

**IN THE PRIVY COUNCIL****ON APPEAL FROM THE COURT OF APPEAL IN BELIZE****BETWEEN:**

**(1) THE BELIZE ALLIANCE OF CONSERVATION  
NON-GOVERNMENTAL ORGANISATIONS**

**(2) PHYLLIS DART**

**(3) GODSMAN ELLIS**

**Petitioners**

**-and-**

**(1) THE DEPARTMENT OF THE ENVIRONMENT**

**(2) BELIZE ELECTRICITY COMPANY LIMITED**

**Respondents**

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**PETITIONERS' NOTE ON THE CORNEC REPORT  
For hearing 3rd December 2003**

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1. The Petitioners have repeatedly asked the Respondents for copies of assessments undertaken pursuant to the ECP. On Friday 28 November 2003, Counsel for the DOE disclosed to the Petitioners the "Cornec report" of 3 May 2002. That report is the very report prepared pursuant to the ECP to resolve the geological issues.
2. Discussions with Counsel for the DOE at 11:00 am on 2 December 2002 confirmed that the whole of the Cornec report had still not been disclosed. A number of additional documents were to be provided to your Petitioner by midday: (i) the whole of the final Cornec report, (ii) an affidavit from the Solicitor General dealing with its non disclosure earlier; (iii) an affidavit from the Inspector of Mines explaining parts of the Cornec report which have yet to be disclosed; and (iv) an affidavit from Mr Fabro dealing with the bias complaint (which your Petitioner raised with the Respondents on 5<sup>th</sup> November 2003).
3. Your Petitioners have waited until 2:30 pm on 2 December 2003 to before finalising this note in order to deal with these new documents. The documents have yet provided and your Petitioner can only deal in writing

with the extract presently available (and apologises for the inadequacy of the referencing to the extract).

4. The importance of the extract is:

- (1) It supports the views of BACONGO's geologist, Mr Holland, on important issues deferred to be dealt with post-approval, including (i) whether the site is granite (as the EIA report contended) or not (as Mr Holland contends), (ii) the potential for dam leakage, and (iii) on the existence of a major fault near the dam site. His views<sup>1</sup> would have been supported by the Cornec report, had it been available. Instead, BECOL witnesses have, throughout these proceedings, sought to discredit Mr Holland as being a lone, voice on such matters.
- (2) That the contents of the (extract of the) report cannot be reconciled with the evidence of the Respondents in these proceedings.
- (3) Neither the witnesses for BECOL (including Director, Lynn Young, and James Code, engineer), nor for the DOE (including Ismael Fabro, Chief Environmental Officer and Chairman of NEAC) have (i) have referred to the existence of the Cornec report in affidavits sworn since its production, (ii) sought to explain why it is incorrect (if, indeed it is); (iii) indicate that the report contradicts information in the EIA report; or (iv) sought to reconcile its evidence with the Cornec report.
- (4) Lynn Young specifically reassured members of the public at the "hearing" of 16 January 2003 that [Bundle 14 page 35]:

"There has been substantial airing of the project and a substantial number of studies have been conducted over the last 15 years. All of these studies are in the public domain ..."  
[underlining added]

That was, of course, not the case.

#### The failure to disclose the report to the Petitioners

5. The Cornec report was prepared on 3 May 2002, 7 weeks after the grant of leave in these proceedings and was presumably available to both Respondents shortly after then.

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<sup>1</sup> Affidavits at Bundle 7A page 141, Bundle 10 page 51

6. Accordingly, both Respondents were under an obligation to put their cares on the table. See R -v- Lancashire ex p Huddleston<sup>2</sup> and R -v- Civil Service Appeals Board ex p Cunningham<sup>3</sup>.
7. The Petitioner has repeatedly asked the Respondents for copies of any geological studies which had been undertaken following the grant of approval for the MRUSF. Thus, for example, on 30 May 2003, the Petitioner specifically asked the DOE [Bundle 5 page 92 para 3]:

“What geological studies have been done of the dam site following the submission of the EIA for the project? BACONGO requests that you provide a copy of these studies, including a study that we understand was conducted by Jean Cornec.”
8. But the DOE’s response of 10 June 2003 simply invited the Petitioner to address its request to BECOL and referred the Petitioner to the ECP [Bundle 6 page 435]. In its judgment of 10 August 2003 (para 20) [Bundle 4 p 13], the Board described that letter as “uninformative”.
9. In any event, in a 6 November 2003 letter to the solicitors for both Respondents, the Petitioners repeated their request for (among other things) “all geological studies, including the study by Jean Cornec” [Bundle 13 Tab 1 para 4]. The 7 November 2003 response from the solicitors for both Respondents was [Bundle 13 Tab 2]:

“4. Information not in the public domain. We note your expectation but do not accept that any of this information is required to be put into the public domain.”
10. Finally, on 28 November 2003, through counsel, the DOE provided the Petitioner with a copy of part the Cornec report. The Petitioner is grateful to the DOE’s leading and junior counsel for acknowledging the importance of disclosing the report.
11. No explanation has yet been offered by either the DOE or BECOL for their failure to provide the report previously.
12. Further crucial documents (as explained below) which should have been provided to the Petitioners previously, were only provided on 1 December 2003. At the time of drafting, others are promised. It is still not clear whether all the documents to which the Petitioners are entitled will be provided.

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<sup>2</sup> Supplementary Authorities Tab 5 per Sir John Donaldson MR

<sup>3</sup> Supplementary Authorities Tab 6 per Lord Donaldson MR

13. Moreover, on 2 December 2003, the Petitioners discovered, for the first time, and through counsel for the DOE, that meetings have been held between BECOL and the DOE to discuss the Cornec report and its conclusions which are, apparently, disputed by BECOL. Plainly, that process should have been in the public domain. No explanation for the secrecy has been offered by the Respondents.

The failure to disclose the report to the Board on 30 July 2003

14. In its judgment of 13 August 2003, the Board noted that (para 15):

“The Respondents’ reluctance to disclose information to BACONGO (even when it is highly material and not obviously confidential) has been a regrettable feature of this case. No doubt the Respondents regard BACONGO as a most troublesome thorn in their flesh, but their unhelpful attitude can only have tended to increase BACONGO’s suspicions and also perhaps its determination to press on with litigation.”

15. For the Board Hearing on 30 July 2003, the Respondents provided to the Board, and to the Petitioners for the first time, a copy of a report of a geological survey conducted by Zulfiqar Aziz (undertaken for BECOL) dated 31 January 2002 [Bundle 13 Tab 3]. But:
  - (1) That report has no relevance to the issue of the geological foundations of the dam (it considers the separate question of whether the reservoir would leak); by contrast, the Cornec report is directly relevant to the fundamental issue of whether the site is granite or not and the implications of that for the dam. Your Petitioners would respectfully submit, (i) its disclosure to the Privy Council may have been decisive to the disposal of the injunction hearing (as explained below), and (ii) it has thus enabled the BECOL to undertake construction work which the Respondents now rely upon in arguing that relief should be refused in the exercise of discretion.
  - (2) The Aziz report referred in turn to a an assessment undertaken by Dr Andrew Merritt, but no copy of any documentation from Dr Merritt was provided at that stage (copies only being provided to the Petitioners with the affidavit of Razi Mireskandari of 19 November 2003 [Bundle 13]).
16. In any event, an assessment of the merits of the Petitioners’ case was central to the Board’s consideration of whether to grant an interim injunction. The Board thus stated that (judgment para 40:

"... their Lordships have to form some view of the strength or weakness of BACONGO's case. That is particularly important where, as here, the grant of an injunction would cause the respondents significant financial loss, and no undertaking in damages has been offered.

17. The Board concluded (para 44) that BACONGO's case "does not appear to their Lordships to be a strong case on which to seek, without an undertaking in damages, an injunction ...". An important element of the Board's assessment of the merits of the appeal (shortly expressed in its judgment) was its assessment of the Petitioners' arguments relating to the flawed and unlawfully deferred assessment of the geology of the site (judgment para 42). On the point, the Board clearly placed great weight on its understanding that the dispute in question had been properly addressed by independent studies undertaken after NEAC's deliberations (November 2001) but before approval was granted (5 April 2002). The Board thus stated (para 42):

"It was clear that there was an important difference of opinion between the geologists who advised BECOL and the representative of NEAC of the Geology Department as to the geology of the dam site. The difference, having arisen earlier, was discussed at the NEAC meetings in October and November 2001. The outcome was that a new independent expert, Dr Andrew Merritt, was instructed and further site investigations took place before the DOE gave environmental clearance. This aspect of the matter is covered in detail paragraphs 27-33 of the judgment of Rowe P in the Court of Appeal. He concluded (paragraph 33):

"This was a case of making "good" better and not one of shutting the eyes of the assessors to patent dangers to the environment." [underlining added]

18. The Board thus proceeded on the understanding that: (i) Dr Merritt had been appointed, (ii) that he was independent, (iii) that his appointment had followed NEAC's decision, (iv) that he was appointed in relation to the "difference of opinion" on the geology (being the question of whether the site is granite or not) and (v) that the further studies on the point took place before clearance was granted on 5 April 2002.
19. In fact, as below: (i) Cornec and Moore were the appointed independent persons, (ii) Dr Merritt was instructed by AMEC/BECOL (he is certainly not "independent"), (iii) Dr Merritt undertook his overflight survey<sup>4</sup> before NEAC reached its decision (not pursuant to it and not with a view to resolving the "difference of opinion" which emerged at its meetings), (iv)

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<sup>4</sup>i.e. a visual survey undertaken by flying over the site

Dr Merritt's survey considered whether the reservoir would leak and not the difference of opinion on granite, and (v) no further studies on that granite question took place before clearance was granted.

20. The relevant report, which should have been disclosed to the Board, was the Cornec report. The Respondents have yet to explain why they disclosed the wrong report.
21. As it happens, Rowe P (to whom the Board referred as above) did indeed explain the decision to appoint a fresh independent expert but he did not say that the expert was Dr Merritt. But it is easy to appreciate how the Respondents' evidence the Board reached its misunderstanding. For example:
  - (1) On 30 April 2002, James Code had sworn an affidavit for BECOL stating that Dr Merritt had been appointed "Subsequent to the decision of the NEAC" [Bundle 7A page 390 para 10]. In his affidavit of 28 May 2003 (for the Court of Appeal injunction hearing) Mr Code restated the point [Bundle 5 page 197 para 9]. But, importantly in terms of the Board's understanding, Dr Merritt had in fact been appointed by AMEC (for BECOL) and undertaken his fly-over survey on 2 October 2001; i.e. before NEAC had reached its conclusion [Bundle 13 Tab 3, 31 January 2002 report].
  - (2) Mr Code's 28 May 2003 affidavit also referred to Dr Merritt's work (describing him as "world renowned") when responding to the Petitioner's contentions "over the issue of granite vs sandstone" thus blurring the issues of leakage (which Dr Merritt was concerned with) with the separate issue over granite [Bundle 5 page 199 para 13].

#### The Cornec report

22. The Cornec report shows:
  - (1) That, on the "difference of opinion", the site is not granite;
  - (2) That the evidence of the Respondents in these proceedings is difficult to reconcile with the Cornec report: that evidence does not refer to the Cornec report, does not explain why the report should be disregarded and is often at variance with the conclusions of that report; and

- (3) That many of critical unresolved matters left for later consideration remain unresolved or have been resolved in a way contradictory to the report of the EIA.
23. Annex 1 sets out a chronology of the evidence and reports.
24. The Petitioners detailed criticisms are set out in Annex 2 below.
25. The Respondents' new evidence
26. The Respondent contends (Supplementary Case para 29) that the new evidence it has now submitted for the Board "demonstrate[s] that the initial decisions reached by NEAC and the DOE were correct". It plainly does no such thing.
27. Rather, it demonstrates (particularly against the backdrop of the Cornec report extracts) that significant issues which were left unresolved by NEAC/DOE have been resolved in way contrary to the understanding of NEAC/DOE and/or are still unresolved. If anything, as above, the Cornec report shows that BACONGO's witnesses on geology, including Mr Holland and Mr Goodman, have been correct in their assessments and concerns.
28. As the Board's judgment of 11 August 2003 stated (para 40):
- "... Mr Clayton submitted that the respondents' assertions about loss should be treated with circumspection, and their Lordships are prepared to assume that they may have put their case too high."
- A similar approach should be taken to the Respondents' new material.
29. That material does not amount to the assessments which NEAC understood would be undertaken. See thus the minutes of its meeting of 9 November 2001, at which it made its decision [B7A page 264 para 1.02]:
- "[The NEAC Member from the GPD] added that at the teleconference held earlier that day, it had been decided by the Chairman of NEAC, BECOL representatives, and himself that an independent geologist would be hired to assess the rock formation."
30. The Cornec report is new evidence in these proceedings because the Respondents have declined to disclose it earlier. The position is therefore different from the new evidence from the Petitioners which shows that the issues were deferred for consideration after the project was approved were in fact significant environmental issues. The difficulty the Petitioners have experienced throughout these proceedings is demonstrated by the failure to disclose the Cornec report; and in those circumstances your Petitioners

would respectfully ask for leave to refer to all of the evidence that has come into existence since the hearing before the Court of Appeal in Belize.

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2 December 2003

## **ANNEX 1: CHRONOLOGY OF GEOLOGY ASSESSMENTS AND EVIDENCE**

- 1999 Swissboring report: Geology study referred to in EIA report Part 2 but not actually included with the EIA report and not made publicly available.
- 24 Aug 2001 EIA report submitted by BECOL to DOE
- 11 Oct 2001 Merritt report to AMEC (BECOL's consultants) – copy not provided to Petitioners until 19 Nov 2003 [Bundle 13 Tab 2]
- 7 Nov 2001 Young letter responding to NEAC questions [Bundle 7A page 53]. States that the dam site is composed "almost entirely of granitic intrusives"; that there were "*no geologic faults encountered during the drilling and mapping program which would prevent dam construction.*" (emphasis in the original)
- 9 Nov 2001 NEAC votes to grant "environmental clearance"
- 9 Jan 2002 Aziz study [Bundle 7A Tab 3]
- 5 April 2002 ECP signed; DOE gives approval for Chalillo dam project
- 30 April 2002 Lynn Young affidavit (for BECOL) for the Supreme Court – no mention of the Cornec studies report [B7A page 282]
- 30 April 2002 James Code affidavit (for BECOL) for the Supreme Court – no mention of the Cornec studies or analyses of rock type which contradict those of the University of Costa Rica affidavit (now discredited by Cornec) [B7A page 389]
- 3 May 2002 Cornec report
- 28 May 2003 James Code affidavit for BECOL for the Court of Appeal – no mention of the Cornec report [B7A page 195]
- 18 July 2002 Ismael Fabro affidavit for the DOE – corrects other document errors in relation to the material before the court but makes no mention of Cornec
- 30 May 2003 BACONGO asked the DOE for post ECP assessments including the Cornec report [Bundle 5 page 92 para 3]
- 3 June 2003 Lynn Young affidavit for BECOL for the Court of Appeal – no mention of the Cornec report [Bundle 5 page 204]
- 10 June 2003 DOE response is "uninformative" [Bundle 6 page 435]

13 June 2003 Lynn Young affidavit for BECOL for the Court of Appeal – no mention of the Cornec report [Bundle 5 page 260]

20 June 2003 James Code affidavit for BECOL for the Court of Appeal – no mention of the Cornec report [Bundle 5 page 270]

30 July 2003 Board Hearing. Board considers Aziz report [Bundle 13 Tab 3] which mentions the Merritt survey. Merritt survey not provided.

11 Aug 2003 Board judgment – places reliance on Aziz/Meritt

6 Nov 2003 Petitioners again request undisclosed studies including the Cornec report [Bundle 13 Tab 1 para 4]

7 Nov 2003 Solicitors for both Respondents reject contention that the information is required to be in the public domain [Bundle 13 Tab 2]

19 Nov 2003 Full copy of Aziz report [Bundle 13 tab 3] and (for the first time) the Merritt report of 11 Oct 2001 [Bundle 13 Tab 2] provided

28 Nov 2003 DOE provided the Petitioner with a copy of part of the Cornec report

1 Dec 2003 DOE provided “Core Labs” analysis of rock samples

2 Dec 2003 DOE provided [awaited, as at 14.30]

## **ANNEX 2: IMPLICATIONS OF THE CORNEC REPORT ON THE RESPONDENTS' EVIDENCE**

### **Introduction**

31. The independent Cornec report of 3 May 2002, was prepared in the light of NEAC's concerns that further studies be undertaken and pursuant to the ECP; thus, after approval of the MRUSF, but before the hearing of the judicial review before Conteh J.
32. The DOE has confirmed that the Cornec report was the "additional geological assessment" which the ECP required to be completed within 3 months of its signing (Bundle 7A page 449 paras 6.51-6.51.4)
33. The Cornec report is based on field studies undertaken between 24-29 April 2002. As above, the report was only provided to the Petitioner on 28<sup>th</sup> November 2003. It casts a new light on some of the Respondents' evidence in this litigation. As explained below, it confirms the correctness of the Petitioners' contentions on various critical issues related to the geological information about the proposed dam site:
  - (1) the mis-characterization of the dam site geology,
  - (2) the relevance of unresolved matters to dam design questions,
  - (3) the unresolved question of potential significant water leakage from the reservoir, and
  - (4) the existence of significant seismic faulting at or near the dam site.
34. The report identified these as areas of continued concern, and recommended further work in each of these areas to provide a detailed investigation of the potential for leakage from the reservoir, and to conduct research of the seismic history of the area so that "the close proximity to a major fault" is taken into account in the dam design. The report also recommended that the design take into account the re-mapping, and weak geological features identified in the proposed foundation.

## **Mis-characterization of dam site geology and weakness of foundations**

### Granite or sandstone/shale?

35. As explained in the Petitioner's Statement of Case (paras 84ff), members of NEAC were uneasy about the EIA's description of the rock at the MRUSF as granite.

36. This question was critical to suitability of the site and the design of the MRUSF for a number of reasons, one of which was recognised by the EIA report itself when it stated (Part 2 Volume II, section 2.5.2.2 (page 10)):

"The granite is high strength, but the sediments are weaker so the powerhouse should be founded on granite." [underlining added]

37. Accordingly, NEAC had requested clarification on the point from BECOL in its letter of 25 October 2001 [Bundle 7A page 52 para 4]:

"Provide detailed information of rock type(s) in location where dam and other structures will be constructed. The EIA states that granite and sedimentary rock are present in the area."

38. In response, Lynn Young of BECOL had written, in his letter of 7 November 2001 that [Bundle 7A page 46 5<sup>th</sup> para]:

"At the dam site area, the outcrops forming the floor of the river valley consist almost entirely of granitic intrusives... Please refer to the geologic section attached."

The attached geological section labelled most of the dam site "G" for granite [Bundle 7A page 58].

39. In evidence for the judicial review, in his 30 April 2002 affidavit, Mr Young, Director of BECOL stated that [Bundle 7A page 285 para 8]:

"It was my understanding that the NEAC was satisfied with the additional information presented to it by BECOL in response to the request from the Department of Environment made in the letter of October 25th. There were no other requests for information."

It is noteworthy that Mr Young:

- (1) Fails to refer to then impending Cornec report; and
- (2) Failed to correct or qualify his evidence at any later stage.

40. In fact, the whole NEAC process left unresolved the issue of geology which, in the end, was left to be resolved by post-approval assessments pursuant to the ECP [Bundle 7A page 449 para 6.51-6.51.4].

41. In his 30 April 2002 affidavit for BECOL, James Code sought to blur the issue thus [Bundle 7A page 390 para 7]:

“Some differences in opinion have arisen as to the classification of the rock in the area on which the dam is intended to be built. While the report refers to the rock as granite, some believe the rock to be sandstone. The mineralogical composition of much of the rock around Chalillo is similar to granite.”

It is noteworthy that Mr Code:

- (1) Failed to refer to impending Cornec report;
- (2) Failed to correct his evidence at any later stage.

42. 3 days after Mr Code swore his evidence, the Cornec report, while recognising that the general area in which dam was to be built included granite intrusions [Bundle 15 page ??] and that pebbles of granite were occasionally to be found in the sedimentary rock at the site [Bundle 15 page ??] stated very clearly that:

“There is no evidence of any granitic intrusion or metamorphism at Chalillo. The closest granite outcrops in the area are located approximately 1 km to the North West.”

43. That was the clearest possible contradiction of the assessment previously provided in the EIA report and by BECOL in response to direct questions from NEAC.

44. In his affidavit of 28 May 2003 (for the Court of Appeal), Mr Code repeated verbatim much of his earlier evidence, but without mentioning the Cornec report [Bundle 7A page 196 para 9]. His failure to do so is difficult to understand.

45. Mr Code also referred (in his 30 April 2002 affidavit) to the results of a laboratory analysis by the University of Costa Rica of samples from the site [Bundle 7A page 391 para. 13]:

“The samples of the dam foundation rock referred to in Paragraph 14 of BH’s [Brian Holland’s] affidavit were sent during the feasibility study to the University of Costa Rica and were identified by the analyst as granite.”

But he made no mention of the subsequent Core Labs, Houston and University of West Indies lab analyses conducted in January 2002, which contradicted the University of Costa Rica findings and which (as explained below) Cornec said were correct.

46. Lynn Young's affidavit, also of 30 April 2002, did refer to these other analyses but stated that the analyses said that the samples [Bundle 7A page 286 para 13]:

"while sedimentary, were derived from granite, and their composition and properties are very similar to that of granite."

Mr Young's affidavit is surprising because:

- (1) The EIA proceeded on the basis that the rock was granite;
  - (2) He failed to mention the fundamental difference of views arising from the different lab analyses and the Cornec report's assessment of the point.
47. In any event, the Petitioners were not provided with copies of any of the 3 sets of analyses in question until a copy of the Core Labs report was provided by Counsel for the DOE on 1<sup>st</sup> December 2003. The other two reports have still not been provided.
48. That might not have mattered if the Petitioners had been provided with the Cornec report because that report states [Bundle 15 page ??]:
- "Conclusions by UWI and [Houston] Core Labs concur perfectly with field observations that the rocks are strongly lithified, (shaley) arkosic sandstones and conglomerates. [University of Costa Rica] findings are mistaking sediments for intrusive rocks."
49. That clearly puts a very different complexion on the assessment of the dam geology and the 3 sets of analyses.
50. The description in the EIA report of the site as being "granite" was not limited to a simple overall textual description. The extent and distribution across the site of the claimed granite was also given through geological maps within the EIA report (see, for example EIA Vol 1, fig 2-2). That distribution was plainly key to deciding on the overall suitability of the site, on the overall choice of dam type, and also the layout of the site including for example) on the question of where the power house should be located (see above).

51. At the time of writing, the Petitioner has not yet received the maps produced by Cornec. However, it is plain from the extract of the text that they are likely to differ markedly from those in the EIA report.
52. Nonetheless, James Code's 28 May 2003 affidavit for BECOL (for the Court of Appeal) Code simply reproduced [Bundle 5 page 196 para 9] text from his 30 April 2002 affidavit, which stated at its paragraph 25 [Bundle page 198 quoted para 25]:
- "The geological map provided for the project covers an area that is normal for a dam site of Chalillo scale. AMEC stands by the correctness of the mapping." [underlining added]
53. At paragraph 13, Mr Code then stated that the AMEC mapping:
- "was done in proper detail, and despite the disagreement over the issues of granite vs. sandstone, correctly provides all necessary information for basic dam design." [emphasis added]
54. At paragraph 21, Mr Code stated that:
- "Based on a review of the Geotechnical engineering, including field work and design and a review of the work of Messrs. Afiq, Aziz and Dr. Merritt, it is my professional view that all aspects of the dam investigation and design have been fully addressed in accordance with international engineering practice, and that the site is suitable for the construction of the proposed dam."
55. It is unfortunate that, Mr Code chose not to comment on the Cornec report.

### **Description of rock cores**

56. The Cornec report also undermines the EIA report's detailed mapping of the rock strength, which had been based on rock core samples drilled at the site.
57. These rock cores were viewed Brian Holland who concluded on 12 November 2001 that the EIA's description of the rock cores was mistaken (see Petitioners' statement of case paras 91). He was then dismissed by BECOL.
58. Cornec also reviewed those rock cores. Several points arose:
59. Firstly, Cornec questioned whether certain measurements of rock strength reported in the EIA were actually even based on the core samples from the site (as had been claimed by the EIA):

"There are several discrepancies regarding the depth of samples taken for UCS [strength] tests. Two samples were taken at depths where the core boxes do not show any missing samples...Three additional sample intervals are questionable..."

60. Secondly, the EIA had stated (EIA Part 2 Volume II, section 2.5.2.2 (page 10)) that:

"Bedrock at and below the valley floor is primarily granite. In CH-1, of 45m depth all but a total of 1m of rock was in granite..."

Similarly the other cores are described by the EIA report as primarily granite.

61. By contrast, the Cornec report says [Bundle 15 page ??]:

"One day was spent re-describing the cores stored at the Belize Electricity Ltd (BEL) compound in Ladyville. The cores are made of the same arkosic sandstones, conglomerates, siltstones and shales as seen on the surface."

### **Implications of the Cornec report for the design of the dam**

62. NEAC recognised that the design of the dam would need to take into account the geological information. Thus, for example, its minutes record that [Bundle 7A page 254 para 3.11]:

"A member reported that the information on geology and geotechnics was not sufficient. He informed the Committee that taking into consideration the different rock types located at the project area [which he considered not to be granite], an arch dam design would probably be better than the design being proposed. ..."

63. The Respondents have throughout sought to minimise the significance of resolving "differences of opinion" about the geology by asserting that the classification of the underlying rock would make no difference to the design of the dam.

64. Thus, in para. 141 of its arguments before the Supreme Court BECOL relied on the Code and Gilbert-Greene affidavits to say that the dam design would not be altered as a result of a difference in classification of the foundation of the dam, thus [Bundle 7D page 1289]:

"... Paragraphs 13, 14, 16, 17 of James Codes affidavit, [and] paragraph[s] 7,8,9 of JG [Jeremy Gilbert-Greene] establish two things. Firstly that the integrity of the site to sustain a dam is unrelated to the nomenclature of the rock type and that in fact the DAM design will not change based on a different classification of the rock. The conclusions drawn from the geological information in the

EIA as to the suitability of the rock type are not flawed nor are they misleading since, as attested by the two engineers the integrity of the site is not dependent on the name of the rock but on special laboratory testing of the samples." [underlining added]

Gilbert-Greene's 18 April 2002 affidavit had indeed stated [Bundle 7A page 395 para 8] that:

"The design will not change based on the final classification of the rock."

65. However, the Cornec report made clear that design would have take into account its findings of weak rock thus [Bundle 15 page ??]:

"The average shale content as seen in cores CH-1 to CH-7 is 6.3%. The shales generally represent narrow seams and layers interbedded within the sandstone and conglomerate units. However, there are two notable exceptions...This graphitic material represents very weak rocks that could possibly act as slippage planes and should be taken into account in the dam design." [emphasis added].

### **Potential leakage from the reservoir**

66. The EIA said that the site would not leak but recommended that further studies be undertaken before final project design:

"From the reconnaissance surveys which were made and knowledge of the rock formations involved it is concluded that, while some water movement out of the reservoir via solution cavities may happen, it will be relatively minor in volume and not affect the viability of the project." [EIA Part 1 Section 2.5.4]

and:

"Although investigations up to now indicate that this is not a major concern, given the nature of geological formations in the area and the possibility that geological contacts may be inaccurate in some instances, additional investigations are warranted that are in line with the conventional approach with regard to geotechnical matters on hydro power projects." [EIA part 1 page 236]

67. The Cornec report of 3 May 2003 said [Bundle 15 page ??]:

"Any Cretaceous-age carbonate that outcrops below the future 400 meters elevation water line will most likely make the reservoir leak like a sieve into adjacent watersheds to the south, such as the Mengel Creek (dry). In view of the disastrous history of dam building within the same karstified Cretaceous limestones of neighboring Guatemala, a very detailed geographic and topographic

survey of the contact on the left bank of the Macal River is critical for the success of Chalillo." [emphasis added]

68. In his affidavit of 3 days before, 30 April 2002, James Code explained to the court that [Bundle 7A page 390 para 10]:

"Dr Merritt indicated [on the basis of his "fly over" survey of 11 October 2001] that, while the area appeared impermeable, further ground surveys were recommended in a limited area. A geologist, Zulfiquar Aziz, was hired and further ground surveys carried out between January 9 and 18<sup>th</sup> 2002, to confirm Dr Merritt's findings. The conclusion was that the reservoir is watertight and that the rocks that occupy the reservoir slopes are mostly shales/slates and quartzitic sandstones. The geologist confirmed this conclusion in a written report."

69. Mr Aziz' report for BECOL of 31 January 2002 (i.e. after NEAC had made its recommendation), which was first made available to BACONGO in the proceedings before the Board in July 2003, had indeed concluded unequivocally that the site would not leak [Bundle 13 Tab 3 page 6 last para of section 6]. But its conclusions were plainly thrown into considerable doubt by the independent Cornec report.
70. In his affidavit for the Court of Appeal of 28 May 2003, Mr Code again sought to assuage any concerns that the assessments which informed the decision to approve the project were insufficient for the purpose of approving the project. He again pointed to the Merritt and Aziz studies and said [Bundle 5 page 200 para 17]:
- "In summary, both investigations confirmed the suitability of the area for a hydroelectric reservoir."
71. It is surprising that Mr Code chose not to refer to the Cornec report (which came after the Merritt and Aziz reports) or to explain his reasoning for ignoring it.
72. As it happens, on 1 December 2003 the Respondents provided the Petitioners with further documents which, for the first time, show that BECOL has (in August – October 2003) undertaken further studies but it is far from clear whether they provide the degree of confidence and detail sought by Cornec. They are certainly not the "independent" assessments which NEAC had understood would take place [B7A page 264 para 1.02]
73. In any event, such matters should plainly have been part of the EIA, and its report, and subject to public consultation (whether with expert geologists or otherwise) or considered by NEAC or the DOE: As the Cornec

report indicates, they go to the very principle of whether the reservoir will work. They thus go to the question of whether the claimed need for electricity capacity could even be met by the dam; and the consequential question of whether that claimed benefit justifies the environmental harm involved.

### **Seismic faulting at or near the dam site**

74. Evidence of significant faulting in the rocks at or near the dam site was of key concern to NEAC members in their context of their concerns about the seismic activity in the area [B7A page 254 paras 3.12; B7A page 259 para 2.18]. NEAC raised the issue in its request for further information from BECOL [B7A page 52 para 4].

75. BECOL's 7 November 2001 response [B7A page 53] stated without reservation or qualification that:

"There were no geologic faults encountered during the drilling and mapping program which would prevent dam construction."

76. Nonetheless, the ECP required that there be further geotechnical assessments at the site [B7A page 449 para 6.51-6.51.4]. As is now clear, those assessments were to be undertaken by Cornec.

77. In paragraphs 16 and 17 of his 30 April 2002 affidavit [Bundle 7A page 391], which he reproduced in paragraph 9 of his 28 May 2003 affidavit for the Court of Appeal [Bundle 5 page 196], Mr Code said:

"... There are not any significant faults at the dam site. It is normal for bedrock to have fractures, and the frequency of occurrence of these is recorded in the borehole logs. The spacing of the fracturing is moderate and will not be a problem.

The area of the river, both up and downstream of the dam site has been inspected by competent geologists with extensive hydroelectric experience, and while normal rock jointing is evident, there is no indication of faults that would cause problems for the proposed structure. In particular, there are no features that would indicate a significant fault at the location just downstream of the dam site and noted by Bateson and Hall in their 1977 report as a fault."

78. But he made no mention of the Cornec report of 3 May 2002 which identifies precisely such a fault when it states [Bundle 15 page ??]:

"A major fault exists some 550 m west of the left abutment of the proposed Chalillo dam...This fault zone merges with the Cooma-Cairn fault lineament that runs N35°E for a distance of at least 25

kilometres, creating the most striking geological feature visible from space satellite for the entire country of Belize...

The major fault zone observed in the Macal river bed appears on the original map of the IGS Overseas Memoir No.3, 1977 by Bateson & Hall. However, this fault is absent on the Geological map produced by AMEC/AGA CI Power: "Partial reproduction of map accompanying IGS Overseas Memoir No.3, 1977, Modified by Agra CI Power" (Vol.1 of 4, Fig 2.1, 2001). The rationale for the removal is unknown as this fault outcrops spectacularly in the Macal river bed and left bank."

79. The Cornec report concludes that:

"The presence of a major fault zone in the vicinity must be taken into account" [Bundle 15 page ??].

80. It is unfortunate that Mr Code did not mention the Cornec report. What was done in the Cornec assessment should have been undertaken as part of the assessments leading to the EIA; and been publicly reported at the time as well as being taken into account by NEAC and the DOE before approval was granted. It should have been made public at the time. And it is surprising that, despite the Cornec recommendation that more studies were needed, none have been undertaken.

81. Furthermore, as noted above, the Cornec report recognises that the report of the ES has deleted the Cairns Fault (as does Mr Holland). The fact, relied on by Jeremy Gilbert-Greene for the BECOL [Bundle 15, Tab Bundle 15 page ??] that some of the maps in the EIA report showed the fault is no answer because both Mr Holland and now Cornec recognise that importance of the document which would be evaluated by an expert geologist (i.e. the feasibility study which considered the key question of whether the project proceeded at all) was materially wrong and misleading. In particular, that document had been altered by removing the fault from the key map. Compare thus Bundle 10 pages 67 (which reproduces the Bateson 1977 survey and shows a major fault running SW-NE just west of the dam site) with Bundle 10 page 66 (which is from the EIA report and which purports to reproduce the same survey but, without explanation, removes the fault in question). No explanation has yet been given for this alteration.

### **Role of laboratory analyses in the dam design**

82. In his 28 May 2003 affidavit, Mr Code had tried to downplay the question of rock type identification by stating that the design of the dam was based

on the findings of laboratory analyses, and not classification of the rock, thus [Bundle 5 page 198 para 10]:

“It is important to appreciate that dam design is based on the results of the laboratory analyses of the rock referred to in the paragraphs above, which analyses speak to properties of the rock samples at the site such as strength, impermeability, fracture frequency and depth of surface weathering. These properties are the relevant factors in considering whether the relevant rock type, irrespective of its nomenclature, is or is not suitable for the construction of a dam. They are also factors which influence, dam design.”

83. The only “laboratory analyses” to which his statement (and his earlier affidavit of 30 April 2002 [Bundle 7A page 392 para 21] referred were an assessment by the “Laboratory of Soils and Pavement, Guatemala” (which has never been provided to the petitioner) and the University of Costa Rica analysis which (as explained above) has now been discredited by the Cornec report.

### **Finally**

84. Annexe II of BECOL’s Case Summary states that:

“2.9 At the time of the decision the available information was that the site was competent to hold the dam and that the reservoir was not permeable. The members had also addressed the issue of seismic activity and had raised the issue with BECOL.”

85. Further at para. 3.2-3.4:

“3.2 At a meeting on 7<sup>th</sup> February 2002 between the Geology and Petroleum Office and James Code it was agreed that further mapping of the site would take place [Code para 8 p. 390].

3.3 Additional studies of the rock samples from the dam site confirmed that the rock type was suitable to hold a dam [Code para 11 p. 391].

3.4 Thus by the time of the decision to give clearance to the project, the DOE had all necessary information as to whether the site could properly hold the dam. Nonetheless, the ECP also includes measures for further mapping to be carried out and for the detailed designs to be submitted to the DOE for approval before works are carried out [paragraph 6.49-6.55 pp 450]. The water level is fixed at a maximum of 400 meters above sea level.”

86. The conclusion that "DOE had all necessary information a[s] to whether the site could properly hold the dam," must clearly now be reconsidered in light of the Cornec report.

