the Kishenganga Court did not directly address
2 this phrase "hydraulic boundary treaty". But as I hope
3 I've shown you, in its approach on the object and
4 purpose and its approach to the interpretation of the
5 provisions and the role of Article 29, it appears to
6 have accepted Pakistan's position.
7 (Slide 46) It's also worth noting the second
8 paragraph of Article XI of the Treaty, which says:
9 "Nothing in this Treaty shall be construed ... as in
10 any way establishing any general principle of law or any
11 precedent."
12 This is because the Treaty was bespoke. It was the
13 product of three specific bargains, and could not,
14 therefore, create a precedent for others.
15 (Slide 47) Mr Chairman, I'm coming to my last point,
16 which is that yesterday you noted -- and also earlier
17 today -- that we have cases where treaties are viewed as
18 a "living instrument" where the meaning isn't fixed. In
19 Pakistan's submission, those cases can be distinguished
20 from the Indus Waters Treaty. And I'm just going to
21 highlight three of them, and I can also address Aegean
22 Continental Shelf.
23 The first is the Gabcikovo-Nagymaros Project
24 (PLA-94). That was a treaty of 1977 regarding
25 a specific construction and operation, and the court,

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12:54 1 the ICJ, did indeed find that its meaning was evolving.
2 But that is not analogous to the Indus Waters
3 Treaty. That treaty had specific provisions,
4 Articles 15 and 19 in particular, that called for taking
5 into account the evolution of environmental norms. And
6 there was also an ongoing process there which was called
7 a "joint contractual plan". There was also no
8 equivalent to paragraph 29 of Annexure G.
9 The Iron Rhine award was cited in the Kishenganga
10 final award at paragraph 111 as a contrasting type of
11 treaty. So whereas the Kishenganga Court rightly said
12 that this is not an evolutionary interpretation, in
13 Iron Rhine there was a living instrument approach.
14 But again, the treaty differs. The object and
15 purpose of that treaty called for new technological
16 developments relating to the operation and capacity of
17 the railway to be taken into account by the parties.
18 There was no equivalent to paragraph 29 of Annexure G.
19 Finally, Costa Rica v Nicaragua, Navigational and
20 Related Rights, was an 1858 treaty fixing the boundary
21 along the right bank of the San Juan River. But the
22 real dispute before the court was the navigational
23 rights of Costa Rica under that treaty and the
24 interpretation of the word "commerce": whether it had
25 the meaning in 1858 or the meaning in 2009, at the time

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12:56 1 it was decided.
2 And there the court said this was a deliberate use
3 of generic terms: not special meaning, but generic terms
4 that were meant to evolve over time. And they also had
5 no equivalent of paragraph 29 of Annexure G.
6 In that same judgment, they referred to the Aegean
7 Continental Shelf case that you referred to earlier,
8 Mr Chairman. That's where we also had generic terms:
9 "domestic jurisdiction", "territorial status". And it's
10 interesting that in that case, the Aegean case, the
11 court said the legal regime of perpetuity in the Aegean
12 case was premised on evolution. That is not our
13 scenario. Our legal regime is premised on stability.
14 If there are no further questions -- and I realise
15 we are up to the lunch break -- that concludes my
16 submissions.
17 (12.57 pm)
18 Questions from THE COURT
19 THE CHAIRMAN: So just one question from me, Professor Webb.
20 Again, just looking at the approach you've taken in
21 the Memorial and the way that you proceeded today with
22 your presentation, it seems as though you may be arguing
23 that there are certain treaties that, as a whole, are
24 not susceptible to evolutive interpretation. But that
25 clearly isn't the lesson of, say, the 2009 Navigational

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12:58 1 Rights case, which is basically a boundary treaty that
 2 did have within it terms that the court regarded as
 3 evolutionary in nature.
 4 PROFESSOR WEBB: Yes.
 5 THE CHAIRMAN: So it seems to me that it's relevant to think
 6 about this Treaty as a whole, and its object and
 7 purpose, which presumably is to create stability on
 8 a very significant level; but that within it, there
 9 could easily be terms that might be regarded as
 10 evolutionary in nature. And then the question becomes:
 11 are there any such terms? And in the context in which
 12 they appear in the Treaty, are they to be regarded in
 13 that way? And I assume that's what we will be talking
 14 about in some of your later presentations.
 15 So I'm just trying to follow up on clarifying.
 16 You're not making the pitch that the Treaty as a whole
 17 has to be approached through a static interpretation,
 18 but that there may well be provisions that are
 19 evolutionary in nature. And in that regard, if that's
 20 correct, I'm wondering if you draw any significance from
 21 the fact that there are several provisions within the
 22 Treaty where the reference to what is customary
 23 specifies "customary on the Effective Date", which,
 24 pursuant to the definition of "Effective Date", is
 25 1 April 1960; whereas in other places, including in

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12:59 1 Annexure D, paragraph 8, that language doesn't appear.
 2 PROFESSOR WEBB: Yes. So we would not say that it is
 3 completely static in nature. We have set out how it is
 4 meant to provide security and stability. It is akin to
 5 peace, it is akin to a boundary. It cannot, in the
 6 words of the Temple of Preah Vihear case, be subject to
 7 "a continuously available process". But that's not to
 8 say that it can't be applied to current conditions, and
 9 certainly it has to be.
 10 As I said, this will become more concrete as we look
 11 at the specific provisions of paragraph 8, including
 12 this reference to "customary and accepted practice" and
 13 the reference "on the Effective Date".
 14 But I would just like to clarify: we wouldn't say
 15 that there are specific terms that are generic in the
 16 sense that "commerce" was in the Navigational Rights
 17 case. We wouldn't make it as broad as that, because
 18 that was very much in the context of the court looking
 19 at the intention the parties that this had to keep
 20 evolving. That's not the intention that we see from the
 21 parties, nor the object and purpose of the Treaty, when
 22 we look at terms like "sound", like "economical", like
 23 "satisfactory".
 24 There is room within them to, of course, look at
 25 current engineering practices and potential future

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13:01 1 innovations, but they always have to serve the bargains
 2 underpinning the Treaty and the understanding that this
 3 Treaty was meant to provide a legal regime of perpetuity
 4 premised on stability.
 5 THE CHAIRMAN: Very good. Thank you very much.
 6 During the course of your presentation there was
 7 a crowd outside the window that applauded, so you had
 8 certainly a receptive group behind us, and certainly the
 9 Court was very receptive to your arguments as well. So
 10 thank you very much, Professor Webb.
 11 As you say, we are at the lunch hour. So we will
 12 break, and see everyone at 2 o'clock this afternoon.
 13 Thank you very much.
 14 (1.02 pm)
 15 (Adjourned until 2.00 pm)
 16 (2.04 pm)
 17 THE CHAIRMAN: Welcome back, everyone. I hope you had
 18 a pleasant lunch.
 19 There was an application received that Pakistan be
 20 allowed to refer to two articles, one by Dr Morris and
 21 one by Mr Ren, and we certainly are agreeable to them
 22 being referenced. Was the application to introduce them
 23 into the record as well?
 24 SIR DANIEL: Yes, I think it was an application to introduce
 25 them into the record, because Dr Morris is intending to

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14:04 1 refer to them in response to the questions raised by
 2 Dr Blackmore.
 3 THE CHAIRMAN: In that case, the application is granted. So
 4 please do introduce them into the record with
 5 appropriate numerical designation.
 6 SIR DANIEL: In the next two minutes they'll be there.
 7 THE CHAIRMAN: Very good. Thank you.
 8 Okay, I think at this point we are ready to hear
 9 from Mr Fietta. So whenever you're ready, please
 10 proceed.
 11 MR FIETTA: Thank you.
 12 (2.05 pm)
 13 Submissions on Water Usage and Sustainability
 14 MR FIETTA: Good afternoon, Mr Chairman, members of the
 15 Court. It's an honour for me to appear again on behalf
 16 of the Islamic Republic of Pakistan to address you on
 17 the subject of water usage and sustainability on the
 18 Western Rivers.
 19 Before we start, I have delivered to you -- or my
 20 colleagues have -- a slide pack which should be in front
 21 of you; I think it may be behind tab 4 in your folders.
 22 All of the slides of course will appear on the screen,
 23 but you will want to keep it to hand, possibly,
 24 particularly when we get to some of the presentation on
 25 irrigation -- and I will flag it when we get there --

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14:05 1 because we have some A3 illustrations at the back.
 2 So when we get to that, you'll see at the back of
 3 the tab there are four A3 sheets relating to the
 4 irrigation network, and the reason we've blown them up
 5 is to make them legible for you. And it may be helpful
 6 to have those open when we get to it, and of course
 7 you're free to open the remainder of the slideshow as
 8 you see fit as we go through.
 9 THE CHAIRMAN: Why don't we let the Secretariat distribute
 10 those before you keep going, Mr Fietta, just so that
 11 everyone has it in front of them before you address the
 12 substance.
 13 SIR DANIEL: Mr Chairman, may I also just say I think the
 14 audiovisual is not working for some reason. So I don't
 15 know whether it needs to be turned on. We can't project
 16 slides just at the moment.
 17 There we are. Thank you.
 18 THE CHAIRMAN: Okay, I think we are all set now.
 19 MR FIETTA: Very good.
 20 So this topic of water usage and sustainability is
 21 essential context to Pakistan's right under Article III
 22 of the Treaty to "receive for unrestricted use" the
 23 waters of the Western Rivers, and India's, of course,
 24 concomitant obligation under that provision to "let flow
 25 all the waters of the Western Rivers".

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14:09 1 issues.
 2 My first slide sets out the structure of my
 3 presentation.
 4 I will start by giving an overview of the Indus
 5 Basin and the Western and Eastern Rivers.
 6 I will then discuss how -- in my second part --
 7 India has worked to maximise its hydroelectric and
 8 irrigation development on the Eastern Rivers since 1960,
 9 such that those rivers now run dry in Pakistan.
 10 The third part will look at seasonal flows, and
 11 agricultural usage and irrigation on the Western
 12 Rivers -- and this will probably be the most substantial
 13 part of my presentation -- including Pakistan's
 14 irrigation network on the Western Rivers in order to
 15 supply water to large areas previously supplied by the
 16 Eastern Rivers.
 17 The fourth part of my presentation will give
 18 an overview of Pakistani and Indian power generation
 19 usage on the Western Rivers; the latter of which, the
 20 Indian usage, is of course closely regulated by the
 21 Treaty.
 22 The fifth topic will address demand-side pressures
 23 on the Western Rivers in Pakistan, caused in particular
 24 by dramatic demographic changes and associated growth in
 25 agricultural and other use in Pakistan.

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14:07 1 I will demonstrate Pakistan's overwhelming reliance
 2 on the free flow of the Western Rivers, especially in
 3 light of India's total exploitation of the Eastern
 4 Rivers, which now essentially run dry in Pakistan.
 5 I will explain also the substantial growth in demand for
 6 water from the Western Rivers in Pakistan, both since
 7 the 1960s and projected into the future. And alongside
 8 that increase in demand, I will identify supply-side
 9 pressures created by a reduction in flows on the Western
 10 Rivers received since 1960, which threaten to become
 11 significantly worse later this century due to the
 12 impacts mainly of climate change.
 13 Much of my presentation today elaborates on
 14 submissions made by Pakistan at chapter 3 of its
 15 Memorial dated 22 March 2024. That chapter was entitled
 16 "The Indus Basin -- Topography, Hydrology, Demography,
 17 Water Security and Climate Change". However, some of
 18 the more technical aspects of that chapter of the
 19 Memorial will be picked up by my colleague Dr Morris,
 20 who will address you immediately after me with
 21 an engineer's perspective on the design and operation of
 22 Himalayan run-of-river HEPs. In particular, Dr Morris
 23 will address you on issues of geology, sediment and
 24 sediment management, and relevant issues of hydrology in
 25 the Indus Basin. So I will go light on some of those

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14:10 1 The sixth topic, the penultimate one, will address
 2 the reduction in flows on the Western Rivers over recent
 3 years, and the potential impacts of climate change.
 4 And then I will make some brief concluding remarks
 5 in the final part.
 6 So I will begin by presenting an overview of the
 7 Indus Basin, and a brief refresher on the six rivers
 8 which are the focal point of the Treaty. This is
 9 slide 2. I can do that by reference to my first map,
 10 which will be a template for a number of maps that will
 11 follow.
 12 Here we see the Indus River system: the Indus River,
 13 with its six principal tributaries, the Jhelum, the
 14 Chenab, the Ravi, the Sutlej, the Beas and the Kabul;
 15 the last of which of course, the Kabul River, is not
 16 regulated by the Treaty.
 17 This map also shows the location of all of
 18 Pakistan's major cities, most of which are located
 19 within the drainage area of the Indus Basin, as we will
 20 see. This fact is, of course, unsurprising, because the
 21 Indus is Pakistan's only river system of any note. It
 22 supplies approximately 95% of the country's water;
 23 that's Exhibit P-248, page 2.
 24 By contrast, India is able to exploit over 20 major
 25 river systems on its territory. These are illustrated

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14:12 1 at map 3.3 of the Memorial; we don't need to go to that
 2 now. And the Ganges-Brahmaputra-Meghna river system
 3 accounts for almost 60% of India's water needs, while
 4 the Eastern Rivers of the Indus Basin here, allocated to
 5 India under the Treaty, account for just 4% of India's
 6 needs. That's Exhibit P-247, page 265.
 7 So my next slide (3) shows that Pakistan administers
 8 the vast majority, that's the green area: approximately
 9 59% of the Indus River Basin. India, by contrast,
 10 administers just over 20%, 21%, a large part of which --
 11 approximately 100,000 square kilometres of which --
 12 comprises Indian Administered Kashmir.
 13 This slide and those that follow also show India's
 14 position as the de facto upper riparian on each of the
 15 three [Western] Rivers, and of course each of the
 16 Eastern Rivers as well.
 17 My next series of slides introduces each of the
 18 three Western Rivers.
 19 (Slide 4) So we start with the Indus itself, here on
 20 the slide. This rises in the Tibetan highlands of
 21 Western China, it flows through Indian Administered
 22 Kashmir, entering Pakistani territory through
 23 Gilgit-Baltistan, before flowing approximately
 24 2,000 kilometres through the entire length of Pakistan,
 25 and discharging into the Arabian Sea near Karachi.

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14:14 1 The second Western River is the Chenab, which has
 2 just appeared on the slide, slide 5. This is
 3 a tributary to the Indus. It originates in Himachal
 4 Pradesh in India. It passes through Indian Administered
 5 Kashmir, before descending from the mountains to enter
 6 Pakistan on the plains of the Punjab province. You can
 7 see the topography of the Chenab here on this map.
 8 The fact that the Chenab enters Pakistan having
 9 already descended from the mountains of Kashmir is
 10 an important topological aspect of the Chenab River, to
 11 which I will return later.
 12 My next slide (6) shows the third Western River, the
 13 Jhelum, which is a tributary of the Indus that
 14 originates in Indian Administered Kashmir, and is joined
 15 by the Neelum-Kishenganga tributary in
 16 Pakistan-administered Kashmir, before descending into
 17 the Punjab province of Pakistan and merging with the
 18 Chenab.
 19 You can see the route of the Jhelum there on
 20 slide 7.
 21 So that's the Western Rivers in overview.
 22 Then we come to the Eastern Rivers. They comprise
 23 the Ravi, the Beas and the Sutlej, of course. The Ravi
 24 has just appeared on my next slide, slide 8. And the
 25 Beas alongside the Ravi, they rise in Himachal Pradesh

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14:15 1 in India.
 2 The Ravi flows through India's Punjab province, and
 3 then meanders along the India-Pakistan working boundary
 4 for approximately 100 kilometres or so, before finally
 5 entering Pakistan and converging with the Chenab. So
 6 there you can see the Ravi joining the Chenab in
 7 Pakistan's territory on the slide.
 8 (Slide 9) And the Beas merges with the Sutlej before
 9 entering Pakistan. The Beas has just appeared. You
 10 will see that it enters the Sutlej River -- it's
 11 a tributary, effectively, of the Sutlej -- and it joins
 12 the Sutlej before crossing the boundary into Pakistan.
 13 The Sutlej is much longer, therefore, than the Beas.
 14 It rises in the Tibetan highlands before flowing through
 15 Himachal Pradesh and the Indian Punjab, then passing
 16 into the Pakistani Punjab and converging with the Chenab
 17 downstream.
 18 So these slides show the historic course -- the
 19 natural course -- of the rivers of the Indus. However,
 20 the waters of the Eastern Rivers of course no longer
 21 reach Pakistan due to Indian development upstream. With
 22 the exception of occasional floodwater released by
 23 India, the only water that ever reaches the riverbeds of
 24 the Eastern Rivers today is actually supplied by waters
 25 transported from the Western Rivers by the world's

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14:16 1 largest irrigation network, a topic to which I will
 2 return.
 3 My next slide, slide 10, shows the areas of glacier
 4 and permanent snow cover in the Indus Basin. This
 5 extends over an area of more than 20,000 square
 6 kilometres, approximately. It's Exhibit P-264, page 45.
 7 Snow and glacier melt amounts for between 72% and
 8 80% of the total flows in the basin's rivers, making the
 9 Indus Basin one of the most meltwater-dependent river
 10 basins in the world. There's a number of exhibits on
 11 that point: P-265, P-263 and P-244, elaborated in the
 12 Memorial.
 13 The remainder of the water in the basin comes from
 14 rainfall, and a disproportionate amount of that rainfall
 15 falls in the Karakoram foothills, which are of course
 16 upstream. Most of these critical areas of glacier, snow
 17 and rainfall, including those feeding the Chenab and the
 18 Jhelum Rivers, are located in India or in
 19 Indian-controlled territory. Consequently, but for the
 20 Treaty, it is no exaggeration to say that India, as the
 21 upper riparian, would have the potential ability to
 22 control the flows of the Western Rivers.
 23 My next slide, slide 11, shows the catchment areas
 24 of the Western Rivers, in green. Now, note that the
 25 vast majority of the course of the Western Rivers and

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14:18 1 their catchment area is located in Pakistan. However,
 2 a disproportionate source of the waters comprising the
 3 Western Rivers is located in, or flows through, India,
 4 the upper reaches of the Indus Basin in
 5 Indian-administered areas. This is because the major
 6 contributor to the flows in each of the Western Rivers
 7 is meltwater from snow and glaciers in the Hindu Kush,
 8 in the Karakoram and in the Himalayan mountain ranges in
 9 India or Indian-administered areas.
 10 My next slide (12) adds to the Western Rivers the
 11 catchment of the Eastern Rivers. This catchment area is
 12 split almost equally between India and Pakistan, but
 13 includes three of the five largest cities in Pakistan.
 14 So it's much more heavily populated on the Pakistani
 15 side.
 16 These cities include the ancient city of Lahore,
 17 which is the capital and largest city of the Pakistani
 18 province of Punjab. It is the second largest city in
 19 Pakistan. And according to the World Population Review,
 20 a public source, it's the 21st largest city in the
 21 world, with a population today of over 13 million people
 22 as of the last census in 2023.
 23 Lahore was founded on the River Ravi, one of the
 24 Eastern Rivers, more than 1,000 years ago, and was one
 25 of the largest cities of the world between the 16th and

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14:21 1 in 1960.
 2 I'll discuss all of this in more detail shortly.
 3 But before that, I want to move on to my second topic,
 4 which is India's development of the Eastern Rivers. And
 5 slide 13 shows the Eastern Rivers in isolation here.
 6 As the Court is aware, Article II of the Treaty
 7 states:
 8 "All the waters of the Eastern Rivers shall be
 9 available for the unrestricted use of India, except as
 10 otherwise expressly provided in this Article."
 11 Article II then sets out the relevant exceptions,
 12 which extend variously to domestic use, non-consumptive
 13 use and agricultural use in Pakistan, together with
 14 a series of provisions concerning the ten-year
 15 transition period between April 1960 and March 1970.
 16 Now, during that ten-year transition period, but
 17 only during that period, only during that period under
 18 the Treaty, Pakistan was entitled to receive
 19 unrestricted use of the waters of the Eastern Rivers, to
 20 be released by India in accordance with Annexure H of
 21 the Treaty. Although we don't need to go to that
 22 annexure now, it's plain from its face that its
 23 overriding purpose was to safeguard Pakistani
 24 agricultural needs from the Eastern Rivers during the
 25 Kharif and Rabi crop seasons, until such time that

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14:20 1 18th centuries in particular, thriving as a commercial
 2 centre for river-based commerce during the time of the
 3 Mughal Empire.
 4 Following partition in 1947, as the upper riparian,
 5 India has the ability to control the flows of the
 6 Eastern Rivers, including of course the Ravi that passes
 7 through Lahore. India has done so to such a degree that
 8 those rivers now run dry in Pakistan almost permanently
 9 due to Indian development upstream. And I'll talk about
 10 India's post-partition and post-Treaty development works
 11 upstream shortly.
 12 As a result of those works, and the corresponding
 13 loss of water supply on the Eastern Rivers, Pakistan has
 14 had to expand its irrigation network enormously since
 15 1960 in order to supply these large areas, in yellow
 16 here -- including around Lahore -- of the Eastern Rivers
 17 catchment, together with its huge population, with
 18 waters from the Western Rivers.
 19 The fact that Pakistan has had to expand its use of
 20 the Western River waters in order to replace waters lost
 21 from the Eastern Rivers adds further resonance to
 22 India's obligation under the Treaty to "let flow" the
 23 waters of the Western Rivers, and highlights why the
 24 uninterrupted flow of the Western Rivers is just as, if
 25 not perhaps more important to Pakistan today than it was

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14:23 1 Pakistan was able to replace those waters from the
 2 Western Rivers.
 3 Since the end of the transition period in 1970,
 4 India has exploited its right of unrestricted use of the
 5 Eastern Rivers, and it has done so to the full, by
 6 building a series of enormous structures, often for
 7 combined hydroelectric and irrigation purposes.
 8 India's upstream projects have included the Thein or
 9 Ranjit Sagar Dam on the Ravi River, upstream of Lahore,
 10 which was commissioned by the Government of Indian
 11 Punjab in 1999. That project comprises
 12 a 160-metre-high, 600-metre-long dam with gross storage
 13 of 3,280 million cubic metres. It is capable of
 14 irrigating almost 350,000 hectares, or 860[,000] acres,
 15 of Indian agricultural land, and of generating 600 MW of
 16 power.
 17 This is just one of a number of such combined
 18 irrigation and hydroelectric projects commissioned by
 19 India on the Eastern Rivers since the creation of the
 20 Treaty. And on the Ravi alone, India has completed at
 21 least five further HEPs upstream of the Thein Dam, with
 22 a total installed capacity of more than 1,370 MW.
 23 That's Exhibit P-578.
 24 India has also dramatically expanded its irrigation
 25 network on the Eastern Rivers so as to supply waters to

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|--|---|
| <p>14:25 1 Jammu and Kashmir, India Punjab and even Rajasthan. For 2 example, India's Indira Gandhi Nahar Project, or IGNP, 3 is fed by the Sutlej and Beas Rivers. That project 4 supplies water to the vast Greater Indian Desert, also 5 known as the Thar Desert, in Western Rajasthan. That 6 Indian network, which was completed in 2010, includes 7 the longest canal in India, which runs for 8 650 kilometres, and which supplies an area approximately 9 60 kilometres wide and 1,000 kilometres long, spread 10 over a gross command area of 2.5 million hectares. 11 That's Exhibit P-578. 12 India's development of these rivers, the Eastern 13 Rivers, is such that those rivers now run permanently 14 dry downstream in Pakistan, except during periods of 15 heavy flooding. India's complete appropriation of the 16 waters of the Eastern Rivers has been deliberate, and 17 based on an understanding that Article II of the Treaty 18 entitles it to run those rivers dry before they enter 19 Pakistan. 20 Now, in its Memorial, Pakistan wrote that the 21 Eastern Rivers run dry for 335 days per year. It cited 22 a 2011 study for that purpose, indicating a reduction of 23 more than 90% of the Eastern River flows into Pakistan 24 by 2010, as compared to flows before the Treaty. And 25 that was with reference to Exhibit P-263.</p> <p style="text-align: center;">Page 137</p> | <p>14:28 1 India for its utilization in India, following steps have 2 been taken: ..." 3 And there are three steps in the document, but the 4 most significant one by some margin is the first one, 5 which is the Shahpurkandi project, which Sir Daniel 6 Bethlehem mentioned briefly yesterday. And as the 7 ministry said: 8 "This project will help in utilizing the waters 9 coming out from [the] powerhouse of [the] Thein dam to 10 irrigate 37000 hectares of land in [Jammu and Kashmir] 11 and Punjab and generate 206 MW of [electricity]." 12 In February of this year, India completed 13 construction of the Shahpurkandi Barrage. And there is 14 a picture of it, I think, on my next slide, slide 16. 15 This is the latest in a line of large Indian 16 multipurpose irrigation and power generation projects 17 built on the Eastern Rivers since the 1960s. And the 18 completion of the barrage was reported in India as 19 having "effectively ceased the flow of water from the 20 Ravi River into Pakistan". That's Exhibit P-559. 21 Despite all its construction works since 1960, 22 however, the flows of the Eastern Rivers within India 23 still have significant untapped potential, particularly 24 hydroelectric potential. We know that because in 2022, 25 consultants at the Indian government-owned company that</p> <p style="text-align: center;">Page 139</p> |
| <p>14:27 1 (Slide 14) We see that on the slide. The reference 2 was made then to the average flow of the Eastern Rivers 3 into Pakistan having been reduced by 75% and 92%, 4 respectively, during the periods 1985-2002 and 5 2007-2010. And you can see there the reduction of flows 6 highlighted of the Ravi and the Sutlej Rivers as they 7 enter Pakistan: a significant reduction. 8 But those figures are now outdated. By 2019, 9 a press release by the Indian Ministry of Water 10 Resources, Development and Ganga Rejuvenation (P-563) -- 11 this is my next slide, slide 15 -- stated that India's 12 works on the Eastern Rivers had "helped [to] utilize 13 nearly [its] entire share" of 95% -- or 95%, they 14 said -- "of the waters of [the] Eastern Rivers" at that 15 time, in 2019. 16 So there we can see the reference to the current 17 status of development in India at the time in the 18 Eastern Rivers: an exploitation of nearly the entire 19 share. 20 But then the Ministry of Water Resources noted that: 21 "... about 2 MAF of water annually from [the] Ravi 22 [was] reported to be still flowing unutilized to 23 Pakistan below Madhopur." 24 And then the ministry said: 25 "To stop the flow of these waters that belong to</p> <p style="text-align: center;">Page 138</p> | <p>14:30 1 runs five large dams on the Ravi wrote, in 2 Exhibit P-578, that India had developed 2,177 MW of 3 an available 3,229 MW of the hydroelectric potential of 4 the Ravi River alone. So India retains the possibility, 5 the paper reported, of expanding its hydroelectric 6 generation capacity in the Eastern Rivers. 7 With the opening of this barrage, the Shahpurkandi 8 Barrage, India's appropriation though of the waters of 9 the Eastern Rivers is complete. It's open to question 10 whether India's cumulative conduct since 1960 on the 11 Eastern Rivers, which has run those rivers dry as they 12 enter Pakistan, is compatible with the Treaty or 13 applicable customary international law, but this is not 14 a question arising for decision in the present 15 proceeding. 16 In any event, the dramatic impact downstream in 17 Pakistan of India's aggressive development of the 18 Eastern Rivers is confirmed by flow data. And we 19 summarise that on my next slide and the one to follow. 20 On this one, slide 17 -- both slides are based on 21 data using the flows of the Eastern Rivers as they enter 22 Pakistan. This one shows cumulative flows over time on 23 the Sutlej and the Ravi as they enter Pakistan. You can 24 see very quickly the flatlining of those flows over 25 time, and particularly after the year 2000.</p> <p style="text-align: center;">Page 140</p> |

14:31 1 And the next slide (18) similarly, in a different
 2 way, charts the level of the flows over that period each
 3 year. These show the significant drop-off in the flows,
 4 measured on the Eastern Rivers in Pakistan since 1960.
 5 So, Mr Chairman and members of the Court, all of
 6 this essential context in connection with the Eastern
 7 Rivers we say is a critical counterweight in the Treaty
 8 to India's unrestricted use of the Eastern Rivers. So
 9 there's a counterweight to that unrestricted use in the
 10 Treaty, and that is Pakistan's unrestricted use of the
 11 Western Rivers under Article III. That was the broad
 12 hydro bargain, if you like, that we've heard about
 13 before.
 14 So having discussed the Eastern Rivers, I'd like to
 15 move on to discuss Pakistan's use of the Western Rivers,
 16 following the Treaty.
 17 The Treaty, as you know, provides in the same way
 18 that it provides essentially for unrestricted use,
 19 subject to some exceptions, by India on the Eastern
 20 Rivers, it provides for unrestricted use by Pakistan,
 21 subject to different exceptions on the Western Rivers,
 22 under Article III.
 23 The critical importance of the free flow of the
 24 Western Rivers for the people, environment and national
 25 economy of Pakistan cannot be overstated. A 2021

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14:33 1 publication of the World Bank entitled "Groundwater in
 2 Pakistan's Indus Basin" -- and that's Exhibit P-248 --
 3 calculated that the basin contributes 95% of the total
 4 water resources in Pakistan.
 5 (Slide 19) Another World Bank publication of 2019 --
 6 that's P-249 -- calculated that two thirds of this water
 7 comprised inflows of the Western Rivers from India. And
 8 that's shown in the slide. That appears at figure 3.1
 9 of the Memorial. You can see here the reference to
 10 "external inflows" on the Western Rivers at that time,
 11 in 2019, constituting 66% of the total water resource --
 12 or renewable water resource -- in Pakistan. The Eastern
 13 Rivers at that time made up only 1.5% of the resource.
 14 Of course, after completion of the Shahpurkandi
 15 Barrage, the Eastern Rivers will be essentially
 16 contributing nothing to Pakistan's water resources going
 17 forward; and Pakistan's reliance on the Western Rivers
 18 will only increase, as compared to the illustration of
 19 that reliance here in 2019.
 20 The average annual flow of water into Pakistan on
 21 the Western Rivers is measured at monitoring stations
 22 situated close to the Line of Control with India. The
 23 flow data appears -- it's before you -- at
 24 Exhibit P-402. It's extensive, and it's been analysed
 25 very closely particularly by Dr Morris for purposes of

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14:35 1 his submissions. And Pakistan has provided analysis of
 2 that data in Appendix D to its Memorial, again thanks
 3 largely to Dr Morris.
 4 The data shows that over the past 30 years, the
 5 total annual flow on the Western Rivers is just under
 6 104 million acre-feet. Of this, approximately 57% of
 7 the flow enters Pakistan on the Indus, 23% enters
 8 Pakistan on the Chenab, and the remaining 20% enters
 9 Pakistan on the Jhelum.
 10 All of these flows on the Western Rivers are highly
 11 seasonal because of their heavy dependence on glacier
 12 and snowmelt upstream during warmer months. And this
 13 seasonality can be seen on my next slide (20), which
 14 shows ten years of daily discharges of the Indus and
 15 Chenab Rivers at the Tarbela and Marala monitoring
 16 stations, respectively. This is figure 3.4 in the
 17 Memorial.
 18 The seasonality of flows dovetails with Pakistan's
 19 national crop seasons, namely the Kharif crop season,
 20 which runs between April and September, and the Rabi
 21 crop season, which runs between October and March. More
 22 than 80% of the seasonal flows on the Western Rivers
 23 occur during the Kharif crop season, with the remaining
 24 20% occurring during the Rabi season. Even in the
 25 Kharif crop season, most of the flows occur during the

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14:37 1 three-month period between mid-June and mid-September.
 2 That's Exhibit P-268 at page 192.
 3 The maintenance of flows during the critical earlier
 4 part of that crop season, while the crops are being sown
 5 and while the availability of water is relatively low,
 6 is critical. Without the let-flow obligation under
 7 Article III of the Treaty, Pakistan would be unable to
 8 irrigate its national crops, particularly during that
 9 early period of the Kharif season, when the rivers run
 10 low during April, May and early June.
 11 Pakistan's crops receive their water from the
 12 Western Rivers via a national irrigation system that
 13 forms the centrepiece of the Indus Basin Irrigation
 14 System, or IBIS. The Indus Basin Irrigation System is
 15 the largest on Earth; or the largest contiguous
 16 irrigation system, certainly, on Earth. It services
 17 more than 25 million hectares of agricultural land, the
 18 vast majority of which is in Pakistan: approximately
 19 84%. That's figure 3.8 in the Memorial.
 20 I will spend a few minutes -- perhaps more than
 21 a few minutes -- describing Pakistan's irrigation system
 22 shortly. For now, the critical point is that by means
 23 of that irrigation system -- largely constructed, as
 24 we'll see, since the Treaty -- the Western Rivers are
 25 truly the lifeblood of Pakistan's huge agricultural

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14:39 1 sector.
 2 That sector consumes approximately 93% of the
 3 country's available water resources annually. Other
 4 uses of the Western Rivers, such as non-agricultural
 5 activities like domestic and industrial use, including
 6 power generation, pale into relative insignificance
 7 compared to the agricultural demand: they consume only
 8 7%. That's all Exhibit P-280.
 9 According to the Pakistan Economic Survey 2022-23,
 10 published by the Pakistani Ministry of Finance, the
 11 agricultural sector contributes approximately 23% of
 12 Pakistan's national GDP and employs approximately 37.5%
 13 of its labour force; Exhibit P-281, page 19.
 14 So, members of the Court, Mr Chairman, it's no
 15 exaggeration to say that Pakistan has a water-based
 16 economy; there's no doubt of that. And that economy is
 17 based itself on the Western Rivers.
 18 In fact, 90% of Pakistan's agricultural production
 19 relies on irrigated water, of which about 70% is
 20 provided by the Western Rivers. That's Exhibit P-244 at
 21 page 231. Up to 80% of those Western Rivers waters are
 22 derived upstream from the glaciers and snowmelt in
 23 Indian-administered territory. One can estimate that up
 24 to half, therefore, of the agricultural production of
 25 Pakistan relies on waters flowing into Pakistan from

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14:40 1 India on the Western Rivers.
 2 This is confirmed by scientific commentary on the
 3 importance of mountain water -- and meltwater, more
 4 specifically -- for production of early Kharif crops,
 5 such as cotton, which is of course particularly thirsty,
 6 and rice and sugar cane. There's an organisation --
 7 based in Nepal, I think -- called HI-AWARE: it's aimed
 8 at enhancing climate resilience in the mountains and
 9 floodplains of the Indus. This is a different one; this
 10 is not the Nepalese one, I'm sorry. But that
 11 organisation, that focuses on climate resilience in the
 12 Indus, observed in a 2018 study that food production in
 13 Pakistan is "heavily dependent on water originating from
 14 snow and glacier melt at high altitudes"; Exhibit P-283.
 15 The irrigation system in Pakistan is crucial, due to
 16 the combination of the seasonality of river flows on the
 17 Western Rivers, the arid climate in much of the country
 18 outside of the monsoon season and, following the Treaty,
 19 the non-availability of the Eastern Rivers.
 20 The Memorial, at paragraphs 3.39 to 3.49, gives
 21 a brief history of the irrigation system in Pakistan,
 22 which originates several thousand years ago. That
 23 system has though seen two periods of substantial
 24 expansion. The first, which is not so important to us,
 25 is the expansion during the late 19th century, under

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14:42 1 colonial rule. And following Pakistan's independence,
 2 the second significant expansion took place immediately
 3 before and during the transition period under the
 4 Treaty. That phase of expansion was focused, of course,
 5 on the formidable task of transporting waters vast
 6 distances from the Western Rivers into large areas of
 7 Pakistan which had previously been supplied by the
 8 Eastern Rivers.
 9 These works conducted following the Treaty in 1960,
 10 these irrigation works, were described by the World Bank
 11 at the time as "the largest programme of its kind ever
 12 to be undertaken anywhere in the world". That's P-277,
 13 paragraph 7. They were undertaken by Pakistan pursuant
 14 to its obligation at Article IV of the Treaty, and they
 15 were undertaken with estimated costs of just over
 16 US\$1.1 billion at the time, which equates to roughly
 17 US\$12.5 billion today. That's Exhibit P-244 at
 18 page 231.
 19 They were financed by multiple countries. And those
 20 countries contributed to the Indus Basin Development
 21 Fund, which was established under the Treaty in
 22 September 1960. India alone contributed in those days
 23 £62,060,000, which equates to more than US\$1.5 billion
 24 today, so just over 10% of the cost of the irrigation
 25 expansion, as it was required to do by Article V of the

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14:44 1 Treaty.
 2 (Slide 21) We can look at Articles IV and V, the
 3 relevant parts, now. They make detailed provision for
 4 the expansion of Pakistan's irrigation network so as to
 5 supply areas previously irrigated by the Eastern Rivers
 6 with irrigation from the Western Rivers.
 7 So there you can see Article IV(1) required Pakistan
 8 to:
 9 "... use its best endeavours to construct and bring
 10 into operation, with due regard to expedition and
 11 economy, that part of a system of works which will
 12 accomplish the replacement, from the Western Rivers and
 13 other sources, of water supplies for irrigation canals
 14 in Pakistan which, on 15th August 1947, were dependent
 15 on water supplies from the Eastern Rivers."
 16 You can see then in the provisions of Article V
 17 India's large contribution to the funding of those works
 18 was "In consideration" -- and they were the words
 19 used -- "In consideration" for the fact that they were
 20 required in order to replace water supplies in Pakistan
 21 previously received from Eastern Rivers, with supplies
 22 to be transported, via the new canals, from the
 23 Western Rivers.
 24 As a result of those works, the Western Rivers
 25 irrigation network today supplies water to more than

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14:45 1 21 million hectares of agricultural land in Pakistan
 2 alone. As the table in my next slide, slide 22 -- which
 3 is also Memorial figure 3.8 -- shows, this comprises
 4 more than 84% of the total irrigated agricultural land
 5 in the Indus Basin.
 6 The areas served by the Western Rivers irrigation
 7 network in Pakistan are illustrated in my next slide
 8 (23). Here it is. This is based on Memorial map 3.7
 9 and it shows the total area of agricultural land in
 10 Pakistan that is irrigated by the Western Rivers.
 11 (Slide 24) It is split into three. The green part,
 12 the first part there, is the areas that are irrigated
 13 and are located within the natural catchment area of the
 14 Western Rivers. So they are, if you like, naturally
 15 irrigated by the Western Rivers.
 16 (Slide 25) But there are two significant additional
 17 areas. The first is the yellow one that we can see now,
 18 and that is the area irrigated by the Western Rivers
 19 today that [is] located in areas previously irrigated by
 20 the Eastern Rivers. This is the area that was the focus
 21 of the post-Treaty irrigation works, to which I'll
 22 return shortly. It covers approximately 50,500 square
 23 kilometres or 5 million hectares.
 24 (Slide 26) Then the second additional area is the
 25 pink one in the Lower Indus Valley. But this is outside

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14:47 1 of the natural catchment of the Indus actually, so I may
 2 have misspoken by describing it as being in the valley.
 3 It is therefore an extension from the natural irrigation
 4 and catchment area of the Western Rivers. And that is
 5 another very significant area of agricultural land in
 6 the south of the country and the centre of the country
 7 which is irrigated now exclusively by Western Rivers
 8 water.
 9 The remaining areas of irrigation in the Indus Basin
 10 are shown on my next slide (27), if you look carefully.
 11 The blue one is easy to spot. This is the area of
 12 Indian irrigation, comprising approximately 14.3% of the
 13 irrigated area in the Indus Basin, and of course that's
 14 irrigated from the Eastern Rivers.
 15 Between them, the blue area in Indian-administered
 16 areas and the remainder in Pakistan comprise 98.5% of
 17 the irrigation in the Indus Basin. The remaining 1.5%
 18 is located in Afghanistan, on the Kabul River. You can
 19 see that if you look carefully in the top left -- it has
 20 just appeared -- in the extreme north-west of the
 21 Indus Basin.
 22 (Slide 27) So the Indian area of irrigation is
 23 marked blue, and this is an area supplied exclusively by
 24 the Eastern Rivers. Of course, this map does not
 25 include though the additional areas outside of the basin

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14:49 1 in India now also irrigated by the Eastern Rivers,
 2 including those canals I mentioned earlier, which extend
 3 hundreds of kilometres into India, as far away as
 4 Rajasthan.
 5 (Slide 28) there's an additional small area of
 6 long-standing Indian irrigation upstream on the Western
 7 Rivers; this is the red one. This predates 1960, and
 8 was explicitly preserved, under Article III of the
 9 Treaty and Annexure C, as an exception to India's
 10 let-flow obligation in relation to the Western Rivers.
 11 And finally, the 1.5% or so in Afghanistan is in
 12 purple, as I mentioned.
 13 THE CHAIRMAN: Mr Fietta, I don't know if anything turns on
 14 this for our current case, but I'm curious whether the
 15 diversion of water from essentially the green area here
 16 down to the yellow area, and perhaps the pink as well,
 17 resulted in a decrease in the waters that normally would
 18 have been in the green area in a manner that worked to
 19 the detriment of those in the original catchment area,
 20 if you will.
 21 MR FIETTA: Yes, thank you for the question. I will come to
 22 that; I was going to address it briefly later. But the
 23 answer, essentially, is: yes.
 24 The expansion of the irrigation network, the very
 25 substantial expansion east into the yellow area, has

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14:51 1 placed stress -- significant stress, at times -- on the
 2 waters of the Western Rivers within their natural
 3 catchment, such that sometimes when the eastern area,
 4 the yellow area, is in particular demand for water, the
 5 rivers, or stretches of the rivers or canal network in
 6 the green area will run dry.
 7 So, as I'll discuss when we get to the irrigation
 8 network in more detail, this is a complex system of
 9 irrigation which is run at a national level, of course,
 10 and then a provincial level, below the national
 11 regulator, and which essentially works hard to
 12 distribute the waters as needed across the entirety of
 13 the irrigation areas of the basin. And that does mean
 14 that at times some areas, including areas that would
 15 otherwise have been more plentiful with water in the
 16 western catchment, have to make sacrifices for other
 17 areas.
 18 This map, perhaps more than any others that you'll
 19 see this week, shows the overriding dependence of
 20 Pakistan on the free flow of the Western Rivers under
 21 Article III of the Treaty, both in the vast natural
 22 catchment areas of the Western Rivers themselves and
 23 beyond, into the similarly vast yellow and pink areas on
 24 this map, also irrigated by the Western Rivers today.
 25 Just to give you a sense, the total irrigated area

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14:52 1 in green, yellow and pink is over 206,000 square
 2 kilometres. It's roughly the same size -- almost
 3 exactly, actually, the same size -- as Great Britain.
 4 And the yellow area alone at 50,548 square kilometres,
 5 previously irrigated by the Eastern Rivers and now
 6 supplied by the Western Rivers, that yellow area alone
 7 is about 25% larger than the Netherlands. So these are
 8 very large areas.
 9 My next set of slides takes us to the handouts
 10 actually. What we're going to do is chart the expansion
 11 of the irrigation network and the major steps in that
 12 expansion since independence, and in particular since
 13 1960.
 14 It's at this point that you might want to open your
 15 folders for orientation purposes, because on the slides
 16 these diagrams are harder to read, I think, than they
 17 are on the paper. But when we talk about specific
 18 features of the network, we will zoom in on them on the
 19 slides.
 20 So there are four A3 sheets in your folders, and
 21 they take snapshots of the system in 1947; in 1960, the
 22 date, of course, of the Treaty; 1970, to coincide with
 23 the end of the transition period; and 2020, to give you
 24 a reflection of the system as it stands now.
 25 I think just by comparing those -- and we'll get to

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14:54 1 the detail -- but by comparing those four snapshots, you
 2 will appreciate the huge expansion by Pakistan of its
 3 irrigation network since its independence in 1947 and
 4 since the Treaty in 1960 so as to utilise waters from
 5 the Western Rivers throughout the agricultural areas of
 6 Pakistan, and in particular throughout the former
 7 catchment of the Eastern Rivers.
 8 So these diagrams are based on figure 3.7 of
 9 Pakistan's Memorial and they're broken down over those
 10 four time windows. We've simplified them a little bit:
 11 we have removed extraneous or irrelevant aspects of the
 12 network, particularly on the Kabul and Swat Rivers,
 13 where there is significant irrigation in its own right.
 14 But to make them a little bit more user-friendly for you
 15 and focused, we've taken those elements out, although
 16 they do appear in the version of this figure at 3.7 of
 17 the Memorial.
 18 So these illustrations show the scale and the speed,
 19 as we'll see, of Pakistan's irrigation network expansion
 20 during the years immediately leading up to the Treaty
 21 and following the Treaty. I don't have time today to
 22 explain each and every expansion, but I am going to
 23 focus on some key elements of that expansion.
 24 So the first illustration is slide 29. This shows
 25 the irrigation network in 1947, on partition, largely

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14:56 1 built by or under the British colonial rule between 1857
 2 and 1947. And you can see that the connections between
 3 the Western Rivers -- which are isolated here on the
 4 illustration -- and the Eastern Rivers, between the
 5 Western and Eastern Rivers at that time the links were
 6 relatively rudimentary, with only a handful of barrages
 7 and link canals in operation, and no reservoirs at all
 8 at this point on the Western Rivers. So that's our
 9 starting point, if you like.
 10 The next illustration you have, which is slide 30,
 11 and if we go again back between the 1947 and 1960, you
 12 will see the changes -- they leap out -- made, and you
 13 will see the changes on the paper versions between 1947
 14 and 1960. Now, these were a number of expansions made,
 15 if you like, in anticipation of the Treaty and following
 16 the 1948 water crisis which we've discussed before.
 17 Pakistan did not delay in starting to make its water
 18 system, its irrigation system, more immune to
 19 intervention that it had suffered in 1948.
 20 (Slide 31) A particularly significant development
 21 during this period between 1947 and 1960 was the
 22 construction of this link canal. We've circled it in
 23 yellow. It's a link canal between the Marala -- it's
 24 called the Marala-Ravi Link Canal, between the
 25 Chenab River and the Ravi. And this was built to

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14:58 1 transport waters from the Chenab directly to the Ravi
 2 upstream of Lahore, close to the Line of Control between
 3 India and Pakistan. And we've zoomed in on the next
 4 slide (32) on that link canal.
 5 Now, this was the first of a number of link canals
 6 you're going to see that have been built. These are not
 7 for irrigation themselves, because they are vast: they
 8 look like rivers, significant rivers, in their own
 9 right. They are purely for the purpose of transporting
 10 water from one river into the catchment of another for
 11 onward distribution through a network of canals.
 12 So the link canals would typically join up with main
 13 canals, and you see the main canals here in green on
 14 these illustrations. But these main canals would then
 15 split into branch canals, and those branch canals will
 16 split into smaller distributaries, which are, if you
 17 like, the capillaries of the system. And it's those
 18 distributaries which distribute the water at
 19 a farm-to-farm level within Pakistan.
 20 So this was the first construction of a link canal
 21 following partition, and in anticipation of the Treaty,
 22 to replenish flows in the Ravi and in the Eastern Rivers
 23 basin. In fact, an interesting fact is: today, if
 24 you're in Lahore, and you see the River Ravi flowing in
 25 Lahore, that water has come down, invariably, the

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15:00 1 MR Link Canal. So it's Western Rivers water, it's not
 2 Eastern Rivers water.
 3 So that's 1947 to 1960. But the period we're
 4 particularly interested in is the next period: between
 5 1960 and 1970. And this is, of course, the transition
 6 period under the Treaty.
 7 (Slide 33) As you can see, that period saw
 8 an enormous expansion of irrigation works, that
 9 required, in the words of Article [IV], paragraph (1):
 10 "... [to] accomplish the replacement, from the
 11 Western Rivers and other sources, of water supplies for
 12 irrigation canals in Pakistan which, on
 13 15th August 1947, were dependent on water supplies from
 14 the Eastern Rivers."
 15 So if we again just flick between those two, you can
 16 see the difference between 1960 -- that's 1960 -- and
 17 1970: substantial development in that ten-year period.
 18 We can't focus on all of it, of course, but we can
 19 focus on a couple of examples. It included, for
 20 example, the construction of multiple of these giant
 21 link canals between the Western Rivers and areas
 22 previously irrigated on the Eastern Rivers.
 23 (Slide 34) We're going to highlight one of the main
 24 links there, which is a new link, which runs from the
 25 Jhelum through the Chenab and the Ravi and the Sutlej.

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15:03 1 the waters, so some of that water may be diverted down
 2 a main canal, for example, where they're illustrated
 3 here. And then you have syphons: there's a syphon
 4 there, the Mailsi syphon. That is a more basic
 5 structure to facilitate the transit of the water across
 6 the Sutlej riverbed there, into areas beyond, in the
 7 southeast of Pakistan, for irrigation.
 8 This period, between 1960 and 1970, also saw
 9 construction of Pakistan's first dam and reservoir on
 10 the Jhelum at Mangla, to help regulate flows upstream of
 11 the new barrages and link canals.
 12 It's important to note that these reservoirs and
 13 dams, the three of them now on the Western Rivers, their
 14 main purpose is for irrigation. They do also generate
 15 electricity, but their main purpose is to assist with
 16 the control of flows, and to provide storage -- critical
 17 storage -- on the system for when it's needed.
 18 The Chashma-Jhelum Link Canal, which I think might
 19 be on the next slide -- maybe it's not on a slide, that
 20 one, actually -- that supplies additional water upstream
 21 of the Trimmu Barrage, and that's for onward
 22 distribution to areas previously supplied by the Ravi
 23 and Sutlej. And that was also completed in the 1970s.
 24 I think I may have jumped actually from the 1960 to
 25 1970 period. So I think this was my last slide on the

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15:01 1 So across those four rivers, two Western supplying all
 2 catchment areas of two Eastern Rivers.
 3 So this is a triplet of link canals and associated
 4 barrages. These barrages are new, and they are
 5 substantial of course in their own right; those barrages
 6 are critical for the control of these waters. So we
 7 have the Rasul Barrage on the Jhelum; the Qadirabad
 8 Barrage on the Chenab; the Balloki Barrage on the Ravi,
 9 just downstream of Lahore; and the Sulemanki Barrage on
 10 the Sutlej, as shown in the slide. And we zoom in on
 11 the next slide (35) so you can see those features more
 12 clearly.
 13 These link canals were, and remain today, a mainstay
 14 of the infrastructure put in place following the Treaty,
 15 in order to use waters from the Jhelum and Chenab to
 16 irrigate agricultural areas of Pakistani Punjab that had
 17 previously been supplied by the Eastern Rivers.
 18 A similar set of link canals were constructed
 19 downstream -- I think that may be the next slide there
 20 (36) -- between the Trimmu Barrage at the confluence of
 21 the Jhelum and the Chenab on the Western Rivers, and the
 22 Sidhna Barrage on the Ravi. This is the "TS" and "SMB"
 23 link canals you can see there.
 24 (Slide 37) I am told that the difference between
 25 a barrage -- the barrage effectively allows control of

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15:05 1 expansion between 1960 and 1970. So that's the most
 2 substantial period of expansion.
 3 (Slide 38) And the fourth period, shown on my last
 4 A3 printout, takes us up to today, shows the irrigation
 5 network as at 2020. Most of those changes actually made
 6 between 1970 and 2020 are hangovers from the transition
 7 period. It's completion of infrastructure that was
 8 begun during the transition period.
 9 (Slide 39) This included the completion of the two
 10 further dams, the Tarbela and the Chashma Dams, both of
 11 which assist regulation of flows. And you see those
 12 here circled.
 13 Also in that period during the 1970s the
 14 Chashma-Jhelum Link Canal was completed, as I say, which
 15 supplies additional water to the Eastern Rivers.
 16 Now, that link canal actually goes to your question,
 17 Mr Chairman, of earlier, because it was built slightly
 18 later. And it was crucial to allow replenishment, from
 19 the Indus, of waters in the Jhelum, another Western
 20 River, to compensate the Jhelum for water lost to the
 21 Eastern Rivers. And as I mentioned, the pressure on
 22 this irrigation network is such that there are times
 23 when parts of the Western Rivers run dry in order to
 24 supply the Eastern Rivers.
 25 (Slide 40) So today this network, if we look at it

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15:06 1 at the 2020 snapshot, it comprises a vast network of
 2 3 major dams and reservoirs; 23 barrages or headworks,
 3 which themselves are substantial pieces of
 4 infrastructure, which manage the flow of irrigated water
 5 across the country.
 6 There are 12 of these major link canals facilitating
 7 the transfer of water between rivers, and hundreds of
 8 smaller branch canals. The branch canals alone extend
 9 60,000 square kilometres. Those branch canals -- which,
 10 if you saw them, would be substantial: they're much
 11 bigger than the canals I'm used to seeing in the UK --
 12 those branch canals lead into more than 1.6 million
 13 kilometres of ditches and streams, which collectively
 14 irrigate the 21 million hectares, or more than
 15 50 million acres, of Pakistani farmland, thereby
 16 ensuring the country's food security.
 17 But it's not just food security that this system
 18 ensures: it also supplies drinking water. One of the
 19 very small features -- which is actually vast -- on this
 20 illustration in 2020 is circled there. We can zoom in
 21 at slide 42: the Karachi Urban Supply Canal. That
 22 supplies Karachi's drinking water. So it directly
 23 supplies drinking water to millions of people through
 24 a channel fed by the Kotri Barrage, downstream on the
 25 Indus.

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15:09 1 the system. They do not show the close to
 2 2 million kilometres of branch canals and other small
 3 distributaries that are the lifeblood of the system.
 4 (Slide 44) Each of the canals shown here is what's
 5 called a "main canal": these thinner lines, which are
 6 separate to the branch canals. And each of those main
 7 canals is substantial, very substantial, which may feed
 8 into the discussion about cutting off two canals, what
 9 the effect of that might be.
 10 (Slide 45) For example, the Kachhi Canal. This is
 11 just an example which we've circled there, downstream on
 12 the Indus. That canal alone extends around
 13 500 kilometres and it supplies water to approximately
 14 1 million acres of agricultural land in Balochistan,
 15 which is some distance from there.
 16 So these are very substantial main canal features
 17 that you can see here, which feed into the branch canals
 18 and the smaller parts of the network.
 19 Finally on this irrigation network, I should mention
 20 the role of groundwater. Of course it does play a role
 21 when there is a shortfall of water available in canal
 22 networks. But even the country's groundwater resource
 23 is reliant on sustained flows in the Western Rivers,
 24 because as the World Bank has observed in Exhibit P-279
 25 at page 1, in research that it undertook, it said:

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15:08 1 Just a few other points on these illustrations, just
 2 so you know exactly what they show. They distinguish
 3 between two separate zones. You may have noticed as you
 4 went through them that there is a shaded area. If we go
 5 back to the 2020 version (slide 43), you see the grey
 6 area and then the remainder.
 7 The most relevant area for our purpose is the grey
 8 one, which is the Jhelum-Chenab or "JC" zone, and the
 9 rest of it is known as the "Indus main stem". The JC
 10 zone is most relevant because it regulates the bulk of
 11 the transfer of water from the Western Rivers to the
 12 Eastern Rivers, into areas previously supplied by the
 13 Eastern Rivers.
 14 This doesn't mean to say the two zones are separate
 15 and independent because as needs arise, Western Rivers
 16 waters are allocated from one zone to the other, using
 17 an intricate network of barrages and canals.
 18 The system operates as one huge integrated
 19 structure, coordinated at national level by the
 20 Indus River System Authority, or IRSA. That regulates
 21 and monitors the distribution of water across the
 22 country, and then the four provinces distribute the
 23 water within their provinces accordingly.
 24 As I mentioned, it is important to note that these
 25 illustrations show only the most substantial parts of

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15:11 1 "Throughout the [Indus Basin Irrigation System],
 2 fresh groundwater exists primarily due to widespread
 3 leakage from [the] canal network."
 4 These are not impermeable canal beds, and they are
 5 very important to supply of groundwater, including again
 6 around Lahore.
 7 Slide 46 is the diagram of the system as a whole.
 8 It shows that the timely and reliable inflow from India
 9 of the Western Rivers is critical in order to keep this
 10 irrigation system working and in order to continue the
 11 supply of water throughout this vast network to areas of
 12 Pakistan previously supplied by the Eastern Rivers.
 13 If India were able to operate HEPs upstream so as to
 14 restrict flows on the Western Rivers or distort the
 15 timing of flows on the Western Rivers, contrary to
 16 Article III of the Treaty, then, especially if this were
 17 done during the early crop season, as happened in 1948,
 18 this would have a devastating impact on Pakistani
 19 agriculture and on Pakistan as a whole.
 20 (Slide 47) One way we can see that, just by way of
 21 example, the vulnerabilities which Pakistan faces on the
 22 Chenab, circled there -- we zoom in on the next slide
 23 (48). Chenab there enters Pakistan and hits the Marala
 24 Barrage, where there is that link canal, which was one
 25 of the early ones, to replenish the Ravi River, and also

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15:13 1 has significant main canals running from it.
 2 Now, I mentioned earlier that the Chenab enters
 3 Pakistan on the plains. It has already descended from
 4 the mountains in Indian Administered Kashmir by that
 5 point, and that means that it's effectively not feasible
 6 to build any reservoir or dam in that area to store
 7 water. So the flows through the link canal and the main
 8 canal there, which are very significant, and replenish
 9 waters in the Eastern Rivers, are directly reliant on
 10 the inflows of water -- and the undisturbed inflows --
 11 on the Western Rivers from Indian-controlled areas.
 12 There are no link canals either, as you can see
 13 here, to supply the Chenab: the topography prohibits
 14 that too. So the entire system that flows downstream
 15 from the Marala Barrage, for example, is dependent on
 16 the maintenance and reliability of flows on the
 17 Chenab River.
 18 Without any reservoirs or incoming link canals,
 19 there's nothing to mitigate, even temporarily, the
 20 catastrophic effect of any reduction in flows from India
 21 on the Chenab. The net result would be catastrophe for
 22 the network downstream.
 23 The position would be hardly any better on the Indus
 24 and Jhelum Rivers. There are some reservoirs on those
 25 rivers -- we've seen there are three -- but those

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15:15 1 reservoirs would offer only minimal protection if India
 2 were to interfere with the flows or the timing of flows
 3 of those rivers.
 4 Mr Chairman, members of the Court, I have spent some
 5 time on the Indus Basin Irrigation System, of course,
 6 and thank you for bearing with me. I've done that in
 7 order to illustrate the enormity of the works undertaken
 8 by Pakistan, following the Treaty, in order to make up
 9 for the loss of the Eastern Rivers to India, and to
 10 illustrate the critical role of full and timely flow of
 11 the Western Rivers under Article III of the Treaty in
 12 order to keep the irrigation network running. It is
 13 those full and timely flows on the Western Rivers that
 14 India's enormous HEP programme upstream threatens to
 15 disrupt, in violation of the Treaty.
 16 So that's the end of my presentation on irrigation.
 17 I can move on now to speak about, more briefly, power
 18 generation.
 19 THE CHAIRMAN: Let me just check to be sure we have no
 20 questions for you on this part of your presentation.
 21 Dr Blackmore.
 22 DR BLACKMORE: Thank you. (Pause)
 23 Thank you. A very comprehensive presentation, and
 24 lots of numbers and the like. So just, first,
 25 an observation about table 19, and I'm just asking for

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15:17 1 a clarification really.
 2 The table is in bcm, billions of cubic metres, but
 3 the number you gave us for water use was
 4 104 million acre-feet. I'm not sure whether that was
 5 a slip; we'll have to check the transcript. But I did
 6 check the transcript, and it was acre-feet. So just for
 7 my benefit, if it's bcm, I think I can probably
 8 understand that.
 9 MR FIETTA: Yes, I think that's a valid observation.
 10 I believe the data points for those -- the 104
 11 I mentioned at a different point, didn't I, of my
 12 presentation? -- is using different exhibits, which
 13 probably referred to a different source and a different
 14 point in time. But I can check that for you and come
 15 back.
 16 DR BLACKMORE: Yes, could you just do that? Because when
 17 I looked at it in the context of where I thought it
 18 landed, I had a little trouble rationalising it. So
 19 that's one.
 20 The second point is an important point, I think,
 21 just in terms of the general discussion. And I like the
 22 way you've laid out the roll-through of the growth of
 23 the irrigation systems. But my understanding -- and
 24 I think it's the same as your understanding, but might
 25 lead into what the consequences are -- is that there are

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15:18 1 1.2 million groundwater bores embedded in this surface
 2 water system that supply, my memory is, about 50% of the
 3 surface water.
 4 Now, you've made the point, rightly, that there's
 5 only 12 bcm that comes from rainfall that recharges the
 6 groundwater, so the rest of it has to come from seepage
 7 in the surface water system. It's basically an alluvial
 8 floodplain, and they leak.
 9 The point though is you were making a point about:
 10 at the start of the irrigation season, if there was
 11 a change in flows from the Western Rivers, that that
 12 would be a significant issue. And it potentially is;
 13 I'm not buying into that. The question I'm asking is
 14 that you have a system with 1.2 million groundwater
 15 bores, which are independent, certainly for a period of
 16 time -- three months, six months, nine months -- of
 17 what's happening either with rainfall or channel flow.
 18 What's your assessment of the buffer that provides
 19 Pakistan in terms of critical water supply through a --
 20 whether it's a climate emergency or something else?
 21 I'd just like your judgment on that, please.
 22 MR FIETTA: Well, thank you for the question. The
 23 groundwater is important, of course, in this basin.
 24 I think it's quite a technical question; I want to
 25 be precise in my answer to you. So I'm going to have to

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15:20 1 go away and have a look at that, and come back to you on
 2 it. Perhaps next week we'll come back to you on that
 3 question with a precise answer. I don't want to
 4 prejudge the specifics. Because just as you like
 5 numbers, and I want to give you numbers and I want to
 6 give you specifics, I don't have them at my fingertips.
 7 I will come back to you on that.
 8 DR BLACKMORE: Okay, thank you.
 9 THE CHAIRMAN: Professor Buytaert.
 10 PROFESSOR BUYTAERT: Thank you. But actually my colleague
 11 already answered the question I was about to ask you
 12 about the balance between groundwater and surface water
 13 irrigation: the number is about 50%. Is that a number
 14 you agree with, or any comments you can give on that
 15 balance?
 16 MR FIETTA: Well, we have -- I think this may go to the
 17 table showing the water resource, the total water
 18 resource. Let's have a look at that.
 19 DR BLACKMORE: Table 19?
 20 MR FIETTA: Yes, exactly.
 21 I will double-check the reference to the internal
 22 Indus. This looks at the total average annual renewable
 23 water resource in Pakistan, and as I mentioned, it
 24 indicates that about two thirds of that total resource
 25 enters Pakistan on the Western Rivers.

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15:23 1 address the decline in flow of the Western Rivers. And
 2 you're right, and it was also shown in slide 14.
 3 But I can answer your central point there: no, it's
 4 not Pakistan's case that the reduction in flows that has
 5 been seen, it's not Pakistan's case that that has been
 6 caused by Indian conduct to date. It's caused by other
 7 factors, which are debated. And it's not clear whether
 8 these are cyclical changes to the flows of the Western
 9 Rivers, whether they're caused by perhaps climate change
 10 and increasing evapotranspiration, different land use
 11 upstream, perhaps.
 12 But it's not caused, certainly, by any of the
 13 conduct that we are most concerned with in this case as
 14 at this point in time. It's not as if the HEPs upstream
 15 have declined the flows of the Western Rivers. That's
 16 a point on which I have taken specific instruction
 17 beforehand, and that's not the case.
 18 PROFESSOR BUYTAERT: Thank you.
 19 Then the last, hopefully quick, question: would you
 20 know the current level of stress on the Indus Basin as
 21 a whole; in other words, what is the percentage of total
 22 flow of the Indus main stem that is abstracted for
 23 irrigation and other uses?
 24 MR FIETTA: Again, I may come back to that. We have 93% of
 25 the usable water resources used for irrigation and

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15:21 1 I think the answer to your question may relate in
 2 part to the Indus internal number, the 20%, but I would
 3 need to check, because obviously there is additional
 4 water which would certainly form part of that Indus
 5 internal, which would be, for example, the product of
 6 precipitation within Pakistan which flows into the
 7 rivers within Pakistan.
 8 I think on this issue I'll need to come back to you
 9 in combination.
 10 PROFESSOR BUYTAERT: I think I'd be particularly interested
 11 in the balance in water use for irrigation, groundwater
 12 versus surface water. I think this table shows the
 13 groundwater recharge; it obviously doesn't show how much
 14 of that, as I understand it, is taken out and actually
 15 used for groundwater.
 16 MR FIETTA: Yes. (Pause)
 17 PROFESSOR BUYTAERT: Then I had another small question on
 18 slide 14. There you show a table with the temporal
 19 trend in flow, where you draw attention on the reduction
 20 of the flow of the east-flowing rivers, obviously, but
 21 also the west-flowing rivers show a decline, and
 22 I wonder whether you have any opinion on the potential
 23 cause for that decline. Might that be natural, or is
 24 that because of increasing use by India?
 25 MR FIETTA: Yes, I'm going to come to that shortly. I will

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15:25 1 agriculture. Whether that is comparable on the Indus
 2 main stem, I'd have to check.
 3 PROFESSOR BUYTAERT: Okay, thank you. That's all for now.
 4 (Pause)
 5 THE CHAIRMAN: I think there's no more questions on the
 6 first part of your presentation. So please proceed,
 7 Mr Fietta.
 8 MR FIETTA: Okay. We're about two thirds of the way
 9 through, or a little bit more than that.
 10 The next topic is Indian power generation and
 11 Pakistani power generation, so another form of usage, of
 12 course, on the rivers of the basin.
 13 I've mentioned that the Western Rivers are the
 14 lifeblood of Pakistan's agricultural sector. They are
 15 also essential for its domestic and industrial water
 16 use, albeit those usages only consume about 7% of the
 17 resource. And they are essential to Pakistan's
 18 hydroelectric power capacity. Following India's
 19 depletion of the Eastern Rivers, Pakistan's primary
 20 source for generation of hydroelectric power is the
 21 Western Rivers.
 22 By contrast, as explained in the Memorial at
 23 paragraph 3.13 and map 3.3, the Eastern Rivers supply
 24 only 4% of India's water resources. As Sir Daniel
 25 Bethlehem explained yesterday, of the 5,000 or so major

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15:26 1 dams constructed or planned in India, only around 200 or
 2 so are located on the Indus Basin. India can rely on
 3 20 or more other major river basins in the country for
 4 its water and hydroelectric needs. These include the
 5 vast Ganges-Brahmaputra-Megha Basin, which accounts for
 6 almost 60% alone of India's water resources.
 7 A report by the Indian Ministry of Power in
 8 August 2023 estimates that the total hydroelectric
 9 capacity in India was 148,701 MW in 2023, of which only
 10 31.56% had yet been harnessed, with another 11.26% to be
 11 harnessed by projects which were under construction.
 12 This leaves a substantial proportion, or approximately
 13 85,000 MW, of India's hydroelectric capacity unutilised
 14 at this point. That's Exhibit P-579 at page 17.
 15 I'm going to show you the Pakistani and Indian HEPs
 16 on the Indus Rivers. My first three slides in this
 17 segment concern the Pakistani HEPs on the Western
 18 Rivers, of course.
 19 (Slide 49) Pakistan has 31 of those. They are
 20 mostly run-of-river, but of course they're not
 21 constrained by the Treaty. And they have a combined
 22 generation capacity of 9,150 MW. They are the green
 23 ones on this slide.
 24 (Slide 50) There are an additional 24 projects under
 25 construction. This is a slight correction to the number

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15:30 1 gave the figure of 200 yesterday as a total. If one
 2 were to isolate each of these, we'd have slightly less
 3 than 200: that's because Pakistan doesn't know the
 4 location of every single planned HEP, so they're not all
 5 shown on this illustration.
 6 To the extent that these HEPs -- the Indian HEPs --
 7 to the extent that they violate the strict limits of
 8 Annexure D, which of course is the issue before you,
 9 essentially, which Pakistan fears that a significant
 10 number will of those under construction or planned,
 11 there will be a violation, of course, of India's
 12 overriding and fundamental let-flow obligation under
 13 Article III, because those plants will not fall within
 14 the exception to the rule. And the more HEPs that India
 15 designs and builds in violation of Annexure D
 16 constraints on the Western Rivers, the more egregious
 17 will be that violation of Article III and, perhaps even
 18 more importantly, the more grave will be the impact of
 19 those violations downstream in Pakistan, as we have
 20 seen.
 21 Dr Morris will explain on Thursday how India's
 22 cascading HEPs threaten the free flow of what is
 23 effectively Pakistan's only water supply -- at least
 24 river-water supply -- on the Western Rivers, or its main
 25 one, with the Kabul River, of course, as well to

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15:28 1 given in the Memorial, which was 21. The Memorial had
 2 misanalysed the table of projects under construction.
 3 There are 24, not 21.
 4 (Slide 51) And there are a further 99 Pakistani
 5 projects in the planning stage, in various parts of the
 6 planning stage. So the green ones are existing, the red
 7 ones are under construction and the purple ones are at
 8 the planning stage.
 9 Like its irrigation network, Pakistan's HEPs are
 10 directly reliant on the free flow of the Western Rivers.
 11 They are the anticipated result of Pakistan's right
 12 under Article III to the "unrestricted use" of the
 13 waters of the Western Rivers.
 14 Notwithstanding Pakistan's right to unrestricted
 15 use, India has seized upon the exception at
 16 Article III(2)(d) and Annexure D of the Treaty to build
 17 or plan a staggering number of HEPs on the upstream
 18 stretches, in a relatively small area of the upstream
 19 stretches of the Western Rivers.
 20 My next three slides show India's HEPs on the
 21 Western Rivers, again broken down. So the first slide
 22 (52) shows the ones which have been constructed to date;
 23 the second slide (53) shows those under construction, in
 24 red; and the third (54) shows those that are planned.
 25 And there are additional ones planned. Sir Daniel

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15:31 1 a lesser extent.
 2 I think following Dr Morris's presentation on the
 3 back of this one and this illustration, you will see why
 4 the systemic oversight of this Court is so important: in
 5 short, to ensure that India's boundless -- almost
 6 boundless, at least -- hydroelectric ambitions on the
 7 Western Rivers comply with the critical requirements of
 8 Article III and Annexure D of the Treaty.
 9 I'm going to spend the remainder of my time
 10 addressing demand- and supply-side pressures on the
 11 rivers. I think -- have I been going for just under
 12 an hour and a half?
 13 THE CHAIRMAN: Yes, we would normally take a break at this
 14 point. So it may be a question of how much more time
 15 you would like to ...
 16 MR FIETTA: I think I can scoot through and finish, and that
 17 way we can have a break and start afresh with Dr Morris
 18 for the last session.
 19 THE CHAIRMAN: Let's do that. Thank you, Mr Fietta.
 20 MR FIETTA: So I'll spend the remainder of my presentation
 21 looking at demand-side pressures, on which I can be
 22 brief, because they're quite obvious, and probably
 23 uncontested, on the Western Rivers. But they do go to
 24 the importance of the let-flow obligation again for
 25 Pakistan.

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15:32 1 Now, a starting point is that Pakistan has, since
 2 2005, been classified as "water scarce"; that is,
 3 a country with water resources of less than 1,000 cubic
 4 metres per capita, according to something called the
 5 Falkenmark indicator. This is one of several indicators
 6 commonly used to measure water scarcity, and it provides
 7 a relationship between available water and the human
 8 population in any given country.
 9 Pakistan was downgraded to that "water scarce"
 10 status in 2005, before which it had been classed as
 11 "water stressed", which is a less serious form of water
 12 stress. But it's projected that Pakistan will approach
 13 the most critical category of all, namely "absolute
 14 water scarcity", with water resources of less than
 15 500 cubic metres per capita, as early as next year. And
 16 of course climate change, which I'll address shortly,
 17 will make the situation even harder for the people of
 18 Pakistan.
 19 India itself is not immune, of course, to these
 20 problems, but it is in a less perilous position. The
 21 Indian Government has projected that per-capita water
 22 resource might drop to 1,341 cubic metres by 2025,
 23 compared to 500, as we've just heard, in Pakistan, which
 24 would classify India as "water stressed". But this is
 25 some way from being "water scarce", which is the current

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15:34 1 classification of Pakistan, and a long way from reaching
 2 "absolute water scarcity" under that indicator. And
 3 these details are given at Exhibits P-300 and P-301.
 4 So the Indus Basin is one of the most depleted water
 5 basins in the world, and there are times at which, even
 6 since 2010, the waters of the basin do not reach the
 7 Arabian Sea.
 8 The two main challenges to the basin on the demand
 9 side are, first, population growth, and second, climate
 10 change. I'll address the two of them briefly.
 11 First, on population growth.
 12 Since 1960, Pakistan's population has multiplied by
 13 approximately six times. Since the Treaty in 1960, the
 14 population is approximately six times larger: it has
 15 grown from 43 million to around 241 million today. And
 16 this is shown on my next slide (55). This shows the
 17 growth in the population of Pakistan between 1961 and
 18 today.
 19 This population growth is disproportionately located
 20 of course in the Indus Valley, where most of Pakistan's
 21 major cities are located. And here you can see the
 22 population density, which, unsurprisingly, is focused on
 23 the rivers. But I think it's important that you note
 24 that perhaps the most dense area of population is
 25 between the Chenab and the Ravi River, and particularly

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15:36 1 around Lahore, which is itself on the Ravi River, so
 2 areas irrigated -- previously supplied by the
 3 Eastern Rivers.
 4 (Slide 56) As my previous slide showed, looking
 5 forward, Pakistan's population growth is expected to
 6 continue equally rapidly over the remainder at least of
 7 the first half of this century. The UN's Population
 8 Fund has estimated a further growth of 67% to more than
 9 400 million by the year 2050.
 10 India's statistics are shown on the right-hand side
 11 of the slide. Its population nationally has roughly
 12 tripled since 1961, so a significant rate, but half of
 13 the rate that we've seen in Pakistan. The UN Population
 14 Fund estimates that in future, as you'll see there, the
 15 growth is predicted to decelerate significantly, to
 16 about 17% growth from today to 2050, compared to the 67%
 17 projected by the UN in Pakistan.
 18 The growing population of Pakistan has generated, of
 19 course -- and will continue to generate -- substantially
 20 higher demands on agricultural output, on energy supply
 21 and on water generally. And urbanisation has only
 22 increased these pressures. A 2021 World Bank paper
 23 projects that Pakistan's domestic water demand will
 24 nearly double by 2050, and that industrial water demand
 25 will potentially triple by 2050. That's Exhibit P-248.

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15:38 1 Meanwhile, also on the demand side, rising
 2 temperatures due to climate change will also increase
 3 agricultural demand for water in the Indus Basin. This
 4 is because increased water loss through
 5 evapotranspiration -- so that's evaporation from the
 6 vast irrigation network and transpiration from plants --
 7 will increase, as a result of which essentially more
 8 units of water will be required in the future to
 9 generate the same amount of agricultural output today.
 10 They're the demand-side pressures. But the
 11 ever-increasing demand-side pressures are only half the
 12 story.
 13 On the supply side, we've seen, as Professor
 14 Buytaert noted, first of all, a reduction in the amount
 15 of water flowing into Pakistan on the Western Rivers.
 16 My next slide, 57, illustrates the observed downward
 17 trend. This again has been compiled by Dr Morris -- who
 18 of course will be available to you if you have detailed
 19 questions on it -- on the basis of the gauge data which
 20 appears in the Memorial. And this shows that since
 21 1960, the annual volumes of waters flowing into Pakistan
 22 on the Western Rivers have reduced about 8%. That is
 23 the trend across this period of 60 years.
 24 Now, there is a statistical reliability gauge for
 25 this sort of data: I'm told it's called the Mann-Kendall

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15:39 1 test. I'm not an expert on it, and if there are
 2 questions on it, perhaps Dr Morris can answer those.
 3 But the output of that test is that this trend is 90%
 4 reliable according to that test, which analyses trends
 5 that increase or decrease over time and how reliable
 6 they are. This seems to be a reliable trend. The
 7 causes of this trend, however, are less clear, and I'm
 8 not going to speculate on them beyond my answer to
 9 Professor Buytaert earlier.
 10 The important point though is that climate change
 11 promises to reduce the flow of the Western Rivers
 12 further over the decades ahead, at least potentially.
 13 Pakistan is responsible for less than 1% of the world's
 14 carbon footprint, but is highly vulnerable to the
 15 impacts of climate change. India is responsible for
 16 a bit more: nearly 8% of global emissions. But of
 17 course climate change does not distinguish between those
 18 states like India which are more responsible, perhaps,
 19 than Pakistan for climate change.
 20 The Global Climate Change Risk Index identified
 21 Pakistan as the eighth most climate-change-affected
 22 country in the world between 2000 and 2019. That's
 23 Exhibit P-292. India was 20th on that list. So India
 24 is affected, but not quite as much.
 25 It's not yet possible to identify with confidence

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15:43 1 glacial lake outburst floods, but will be followed by
 2 a reduction in the water flow. However, the future
 3 response of the glaciers in the Indus Basin to the
 4 runoff is not very clear ... Any changes in
 5 precipitation and temperature in the basin are important
 6 parameters and must be taken into consideration ...
 7 Although several studies have been carried out to
 8 project future temperature and precipitation,
 9 a comprehensive assessment of the current state of
 10 climatic components is largely missing."
 11 So in short, the reduction in size of the glaciers,
 12 particularly in the Himalaya and Hindu Kush, is
 13 significant. That's clear: that's going to happen. The
 14 Karakoram has a slightly different trend of glacial
 15 reduction, but the long-term is still reduction.
 16 They're the three glacial areas that feed the rivers.
 17 But the impact on flows is less certain because there
 18 are many other factors, including the precipitation, of
 19 course.
 20 What is very clear is that the timing of flows will
 21 become less predictable, and may be more dramatic. We
 22 may see more drought and more floods.
 23 In fact, we can make four high-level observations
 24 which do seem to reflect the scientific consensus.
 25 The first is that surface temperatures will increase

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15:41 1 the precise effects that climate change will have in the
 2 Indus Basin, whether to this point or in the future.
 3 The topic is highly complex and subject to ongoing
 4 scientific study. But some broad observations can
 5 certainly be made.
 6 One summary that I found for this purpose of perhaps
 7 the current state of the science is at Exhibit P-295,
 8 and it's on my next slide (58). Here it is. This paper
 9 cites a large number of other papers and modelling
 10 studies undertaken before it was published in 2019. So
 11 in that sense it's an agglomeration of the studies done
 12 by that date, and it summarises the takeaways of those
 13 studies.
 14 It says that certainly the warming in the Indus
 15 Basin, and particularly in the Upper Indus Basin, has
 16 been well above global averages; and there's been a loss
 17 of glacier mass, which will continue for decades, even
 18 if temperatures remain as they are today. And it
 19 continues in a passage which appears on this slide,
 20 commenting as follows:
 21 "The majority of the flow comes from glaciers, so
 22 the Indus basin is particularly vulnerable in terms of
 23 climate change that causes higher warming trends and
 24 loss of glacial mass. Global warming will initially
 25 creature the water flow, causing flash floods and

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15:44 1 substantially: between 1.7° and 6.3° by the end of this
 2 century, with the higher temperature changes expected in
 3 the Upper Basin, which is more vulnerable. In that
 4 region, temperatures are projected to increase by at
 5 least 5° by the late 21st century, as compared to the
 6 late 20th century. That's Exhibits P-294 and P-295.
 7 That's the first headline conclusion.
 8 The second is that in the short term, the Western
 9 Rivers will become less predictable and more volatile.
 10 There will be increased periods of flooding and drought.
 11 We've seen that in the past two years, in fact: there
 12 was a significant drought last year during the Kharif
 13 cropping season; and the year before, there were almost
 14 unprecedented floods. At the time of the drought last
 15 year, a spokesman for the Indus Rivers System Authority
 16 attributed the drought to "the dangerous impact of
 17 climate change on water availability in the [Indus
 18 Basin] rivers". That's Exhibit P-284.
 19 The third high-level conclusion is that there will
 20 be a significant reduction in glacial areas which supply
 21 the vast majority of the waters of the Western Rivers
 22 today, which will likely manifest itself in periods of
 23 increased flows during the melting process, followed by
 24 reduced flows, especially during dry summer months,
 25 ordinarily supplied by glacial melt.

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15:46 1 And the fourth high-level conclusion is that while
 2 the rate, timing and extent of glacier loss associated
 3 with reduction in river flows will depend on precise
 4 temperature and precipitation trends, which varies
 5 enormously through the basin, all scenarios do indicate
 6 serious consequences in the basin.
 7 My final slide (59) is a table indicating the level
 8 of glacier loss in the Hindu Kush and Himalayas by 2100
 9 anticipated according to different levels of global
 10 warming. So this is warming global-wide. As you'll be
 11 aware, the target is between 1.5° and 2°. In that
 12 scenario, the glacier loss in the Hindu Kush and
 13 Himalayas would be between 30% and 50%, so very
 14 significant. But if the Paris targets are not met, then
 15 the amount of glacial loss promises to be even more
 16 dramatic.
 17 Increased evaporation from Pakistani rivers and its
 18 extensive canal network and increased transpiration, or
 19 water loss, from Pakistani crops due to warmer
 20 temperatures will also exacerbate the challenges of
 21 climate change. The level of Western River flows that
 22 will be required in order to maintain, as I've said, any
 23 given unit of agricultural production will increase due
 24 to these evapotranspiration factors alone.
 25 So alongside the ever-growing pressures on demand

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15:47 1 for water on the Western Rivers, Pakistan faces
 2 substantial challenges on the supply side through the
 3 likelihood of reduced, and certainly less predictable,
 4 flows on the Western Rivers by the end of this century.
 5 By way of conclusion, all of this adds up to
 6 critical threat to Pakistan's ability to sustain its
 7 agricultural sector, alongside other areas of its
 8 economy and even its population in the years to come.
 9 It will be more critical than ever that the remaining
 10 waters of the Western Rivers are allowed to "let flow"
 11 into Pakistan without unlawful interference upstream
 12 from Indian activity, including Indian HEPs. Thus the
 13 importance of this Court's systemic interpretations of
 14 the provisions of the Treaty that are designed to
 15 safeguard Pakistan's unrestricted use of the Western
 16 Rivers, alongside India's deployment of run-of-river
 17 HEPs upstream, within the carefully framed constraints
 18 imposed by Annexure D.
 19 Mr Chairman, members of the Court, that concludes my
 20 presentation.
 21 THE CHAIRMAN: Thank you, Mr Fietta. (Pause)
 22 Okay, I think we don't have any questions for you,
 23 Mr Fietta, but thank you very much for your
 24 presentation.
 25 We will now take a coffee break and come back at

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15:49 1 4.20. Dr Morris, I take it, will be next up in the
 2 presentations. We are squeezing him rather tight, in
 3 that I do intend for us to end the day at 5.30. So my
 4 expectation is that Dr Morris will continue over into
 5 tomorrow morning, in all likelihood, and then we'll
 6 continue onward.
 7 The good news is we have a little bit of contingency
 8 time, I think, built into tomorrow, so that shouldn't
 9 present any difficulty.
 10 SIR DANIEL: Mr Chairman, that's perfectly fine with us.
 11 I think we are comfortable and not being squeezed unduly
 12 in terms of time.
 13 I did want to give you the option -- but you may
 14 have preempted it with your remarks now -- if you did
 15 wish, simply because the flow was continuing beyond
 16 5.30, to continue for a while, I'm sure that on our side
 17 we would be perfectly happy to accommodate that. We
 18 don't want to use this as an opportunity to get
 19 additional time, and we would be happy to have time
 20 docked from us tomorrow if you just wanted to continue
 21 the time to keep to the schedule.
 22 THE CHAIRMAN: I think we would like to finish today no
 23 later than 5.30. I do suggest that Dr Morris consider
 24 whether there's a particular break in his presentation:
 25 we don't have to go all the way to 5.30, but I don't

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15:50 1 think we want to go past it. But of course we have
 2 plenty of time tomorrow, I think, to pick up with him
 3 and then continue onward. Thank you.
 4 SIR DANIEL: That's fine, thank you.
 5 (3.51 pm)
 6 (A short break)
 7 (4.21 pm)
 8 THE CHAIRMAN: I think we're ready to resume our afternoon
 9 second session, and we have Dr Morris up.
 10 As indicated before we broke, hopefully, Dr Morris,
 11 you've thought through whether there's a particular
 12 point in time in your presentation where we might break
 13 for the end of the day. That might depend in part on
 14 the questions you get from the members of the Court, so
 15 you might want to have in mind two or three possible
 16 places of breaking. (Pause)
 17 So please proceed with your presentation.
 18 (4.23 pm)
 19 Himalayan Run-of-River Design and Operation:
 20 An Engineering Perspective
 21 DR MORRIS: Thank you. It's a pleasure to be here in front
 22 of you, gentlemen. And what I would like to do to begin
 23 with, I'd like to talk just briefly about my background
 24 and how I come to this.
 25 I've been working with sedimentation problems with

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16:23 1 reservoirs since 1974. And when I started working with
 2 this, the accepted policy, let's say, is that you design
 3 a reservoir to accumulate, let's say, 100 years of
 4 sediment and you don't worry about the future. But
 5 that's not sustainable, and I've made it basically
 6 a life quest to figure out and develop strategies that
 7 will work. And in that process, I wrote a very large,
 8 748-page handbook for McGraw Hill, together with
 9 Professor Fan from China, and I worked on 60 reservoirs
 10 in 20-some-odd countries.

11 In the Himalayas, I've worked about eight or nine
 12 reservoir designs in Nepal. I've worked with the
 13 Nurek Reservoir in Tajikistan. I've worked with several
 14 reservoirs in Pakistan. We've just finished -- are just
 15 finishing a multi-year, very detailed study of Warsak
 16 Reservoir flushing and modelling. I've worked pretty
 17 extensively with Tarbela, and we're working currently
 18 with the Neelum-Jhelum. And of course I've done
 19 modelling with the Kishenganga and currently working
 20 with Ratle.

21 So I have a little bit of familiarity with this
 22 region, plus a number of other mountain regions, ranging
 23 from the Philippines to Andes, et cetera.

24 So with that preamble, I'll just start.

25 (Slide 2) What I want to do is outline some key

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16:26 1 but those constraints don't make it impossible for India
 2 to develop strategies that will work in this environment
 3 in addition to flushing.

4 So I'd like to first talk a little bit about
 5 hydrology and sediment.

6 The hydrology in the Himalayas throughout the
 7 region, so the monsoon hydrology has a very dry winter,
 8 and you have most of your water coming down the river in
 9 the summer. Most of the precipitation occurs in the
 10 winter, but that precipitation is mostly snowmelt. So
 11 you don't see the meltwater coming to you until, say,
 12 April/May, and it's a combination of snow plus glacial
 13 melt. And as the summer progresses, you get increasing
 14 monsoon activity and more water from rainfall.

15 (Slide 4) So what you end up with is having a highly
 16 variable flow, as you can see here in the graphic.

17 Let me see if I can turn the laser pointer on. Here
 18 we go.

19 And you can see the winter: it's quite low flow. Up
 20 here in the red line, the dotted line, we have the
 21 design plant capacity. And during the summer months,
 22 you have, of course, the high discharges. So your plant
 23 runs part of the year as a baseload plant, 24/7, full
 24 power; and during the winter months, it's going to
 25 operate as a peaking plant. These particular data are

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16:24 1 aspects of run-of-river hydro as it relates in
 2 particular to the Himalaya, and a variety of techniques
 3 that can be used to successfully manage sediment and
 4 sustain power production. There is no single best
 5 answer, so I'm going to look at several different types
 6 of strategies that have all been used successfully.

7 What I also want to emphasise is that hydro plants
 8 do not operate in a void. As an engineer, we always
 9 have constraints. And those constraints, depending on
 10 which country you're in, what regulatory environment,
 11 who is downstream from you, et cetera, they can vary
 12 considerably.

13 You have, of course, your physical parameters: you
 14 have topography, geology, hydrology, sediment load, site
 15 access. If you have a very remote site, this will limit
 16 some of the equipment that you can bring in. You have
 17 all your social parameters: laws, in this case a treaty,
 18 environmental protection laws. You have land
 19 use/acquisition problems to deal with; downstream
 20 impacts, either existing or potential.

21 And of course you have the financial parameters.
 22 Not only does a project need to have a good return on
 23 investment, but you have to have an investor and you
 24 have to have a financial line of credit available.

25 So the Treaty does establish certain constraints,

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16:28 1 from Neelum-Jhelum, which you of course have seen.

2 (Slide 5) The sediment sizes we deal with in the
 3 Himalaya cover a very large range. We have clays, but
 4 clays do not dominate the sediments in the Himalaya.
 5 Clays are typically a small fraction: maybe 15%; in some
 6 places, significantly less. It's mostly silt and sand,
 7 in approximately a 60:40 ratio. It varies a little bit
 8 from river to river: some rivers are skewed more in one
 9 direction than the other. But as a general rule, that's
 10 a pretty good general rule of thumb.

11 We have sediment which we classify as "fines", which
 12 is stuff that's smaller than sand. In the graphic here
 13 I have the sand shown as 0.062 millimetres, which is
 14 according to the Wentworth scale, which is used
 15 internationally. The Indians use 0.075, so they use
 16 a little bit larger to differentiate between fine and
 17 coarse; actually they use a fine, medium and coarse.
 18 But these are just very general numbers to give you
 19 an idea.

20 The fine sediment settles very slowly. The sands
 21 are typically large enough that they can be captured, if
 22 not entirely, at least to a good percentage in
 23 a desanding sedimentation basin.

24 We also deal with cobbles and boulders. If you're
 25 high in the mountain, you can have GLOF events, which is

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16:30 1 a glacial lake outburst flood; or a LLOF, which is
 2 a landslide lake outburst flood, where a landslide comes
 3 down the mountain, blocks the river, the river fills the
 4 area behind the landslide, overtops, erodes, and it's
 5 just like a dam break.
 6 So these events, high in the mountains, you can be
 7 mobilising boulder-sized material. But down lower,
 8 where most of the reservoirs are -- and particularly the
 9 reservoirs that have any significant storage capacity --
 10 you're talking about sediment that's typically
 11 cobble-sized on the bed. Maybe boulders have come down
 12 off of the mountainside and are sitting there, but
 13 they're usually not mobile. And so we're looking at
 14 cobbles and smaller.
 15 The bed material in the Himalaya is surprisingly
 16 stable. This is something that is a little bit
 17 different from the traditional way of approaching
 18 things. There's no way to actually measure bed-load
 19 transport.
 20 Let me go to the next slide (6), and this will show
 21 the difference here.
 22 You can see that you have the suspended sediment
 23 load, which is basically particles that remain suspended
 24 as a result of turbulence in the river. The bed load is
 25 material which is lifted off of the bed material. You

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16:33 1 of sand in the Andes, and it's very angular. It's
 2 angular because it's recently weathered from the parent
 3 rock. And typically you'll see parent rock -- for
 4 instance, if you look at granite, you'll see it looks
 5 like salt and pepper, and all these little crystals.
 6 And as the rock weathers, the quartz in particular will
 7 separate from the matrix, and you'll have these angular
 8 particles.
 9 Quartz is the most resistant of all minerals to
 10 solution. So that's why you go to Florida, and you have
 11 sand beaches that are all quartz, because that's what's
 12 left after the Appalachian mountains in the eastern
 13 United States eroded tens of millions of years ago: what
 14 remains is the quartz.
 15 So quartz is also very problematic for turbines
 16 because it's very hard. You'll see here on the diagram
 17 it says the mohs scale for hardness: talc is 1,
 18 a diamond is 10. The turbine steel, steel used for
 19 turbines, is about 4.8. And sand has a mohs value of 7.
 20 So sand is much harder than this turbine steel.
 21 There are different types of steel, of course, and
 22 turbine steel is selected for a combination of its
 23 capacity to be worked and its capacity to absorb what
 24 you call the working of the pressures back and forth.
 25 It's not a brittle steel. You can have brittle steels

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16:31 1 see how the bed material is a material that's
 2 predominant on the bed. And the material on the bed
 3 which is lifted and moved along the bed by hydraulic
 4 action, that's your bed load.
 5 There is a variety of different estimates of
 6 typically making bed load: some people say it's 20% or
 7 30% or 15%. But those estimates were in many cases --
 8 basically, the original work was derived from work in
 9 the western United States, where the suspended load is
 10 not nearly as large as it is in the Himalaya. So if you
 11 have a bed load against a not so large suspended load,
 12 the percentage is large. But if the suspended load is
 13 very large, this same amount of bed load now becomes
 14 small as a percentage basis.
 15 So there tends to be a tendency to overestimate bed
 16 load in the Himalaya. And we've seen this in work I've
 17 done in Nepal at Kali Gandaki: a reservoir that was
 18 predicted to fill completely with gravel within
 19 ten years. And after ten years, there's a lot of sand,
 20 but there's hardly any gravel at all because we don't
 21 have the bed load transport. So these are actual things
 22 that I have observed and we have studied in the field.
 23 (Slide 7) Himalayan sand is quite angular. But this
 24 is common to sands of mountain areas, at least
 25 everywhere I've been. I've got pictures just like this

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16:35 1 which are much harder. But for turbines, this is a type
 2 of steel which works, and it is significantly less hard
 3 than sand.
 4 (Slide 8) The bed material in the Himalaya, as you
 5 will see here on the picture on the left, that's at
 6 Besham Qila. This gauge station is upstream of Tarbela
 7 Dam. You will notice that there are some people in the
 8 figure, and that gives you an idea of the size: these
 9 are boulders and cobbles in the bed, largely boulders.
 10 And you will also notice there's sand deposits: the
 11 arrows point to the sand deposits.
 12 And if you look at the right-hand photo, that's the
 13 Kali Gandaki River in Nepal, where you also see the sand
 14 deposits. And what happens is that the monsoon comes,
 15 the river level rises, it transports large amounts of
 16 sand. And as the water levels drop down, then the sand
 17 gets deposited. So you basically have a bimodal system:
 18 you have a lot of sand being transported, sand and silt;
 19 and then you have a bed material which is much larger
 20 material, which is relatively immobile compared to the
 21 amount of sediment transported in suspension.
 22 (Slide 10) The sedimentation process in reservoirs
 23 is pretty consistent throughout the world. You
 24 typically have a deposition of coarse sediment upstream,
 25 which you can see here on the left-hand side at the top;

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16:36 1 and you have a fine sediment deposit that proceeds
 2 beyond the delta.
 3 So imagine a river is carrying sand and clay and
 4 silt, and maybe a little bit of gravel during a flood
 5 event. And this material enters a reservoir, which is
 6 water which is standing, and immediately the coarse
 7 material settles to the bottom. And the finer material,
 8 which is sustained in suspension, continues downstream,
 9 and then gets deposited further downstream and closer to
 10 the dam, but beyond the delta.
 11 And it's interesting because this delta phase is
 12 actually, in many reservoirs, quite a distinct change in
 13 topography. In Tarbela, for instance, it's quite
 14 distinct. And that's what we would expect to see -- and
 15 what we do see -- in any of the deeper reservoirs.
 16 At the bottom we have the configuration of where
 17 this thing ends up after a number of years, and you'll
 18 notice that the delta has moved towards and reached the
 19 dam, in this particular example. So what happens is
 20 that when you reach an equilibrium between the sediment
 21 inflow and sediment outflow, you will have the delta
 22 deposits that reach the dam.
 23 Delta deposits are problematic for hydropower
 24 because they contain sand. The fine sediment is not so
 25 problematic. It can, of course, produce erosion,

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16:38 1 produce abrasion of your equipment, but it's not
 2 anywhere near as damaging as sand.
 3 And what we're trying to do at reservoirs, both
 4 storage reservoirs as well as hydropower reservoirs, is
 5 change the concept of reservoir operation [from] "We're
 6 going to store sediment" to "We're going to move to the
 7 point at which sediment inflow matches sediment
 8 outflow", and we're trying to reach this equilibrium
 9 profile at the same time that we're preserving storage
 10 capacity and other benefits.
 11 (Slide 11) We also have turbid density currents
 12 which can occur. This is muddy water that enters the
 13 reservoir during a flood, and it will plunge, go
 14 underneath, and flow along the bottom. And if it
 15 reaches the dam -- sometimes it does, sometimes it
 16 doesn't; it depends a lot on your site conditions -- you
 17 can pass it through turbines, or you can discharge it
 18 over the top of the dam.
 19 And this is one way that you can reduce the
 20 accumulation of fine sediment in a reservoir, which
 21 leaves more volume available to capture the sand, the
 22 delta. And that will retard the arrival of the delta,
 23 because the delta results in more difficult management
 24 problems.
 25 (Slide 12) Let's move now to run-of-river plants for

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16:40 1 hydropower.
 2 (Slide 13) I know you've seen this before. But
 3 basically, you start with a reservoir. You see we've
 4 got the reservoir, you've got the delta and the fine
 5 sediment. You've got the intake.
 6 Typically, you will have a desander. This is the
 7 traditional way of dealing with sediment in
 8 a run-of-river hydropower plant. You may have seen from
 9 the Kishenganga case that India was alleging that the
 10 flushing of sediment is a new technology. It has been
 11 around for many years, but has been very infrequently
 12 used in the past because your hydropower plants, the
 13 run-of-river plants, use desanders. So there are many
 14 plants in many parts of the world that rely on, use
 15 desanders, and you saw the desander at the
 16 Neelum-Jhelum.
 17 From the desander, you go to the headrace tunnel,
 18 the surge tank, and into the powerhouse.
 19 Now, one of the things that we will talk about later
 20 is: notice that the turbine is placed underneath the
 21 generator. And the traditional design for power plants
 22 is for the Francis turbine to be removed by lifting it
 23 up. So to get the Francis turbine out to repair it or
 24 do any maintenance, you have to take the generator out.
 25 And that's very complicated.

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16:41 1 At Neelum-Jhelum they have actually made it so that
 2 you can drop the runner from the turbine and pull the
 3 runner out without touching the generator. And that's
 4 just one of the types of modifications that you do to
 5 your design to accommodate sediment, because you want to
 6 be able to access and repair your equipment much more
 7 easily.
 8 (Slide 14) Spillways. You always have to have
 9 a spillway: you always have to be able to deal with the
 10 floods. And different spillway configurations are
 11 available, and a single dam will frequently have
 12 multiple spillways.
 13 At Neelum-Jhelum you saw that there was a main
 14 spillway, which was an orifice spillway, but there was
 15 also a top-level spillway. These are provided in some
 16 cases as a safety valve, but more typically to release
 17 floating debris, because you want to be able to release
 18 logs and other stuff that comes floating into the
 19 reservoir.
 20 The definition of freeboard on the far left of the
 21 diagram shows an ungated spillway. When you are going
 22 to release your flood, flood will not flow over
 23 a spillway unless you start raising water level over the
 24 top of the spillway. So your design flood, you will
 25 typically have a fairly deep depth of water over the

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16:43 1 spillway.
 2 And typically what's done is that you place
 3 a gate -- as shown in the middle diagram, letter (b) --
 4 you place a gate which can be closed to maintain
 5 a normal pool level, or a full pool level during normal
 6 conditions, and then you open the gate to release the
 7 floods. This is a very common -- perhaps the most
 8 common -- configuration that you see on dams.
 9 And the freeboard is considerably less because now
 10 you have released the flood by opening a gate instead of
 11 having it raise up above the crest elevation. It's the
 12 same level, but in one case you have uncontrollable
 13 storage, in letter (a), and controllable storage in
 14 letter (b).
 15 Letter (c) is the orifice spillway. And again, the
 16 design flood will be established according to the
 17 capacity of the gates, and you will again have freeboard
 18 above that level.
 19 (Slide 15) Now, the "freeboard" concept is different
 20 from the concept of "controllable storage", which we
 21 will go to next. Controllable storage is that storage
 22 volume that you can actually control by the manipulation
 23 of gates. "Freeboard" is defined in the Treaty;
 24 "controllable storage" is not. But controllable storage
 25 is a fact of life.

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16:46 1 flow of water.
 2 (Slide 16) The elevation capacity curve -- this is
 3 a generic curve, but they all look pretty similar to
 4 this -- is a curve showing the elevation of water in the
 5 reservoir against the capacity.
 6 At the very left, you see that the elevation goes up
 7 quite a bit with very little increase in capacity. And
 8 this occurs because if you look at a reservoir, you can
 9 think of it like being triangular-shaped: at the bottom
 10 it's very small, and you go up higher and higher in the
 11 valley and it widens out.
 12 And the other thing is that the distance from the
 13 dam -- if you have a dam and you only fill it 5 metres
 14 deep, the pool is not going to go very far upstream; but
 15 as you fill it higher, the pool gets longer. So as you
 16 get higher in elevation, your reservoir surface gets
 17 wider and longer, and this means that each additional
 18 increment in elevation gives you more than
 19 a corresponding increase in capacity. So that's why
 20 this curve flattens out towards the right: because you
 21 keep increasing the elevation, and the surface area gets
 22 bigger and bigger and bigger.
 23 What this implies -- and that's shown here in red,
 24 the red dotted line -- is that the capacity of the
 25 reservoir is very sensitive to the top elevation. So if

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16:44 1 So on the left-hand side, you have freeboard again
 2 defined, but you also have controllable storage, which
 3 is everything above that crest outlet. On the
 4 right-hand side, you have a definition for controllable
 5 storage for an orifice spillway. And there are two
 6 differences between the left and the right diagram.
 7 On the left-hand side diagram, you'll see that your
 8 freeboard on top of the gate, that is uncontrollable.
 9 You can't lift the water into that zone because it will
 10 just flow over the top of the gate. But on the
 11 right-hand side, with the orifice spillway, if you don't
 12 have a crest spillway of some sort installed there, you
 13 can simply close your gate and raise the water level,
 14 and therefore convert freeboard into controllable
 15 storage. You could fill it and empty it as you wish to
 16 just by operating the gates.
 17 The second aspect of this is the placement of the
 18 spillway. If you have a deep spillway, of course this
 19 will increase the controllable volume, the deeper you
 20 put the spillway. So anything that drives your spillway
 21 depth down lower into the reservoir, you are again
 22 increasing controllable storage.
 23 And controllable storage, from the standpoint of
 24 Pakistan, is quite a problem because it allows the --
 25 obviously in the dams you have more capacity to control

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16:48 1 you can increment the elevation a couple of metres, you
 2 have produced a lot of additional capacity, because each
 3 incremental metre means that you have a bigger and
 4 bigger area against which you're filling up with water.
 5 So that's just to put into context the importance of
 6 limiting the top elevation at which you can raise
 7 a pool.
 8 Now, on slide 17, let's talk about the annual
 9 operating cycle.
 10 The bottom graph here is the graph which we saw
 11 a few slides ago about the seasonality of the inflows,
 12 and the top portion of this graphic shows one year, from
 13 January to December. A typical characteristic of
 14 run-of-river plants in a monsoon-type environment, where
 15 you have a dry season in the winter, and that dry season
 16 is used for power peaking. You don't have enough water
 17 to run the plant 24/7 at full power.
 18 So what you do is during part of the day, let's say
 19 overnight, you accumulate water; and then during the
 20 morning or evening peak, you turn the turbines on -- it
 21 would typically be, say, full power -- and run them for
 22 a certain number of hours to release that water and
 23 produce power during the peak hours. Because it doesn't
 24 make any sense to release power overnight, when the
 25 demand is low.

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16:49 1 Hydropower plants are pretty unique in the context
 2 of the overall energy system because they can turn on
 3 and off very quickly. You can bring a hydropower plant
 4 to power within a couple of minutes. A thermal plant,
 5 you have to -- if it's a gas turbine, which is like
 6 a jet engine, they can also ramp up very quickly. But
 7 conventional plants, like a coal power plant or
 8 oil-fired plant, they need to heat up, you have boilers,
 9 and it takes time to do this. In a nuclear plant,
 10 you're talking a couple of days to get going.
 11 So these power plants, the hydropower plants, are
 12 very good for power peaking. They can come in -- if
 13 you're having a cloudy afternoon and your solar is being
 14 reduced, you can say, "Well, we need some more power, so
 15 we'll put the peaking plant online".
 16 And typically, the grid operator will operate the
 17 hydropower plant to use as much of its power as
 18 possible. Because when a grid operator brings units
 19 online, they're bringing on the cheapest unit first, and
 20 hydropower has zero fuel cost. It's all sunk cost; zero
 21 fuel cost. So your grid operator will bring on
 22 hydropower and use that to its maximum capability.
 23 So that is your power peak. And of course during
 24 the wet season it will be continuously operating, 24/7,
 25 as a baseload plant. It will run alongside a nuclear

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16:51 1 plant or a coal plant.
 2 So two types of operation: a peaking plant and
 3 a baseload configuration.
 4 And the other interesting thing about the Himalayan
 5 hydrology: you will notice that there is a pretty
 6 dramatic and rapid transition from the baseload mode
 7 down to a power-peaking mode, with not very much water.
 8 The transition occurs pretty quickly, so it's not a very
 9 gradual thing.
 10 (Slide 18) Two types of turbines we are typically
 11 talking about: the Francis turbine on the left. The
 12 Francis turbine is typically used in the 50-350-metre
 13 range of head. I mean, there are plants that run at
 14 higher heads. But one of the characteristics of the
 15 Francis unit is you'll see it has what's called
 16 a "scroll case" here -- the scroll case is up here
 17 (indicating) -- and it's got a draft tube, and these are
 18 all under pressure.
 19 So it's a pressurised system, which is one of the
 20 reasons why they have traditionally not taken the runner
 21 out from below. But at Neelum-Jhelum, right around
 22 where the red dot is, in that area they have a gap in
 23 the draft tube where it's bolted together, large bolts
 24 all the way round, and they can take that apart, drop
 25 the runner and pull it out.

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16:53 1 The Pelton, on the right-hand side, operates at
 2 atmospheric pressure. Here is a top picture -- it's
 3 a small Pelton plant. That one's in Colombia. But it's
 4 a good picture showing you that the enclosure on the
 5 buckets is just to keep the water from spraying out and
 6 around. The nozzle down here sprays water against the
 7 buckets and causes them to rotate. This shows with
 8 a single nozzle; you can have Pelton plants with up to
 9 six nozzles.
 10 So the Pelton plant, which is not operating under
 11 pressure, is very easy to take off. If you get good at
 12 it, you can replace the Pelton runner in 24 hours. So
 13 it's a plant that's easier to maintain and do repairs
 14 on. And that may be an important consideration if you
 15 have sediment: that you want something that you can
 16 replace rather frequently.
 17 Peltons are used typically over about 350 metres.
 18 You can use them at a little bit less. But if you get
 19 to high heads, it's a Pelton plant that you're going to
 20 be running.
 21 (Slide 19) The sediment impacts run-of-river hydro
 22 plants, there's two basic types of problems that occur:
 23 you can have abrasion damage to your runners and
 24 ancillary hydromechanical equipment, the wickets or
 25 guide vanes, and you have stay vanes, and your shaft

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16:54 1 bearings can be subject to abrasion.
 2 You can also have problems with the cooling system.
 3 The generator uses a cooling system, and if you use
 4 water directly from the river and the river gets a lot
 5 of sediment, your cooling system will clog. It's like
 6 putting sand into your radiator in your car, so to
 7 speak. But to get around that, you simply use
 8 a closed-cycle cooling system, where you have clean
 9 water that recycles through it. So that has
 10 a workaround. Hopefully you designed it properly to
 11 begin with, so you don't have to try and redo it later.
 12 You can also have structural components in the dams.
 13 Part of the concrete near the gates can be abraded by
 14 sediment.
 15 Now, in the reservoir, the problem is you lose
 16 storage capacity. And along with the storage capacity
 17 is the delta advances down to the area of the dam and to
 18 the intake.
 19 One of the things that you need to avoid, and one of
 20 the things that has caused a little bit with difficulty
 21 in the industry, is that many plants have been designed
 22 as if the sediment is going to not be a problem, or not
 23 going to be a problem, say, in my lifetime, or my design
 24 lifetime. So there are plants that have been designed
 25 without thinking of what's going to happen in 50 or

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16:56 1 100 years. And we're dealing with those issues now.
 2 The Warsak project in Pakistan is one such problem,
 3 where we're looking at a plant that was designed in the
 4 1950s and has had very substantial sediment challenges,
 5 and the idea is how to best make it work better. It
 6 works, it produces power, but the operator is always
 7 looking for a way to make things work better.
 8 You have a sediment-challenged environment, and you
 9 will have wear on certain components of your system.
 10 The runner and the equipment that would run for 50 years
 11 in a sediment-free environment, you may need to replace
 12 it: bring it out and repair it on an annual cycle.
 13 I worked on a small plant in Peru in a sediment-free
 14 environment. The plant was built in 1914, more than
 15 100 years ago. They've changed the runner once in
 16 100 years. But that's a very special case. So you do
 17 have that end of the spectrum, and then you have the
 18 other end of the spectrum. So you cannot approach
 19 a sediment-challenged environment without taking into
 20 context all of the mitigation measures that you can
 21 manage.
 22 So what are these mitigation measures? Let's go to
 23 slide 21. In general, the little graphic on the left
 24 outlines some of the different places where you can
 25 influence the sediment that affects your equipment.

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16:58 1 You're not going to affect the shape of the sediment;
 2 that's given by geology. You're not going to affect the
 3 hardness of the sediment; that's also given by geology.
 4 But you can influence the size and concentration of the
 5 sediment that reaches your machines.
 6 You have pre-treatment sedimentation. You can do
 7 sedimentation in the reservoir; you can do sedimentation
 8 in your sedimentation tank. And you can also design
 9 your intake to minimise the entrainment of sediment.
 10 We'll talk about each of those. And you can do what we
 11 call sediment-guided operation, and we'll mention that
 12 in a minute.
 13 You can modify the hardness: you can increase the
 14 hardness of your turbine by using a protective coating,
 15 a ceramic coating instead of steel. You can select
 16 an appropriate turbine design that is less sensitive to
 17 sediment damage.
 18 And you can select your site. If you have a real
 19 sediment problem, and you said, "Well, I want to put
 20 a plant with 1,000 metres of head", maybe that's not the
 21 best idea, because a Pelton plant operating with
 22 1,000 metres of head, you can destroy the needle valves
 23 in 24 hours. And I've seen it happen at a client's
 24 plant. So these things can happen.
 25 (Slide 22) Reservoir management to operate your

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17:00 1 reservoir for sedimentation. This is basically the type
 2 of strategy that India prefers to use now. And there
 3 are a couple of different ways to do this, and I've
 4 actually designed plants in Nepal that operate both
 5 ways.
 6 The top one shows a sediment bypass tunnel. This is
 7 appropriate for, let's say, a small reservoir, a steep
 8 river. And what you're doing is you're taking the water
 9 that comes into the reservoir, and you only want to run
 10 a certain amount of water through your turbine.
 11 Let's assume that your turbine takes 100 metres per
 12 second of flow rate. But if I have 300 metres a second
 13 entering my reservoir, I don't want 300 metres a second
 14 going through my reservoir and bringing all that
 15 sediment into it. So I can divert 200 metres around my
 16 head pond, which is shown here (indicating) -- it shows
 17 here a little head pond -- I can divert 200 metres
 18 a second around that, and the remaining 100 metres
 19 a second goes to the turbine. So I've converted this
 20 into a big sedimentation basin.
 21 Of course, bypass tunnels cost money, but they're
 22 typically not quite as expensive as desanders.
 23 The other graphic below that shows the option of
 24 flushing. If you have a larger reservoir, you may not
 25 need the bypass tunnel. The bypass tunnel in a larger

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17:01 1 reservoir may be quite long. At current, the longest
 2 bypass tunnel in the world is less than 5 kilometres.
 3 We are currently looking at one in Colombia which would
 4 be 17 kilometres.
 5 But the bottom graphic shows flushing which you can
 6 undertake with or without a bypass tunnel. And the idea
 7 here is that you empty the reservoir, and you release
 8 the sediment by passing the river through the empty
 9 reservoir, and it scours it out, and then you refill it.
 10 This has certain advantages and disadvantages which
 11 we'll go into later.
 12 Of course, one of the problems is that you do have
 13 to empty the reservoir, you will be not producing power
 14 for however long the flushing takes, and you will be
 15 releasing potentially very high concentrations
 16 downstream. And we're talking about more than
 17 100,000 milligrams per litre of sediment concentration.
 18 To mitigate that -- and there have been plants that
 19 have released multiple hundreds of thousands of
 20 milligrams per litre downstream. To mitigate against
 21 that, you draw your reservoir down much more slowly,
 22 which prolongs your flushing period, which prolongs the
 23 period at which the power plant is not operating.
 24 You can configure your intake to reduce the sediment
 25 entrainment. Now, if you go into a river and you sample

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17:03 1 the surface of the water, or you go down close to the
 2 bottom, the concentration of clay and small silts will
 3 be uniform, because it settles very slowly. But sand,
 4 low concentration on top, high concentration at the
 5 bottom.
 6 So what you typically want to do on a run-of-river
 7 intake is you want to draw the water from as high as
 8 possible in the water column. If you have a big
 9 reservoir, a deep reservoir or a storage plant, it
 10 doesn't really matter that much. It will matter because
 11 of downstream water quality -- those will be other
 12 constraints -- but not sediment. But at a run-of-river
 13 plant, the sediment is going to be the primary factor
 14 that will control your design.
 15 (Slide 23) So you have two options. On the
 16 left-hand, I have a deep intake, which is basically
 17 extending my headrace tunnel to the reservoir. And the
 18 minimum operating level -- "MOL" in the diagram -- will
 19 establish, below that, an anti-vortex water seal depth,
 20 typically maybe 2-3 metres, something like that,
 21 depending on the intake configuration, et cetera.
 22 And on the surface intake on the right, what we've
 23 done: we have the same tunnel, but we've put a barrier,
 24 a skimming wall that is in front of the intake, so that
 25 I can withdraw water from as high as possible in the

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17:07 1 the desander or sedimentation basin.
 2 Now, a desander ideally works the way it's shown in
 3 the diagram here: you have water that comes in, and the
 4 flow is perfectly uniform along the length of the
 5 desander, and the sediment settles out.
 6 Unfortunately, it doesn't generally work that way in
 7 practice. And this is something that I've noticed over
 8 the years in multiple sites in multiple countries, is
 9 that -- and we'll go here to slide 25. This compares
 10 the theoretical path to an observed flow path.
 11 This shows a recirculating eddy. And this is caused
 12 by -- in this particular case, the inlet to the basin
 13 has a curve on it. And just like when you go around the
 14 corner in your car and you kind of like get thrown
 15 off -- if you're turning to the right, you get thrown to
 16 the left side of the car, the same thing here: the
 17 momentum carries the water to the left side of the basin
 18 and you get this big recirculating eddy.
 19 You can also have vertical eddies. I've got a good
 20 video of a horizontal eddy from a site visit a couple of
 21 weeks ago in Peru, if you're interested in seeing that.
 22 But both the vertical and the horizontal eddies occur at
 23 Neelum-Jhelum. I don't know if you noticed it, but
 24 there was a vertical eddy. And you go a certain
 25 distance into the desander -- about, say, a third of the

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17:05 1 reservoir. The trash rack can be located at a couple of
 2 different locations. And you would probably have
 3 a desander located between the skimming wall and the
 4 tunnel. The desander is not shown here, but this is
 5 what you saw at Neelum-Jhelum: you had the intake,
 6 you had the desander, and after the desander came the
 7 entrance to the tunnel.
 8 So that is just basically a strategy to work with
 9 the configuration of the reservoir to minimise the
 10 sediment entrainment by proper design of the intake.
 11 You also want to avoid eddies. If you look at
 12 flowing water -- and water is always flowing in
 13 a run-of-river plant. It may not flow as rapidly as the
 14 river, but it's moving. And if your intake is oriented
 15 wrong, you can get these eddies which will lift sediment
 16 off the bottom.
 17 This is typically analysed using, say, a physical
 18 model, a physical scale model, which is, say, a model --
 19 the dam might be this tall (indicating), and the
 20 reservoir might be 30, 40, 50 metres long, and you use
 21 these physical scale models to simulate and directly
 22 observe the different configurations. And you can
 23 actually modify the geometry and see how it impacts the
 24 hydraulics of the intake structure itself.
 25 (Slide 24) The next step in eliminating sediment is

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17:08 1 distance -- and the water comes up, and then you see,
 2 like, water boiling up. Once you know what to look for,
 3 you can see it, but if you're just looking at it, you
 4 may not notice it. But you see these types of eddies.
 5 So what you do in this type of situation is you put
 6 what they call a "tranquilliser" at the entrance to the
 7 basin, which is basically a barrier. They are typically
 8 made -- for instance, you can use like an angle iron,
 9 and put a series of these angle irons, and the idea is
 10 to produce maybe about 10 centimetres of head loss.
 11 Because what happens is that if the water starts to
 12 pile up, creating head loss, it tends to even out. So
 13 if you have a jet of water, what you do is put it
 14 through a perforated wall of some sort, and that
 15 friction or that head loss created by the wall causes
 16 the water to pile up a little bit and spread out more
 17 evenly.
 18 This is a strategy that's used throughout the water
 19 treatment industry. For instance, a water filtration
 20 plant, the floc is very difficult to settle, so they're
 21 very, very particular on optimising the performance of
 22 their settling basins. This is something which is
 23 typically not done in the hydropower industry. So
 24 frequently we see that the desanders have been put in
 25 place, but their operation is quite poor from the

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17:10 1 hydraulic standpoint.
 2 Another thing that you do is at the outlet you want
 3 to make sure that your overflow isn't too strong, you
 4 don't have too much overflow per linear metre of weir
 5 length. And you can use finger weirs. There's a couple
 6 of different strategies you can use, again, to optimise
 7 a basin. (Pause)
 8 (Slide 26) At the powerhouse, there are several
 9 things that you can do.
 10 You can, as I had mentioned, configure the draft
 11 tube for the rapid removal or to facilitate the removal
 12 of the runner. This is a cut-away from the
 13 Neelum-Jhelum plant which you've seen previously, and
 14 the arrow points to the segment of the draft tube that
 15 can be opened up to allow the runner to drop down and
 16 then be taken out horizontally.
 17 You can select a low-velocity turbine of more robust
 18 construction. If you have a very rapid turbine, high
 19 velocity, the sediment impinging at the high velocity
 20 will generate more abrasion than the same particle
 21 impinging at a lower velocity.
 22 Also if you have turbines which are a little bit
 23 more robust, in terms of being thicker on the
 24 construction, the sediment erosion will take more time
 25 to do a significant amount of damage that requires

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17:14 1 a new design which allowed greater space and allowed the
 2 robot to go in and then apply coatings, and that was
 3 very effective.
 4 The duration that a coating will last, it depends,
 5 but typically we can think it will last several years.
 6 So a plant that would have a -- let's call it
 7 an unacceptable amount of abrasion in one year can run
 8 for several years.
 9 The shaft seals are another place where you get
 10 abrasion. You can provide pressurised clean water to
 11 prevent the sediment from getting into those.
 12 You would want to, typically, reduce the submergence
 13 of your turbine to reduce cavitation potential.
 14 Cavitation occurs when you have a, let's say --
 15 for instance, let's use the example of a propeller on
 16 a submarine. The propeller goes through the water, and
 17 when you look at a propeller behind a speedboat, you
 18 have these little bubbles that come out from the
 19 propeller. And those bubbles will then collapse, and
 20 that's cavitation.
 21 So what happens is when they collapse, it's like
 22 a small explosion, and that damages the steel. If you
 23 have sediment plus cavitation, they both act
 24 synergistically to damage the steel. So you really want
 25 to be careful about doing what you can in your design to

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17:12 1 replacement. The more robust turbines can be a little
 2 bit bigger, they're going to cost a little bit more, but
 3 it's a case of taking a cost of initial cost versus
 4 maintenance/repair cost.
 5 There is, I believe, a tendency -- at least from my
 6 experience that I've seen -- that the designer wants to
 7 have a low-cost project, initial construction, and the
 8 long-term operational cost is maybe a little bit more
 9 secondary, because it's the initial project cost that
 10 you have to overcome to get it built.
 11 You need to put wider spacing between the turbine
 12 blades.
 13 If you're going to apply the protective coating,
 14 that coating can be applied by hand or it can be applied
 15 by robot. This is a high-temperature, oxygen-fed nozzle
 16 that sprays this material on to the steel. And if you
 17 do it by robot, it's going to be good, and if you do it
 18 by hand, it's much more tricky. So the preferred method
 19 is to apply by robot, but the robot needs a certain
 20 space between the blades to actually get in and coat the
 21 entire blade.
 22 So you need to select your runner based on the
 23 maintenance that you expect that you're going to do it.
 24 Some of the plants that had severe abrasion to the
 25 runners, they basically threw away the runners and got

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17:15 1 minimise the potential for cavitation.
 2 You want to avoid low-load operation: you operate
 3 your turbines at or near full power, because low-load
 4 operation tends to increase your abrasion.
 5 Closed-circuit cooling for generators we've already
 6 mentioned.
 7 So there's a variety of things that you can do in
 8 the power plant.
 9 (Slide 27) This is the runner at Neelum-Jhelum
 10 I'm showing, after about five years, the difference
 11 between coated and uncoated. So you see that the
 12 coatings can be quite effective.
 13 (Slide 28) Sediment-guided operation. Now, what you
 14 do with sediment-guided operation is you turn your plant
 15 on, off, or you reduce your power, depending on the
 16 sediment concentration.
 17 For instance, you look at the sediment concentration
 18 data from a number of rivers and you see that there are
 19 certain days of the year that had a very high
 20 concentration, and those high concentration days
 21 contribute to a disproportionate part of the load of
 22 sediment on the turbines, and thus the abrasion.
 23 For instance, we've seen this in Pakistan: we've
 24 looked at it both at Warsak and Neelum-Jhelum. At
 25 Neelum-Jhelum, we've got 1.5% of the days account for

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17:17 1 one third of the load of sediment on turbines. So if
 2 you were to take out 1.5 times 365, it's like 5 days
 3 a year. If you turn them off for 5 days a year, you've
 4 just eliminated a third of your abrasion problem. And
 5 those days account for 3% of your total energy. So
 6 you're going to pay a little bit of energy, but you're
 7 going to have a much, much reduced abrasion problem.
 8 Now, you don't necessarily have to turn the turbine
 9 off either, because if you have a desander, desanders
 10 work based on hydraulic load. So you have the flow
 11 coming into the desander, and you have a certain
 12 residence time that the water takes to go from the
 13 beginning to the end of the desander. So if you drop
 14 the hydraulic load on that desander by 50%, the water is
 15 going to take twice as long and you're going to get more
 16 sediment that's going to settle out.
 17 So you can have high-sediment days where you'll say
 18 that: well, today, because we have a very high sediment
 19 load, we had a flood in the watershed, it's coming down
 20 really bad, we are going to operate at half-power. So
 21 there are ways that you can operate your plant to,
 22 again, minimise the sediment management.
 23 Now, another problem that I've seen is that people
 24 at power plants take data. I saw this at one of the
 25 plants in Nepal. They take a lot of data. They have

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17:20 1 job back.
 2 So there are all these little things that come into
 3 play. You have to have good operator training; you have
 4 to take data, you have to look at the data, you have to
 5 analyse the data. And all these come in to being part
 6 of how you operate a plant under challenging conditions.
 7 It's like if you're driving on a Sunday morning,
 8 there's no one on the highway, and it's a clear sky, you
 9 can just breeze down the highway, no problem. But if
 10 it's Friday night, and it's raining and thunder and
 11 lightning and it's windy, you're going to be more alert
 12 because the conditions are different. And it's exactly
 13 the same with a hydro plant: if you have challenging
 14 conditions, you have to be alert, you have to be on to
 15 what's going on.
 16 And the final point -- and I think we'll finish with
 17 this slide (29), to make it a good transition for
 18 tomorrow morning -- is the concept that runners are
 19 actually expendable.
 20 If you've been operating plants that have very
 21 little sediment problems for decades, you have the
 22 expectation your runner is going to last forever. But
 23 runners are expendable. And there are plants that take
 24 out their runners and replace them, refurbish them, on
 25 an annual basis, and can refurbish them multiple times.

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17:19 1 a sediment laboratory on site. They write all the
 2 numbers down, they put them in spreadsheets and they
 3 send it off. Never gets graphed. No one ever looks at
 4 it.
 5 So I took the data and I looked at it, and I said,
 6 "Wow! All of a sudden, in this particular point in
 7 time, the units are starting to have a lot more sediment
 8 at the turbines". Because you will typically measure
 9 the concentration sediment in the river, you will
 10 typically measure it after it comes out of the desander
 11 or at the turbine, because what comes out of the
 12 desander is what's going to hit your turbine. So you
 13 can pick it up at the turbine, you can pick it up at the
 14 exit from the desander.
 15 But in this case, they were picking it up at the
 16 turbine from the draft tube, and you saw that all of
 17 a sudden there was a lot more sediment getting into the
 18 turbine. And I worked with this plant over a period of
 19 several years, back and forth, different trips, and
 20 I got to know both the operators: the old operator, the
 21 new operator. And it's a funny story because -- it
 22 wasn't very funny really. But the old operator didn't
 23 like getting moved to Kathmandu, so he didn't train the
 24 new operator. And he told me, "The new operator doesn't
 25 know how to operate the plant, but I do", and he got his

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17:22 1 You take the welding rods and you place more steel on to
 2 the runners, you reshape it, you put it back in the
 3 plant. And you can do that half a dozen times before
 4 you actually get rid of the runner and replace it with
 5 a new one.
 6 But let's compare to an automobile. On
 7 an automobile, the tyres are expendable: they wear out.
 8 And the tyres on a new automobile represent something
 9 like 2% of the cost. So you go buy a new car, you're
 10 going to pay, what, \$35,000; and you're going to buy
 11 a new set of tyres, it's going to cost like \$800. It
 12 works out about 2%, more or less.
 13 The wearing components, the runner and the valve,
 14 the blades and the wicket on a hydro plant is not 2%:
 15 it's more like a half of 1%. So the concept that we
 16 must, must, must protect our runners at all cost is
 17 something of a misnomer.
 18 Now, engineers I have dealt with who are from the
 19 mechanical side, they work with the equipment, they
 20 don't want to see any damage to their runners. But in
 21 truth, the runner is a component which, if you're in
 22 a challenging environment, it will experience wear. You
 23 have to minimise that wear, but don't expect that it's
 24 going to last forever.
 25 And in a monsoon climate, when the runner efficiency

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17:23 1 becomes reduced due to abrasion and deformation --
 2 runners are designed for perfect hydraulic conditions.
 3 So when a runner begins to erode, you lose that shape
 4 and you start to lose efficiency. A brand new
 5 well-designed Francis runner, design capacity will run
 6 about 94% efficiency. This is from water to mechanical
 7 energy. So that 94% efficiency is going to drop and
 8 drop and drop and drop. But if you're in a monsoon
 9 climate and you have a lot of water available, you just
 10 put more water through it.
 11 This is what we saw at the Warsak plant. Their
 12 runners are very substantially abraded, they're eroded.
 13 They run for five and a half years before replacement.
 14 They have six machines: one runner gets replaced every
 15 year. Take it out, refurbish it, weld on new steel, and
 16 they take it out and put a replacement in. These
 17 six-year repair cycles, because they have six units, so
 18 they repair the runner and the generator at the same
 19 time: it's a major overhaul. So on the six-year repair
 20 cycle.
 21 But when I got the data on the power produced by
 22 each of the units, it's the same: the runner that has
 23 been in operation for five years is producing the same
 24 amount of energy as a brand new runner. How does that
 25 happen? It happens because they just put more water

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17:25 1 through it. They've got the water available. Lower
 2 efficiency, it takes more water to produce the same
 3 amount of power. So just because it's abraded doesn't
 4 mean you're going to lose power in a monsoon
 5 environment, where you have most of your energy produced
 6 during the wet season when there's a lot of extra water.
 7 Now, of course, high-head plants are very sensitive
 8 to sediment, much more sensitive than low-head plants
 9 and can, of course, experience catastrophic damage. So
 10 again, this is not a case of one rule applies to
 11 everybody. But I just hope to have been able to run
 12 through some of the options, some of the many options
 13 that are available that would be applied, and totally
 14 applied as a group of integrated procedures. You would
 15 apply all of these together to help manage your sediment
 16 at a run-of-river plant.
 17 And what happens is that, on one hand, you have the
 18 strategy of using a larger reservoir, sedimentation in
 19 the reservoir and flushing, versus managing
 20 sedimentation in the desanders and not flushing. And
 21 those two cases have implications in terms of the amount
 22 of controllable storage and downstream consequences of
 23 sediment release.
 24 So I think with that I will close. It is, I think,
 25 5.28. And we can continue tomorrow morning.

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17:27 1 THE CHAIRMAN: Thank you, Dr Morris. Before we conclude
 2 though, I'm just going to check to see if there are some
 3 questions that anyone on the Court has.
 4 Professor Buytaert?
 5 PROFESSOR BUYTAERT: Thank you very much, Dr Morris, for
 6 a very clear presentation.
 7 At the very start, you mentioned density current
 8 flushing, and that requires quite specific hydraulic
 9 conditions to be able to do that. From your experience,
 10 how commonly are those conditions met at a certain site?
 11 DR MORRIS: They are not -- a site will typically have the
 12 conditions or not have the conditions. Let me give you
 13 a couple of examples from Colombia, because I've done
 14 work on a couple of plants there that were very
 15 interesting.
 16 One of the plants has density currents: we observed
 17 them, they enter the reservoir. Nothing reaches the
 18 dam, and it's only 3 kilometres away. Nothing. It's
 19 heavy material, it's a lot of sand; it drops right to
 20 the bottom, deposits on the delta. Another plant,
 21 Guavio, which was a large plant, 1,000 MW, and it has
 22 density currents that have a very substantial
 23 accumulation in front of the dam.
 24 So it depends on the project site. It's rather
 25 difficult to predict what they're going to be like.

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17:28 1 Because, for instance, most of the data that's available
 2 in the Himalaya, it grades your sediment into fines,
 3 medium and coarse. What is that fines: is it all silt,
 4 all clay, some percentage?
 5 What is your sand? What's your gradation? If
 6 I have that -- medium sand goes from -- in the typical
 7 range used -- like, for instance, in India it's 0.075 to
 8 0.2 millimetres. Now, at 0.2 millimetres you're not
 9 going to get density currents; it can drop pretty
 10 quickly. But 0.075, yes, that can contribute.
 11 So even here, if we had the tools, we don't have the
 12 data.
 13 We've got a project I'm designing right now and
 14 I've just put in a density current release mechanism.
 15 It's a storage project. And we're anticipating it's
 16 going to release maybe 15% of the total sediment load.
 17 But the prevalence of density currents is
 18 significant. I know it does happen in the Himalayan
 19 area in different reservoirs. Nurek, for instance, has
 20 very significant density currents. Tarbela does not.
 21 Tarbela doesn't because the slope is too low, not deep
 22 enough, not steep enough. But upstream, where they're
 23 building new projects, I totally expect density
 24 currents.
 25 PROFESSOR BUYTAERT: So would you be able to put a number on

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17:30 1 the estimate of how frequent it occurs, and say 10%,
2 20%, any rough estimate?
3 DR MORRIS: When you have -- okay, let me try and use in
4 context maybe something like Nurek. And I'm expecting
5 there that maybe, just in very, very round numbers,
6 maybe 20% to 35% of the inflow would produce density
7 current.
8 PROFESSOR BUYTAERT: Thank you.
9 THE CHAIRMAN: Okay, I think we have no further questions
10 for you, Dr Morris. So we'll end the day here, but look
11 forward to seeing you tomorrow morning at 9.30.
12 DR MORRIS: Perfect, thank you.
13 THE CHAIRMAN: Thank you.
14 (5.31 pm)
15 (The hearing adjourned until 9.30 am the following day)
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