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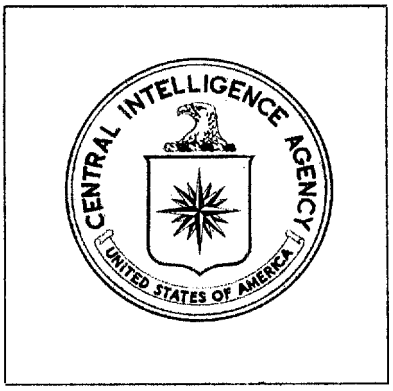

Power Politics in the Rio de la Plata Basin

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BGI RP 74-17
May 1974

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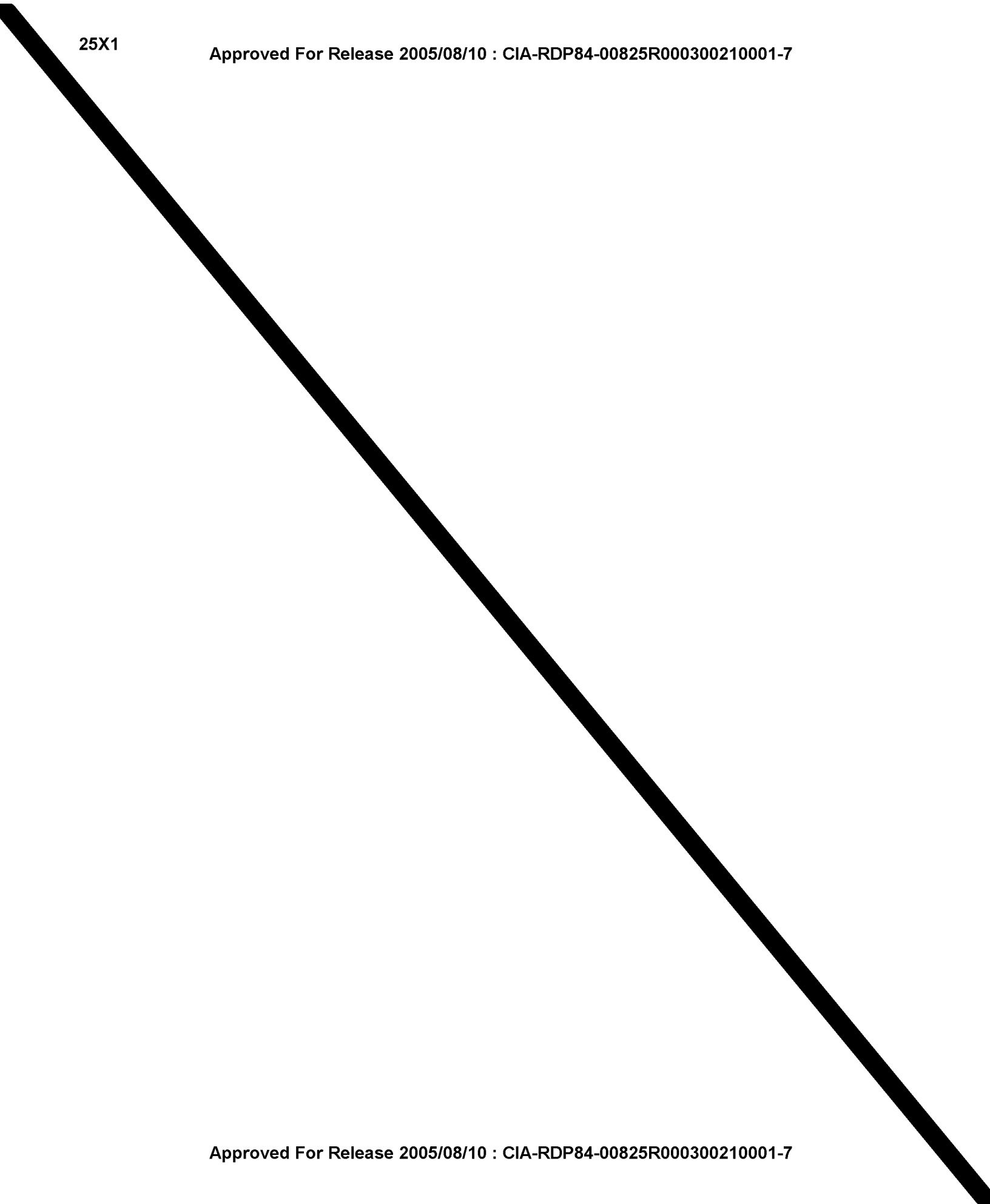

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Map A

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Summary

A dispute smoldering between Argentina and Brazil over construction of the giant Itaipu hydroelectric plant may surface again at the Sixth Conference of the Foreign Ministers of the Plata Basin Countries to be held at Buenos Aires on 10 June 1974. Argentina claims that the Itaipu plant, a joint Brazilian-Paraguayan project designed to have the largest installed generating capacity in the world, will preclude optimum development of the hydroelectric potential downstream along the Argentine section of the Parana River.

The controversy is rooted in conflicting economic and political interests of the two traditional rivals, although the arguments are couched in terms of international law and environmental impact. Argentina contends that Brazil and Paraguay are obligated to consult with her before completing their plans for the dam since, she claims, its construction will adversely affect her use of the river downstream. She maintains that the Itaipu facility will reduce the hydraulic head available, destroying the economic feasibility of a proposed joint Argentine-Paraguayan hydroelectric plant at Corpus, and asks that the Itaipu design be modified.

Argentina has gained support for her position at international conferences, and the United Nations Economic and Social Council has passed an Argentine-proposed resolution calling for consultations among neighboring countries before any party exploits "common resources." Her four sister Plata Basin countries did not, however, support this resolution. Brazil can still point to the "Declaration of Asuncion," unanimously adopted at the Fourth Conference of the Foreign Ministers of the Plata Basin Countries, which states that "in the case of international rivers with successive courses and on which there is no joint sovereignty, each state may exploit the water in accordance with its needs and provided it causes no important damage to another state in the basin."

The Argentine claims of adverse environmental impact appear largely unfounded; even if they were sound, they would unquestionably apply with equal force to her own proposed hydroelectric projects. On the other hand, her position is valid that the Parana River can be developed more rationally through joint planning, with a greater accrual of economic benefits to the region as a whole. It also appears that the design modifications Argentina requests at Itaipu are technically feasible, although they would reduce the generating capacity by about 15 percent.

Brazil and Paraguay are unlikely to accept Argentina's view on prior consultation and include her in the Itaipu decision-making process. The prospects are for a continuation of planning and subsequent construction on a binational basis, but perhaps with some *ad hoc* agreement tying modifications in Itaipu design to allocation of Corpus electricity to the Itaipu system to compensate for the loss in Itaipu generating capacity. If a compromise agreement is not reached, Argentina and Paraguay may choose another -- but less desirable -- damsite in place of Corpus for their joint hydroelectric project. Garupa, about 65 kilometers downstream, has been mentioned in the press as a possible alternative.

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Central Intelligence Agency
Directorate of Intelligence
May 1974

POWER POLITICS

IN THE RIO DE LA PLATA BASIN

1. The traditional rivalry between Argentina and Brazil has again surfaced in a bitter dispute over plans for the joint Brazilian-Paraguayan Itaipu hydroelectric plant on the Parana River (Rio Parana), designed to have the largest installed capacity in the world. Argentina claims that the Itaipu facility, planned without prior consultation with her, will preclude optimum development of the hydroelectric potential further downstream and will have adverse effects on the environment. She has raised the issue of her rights to prior consultation in the United Nations and other international forums. Although the arguments are couched in terms of legal principles and environmental impact, the real controversy is rooted in conflicting economic and political interests.

2. Itaipu is one of several joint hydroelectric projects being undertaken in the Plata Basin under binational agreements. Although permissible under the Treaty of the Rio de la Plata Basin (1969), these binational agreements tend to frustrate the stated goal of the treaty to facilitate integrated economic development of the Basin -- including development of its enormous hydroelectric potential.

Note -- This memorandum was prepared by the Office of Basic and Geographic Intelligence and coordinated within the Directorate of Intelligence. Comments and questions may be directed to [redacted]

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Key Economic Region

3. The Rio de la Plata Basin of southern South America includes a high proportion of the continent's industrial capacity and prime agricultural land, along with its two largest urban areas (Map A). The economic activities within the Basin account for more than half of the aggregate income of the South American nations.

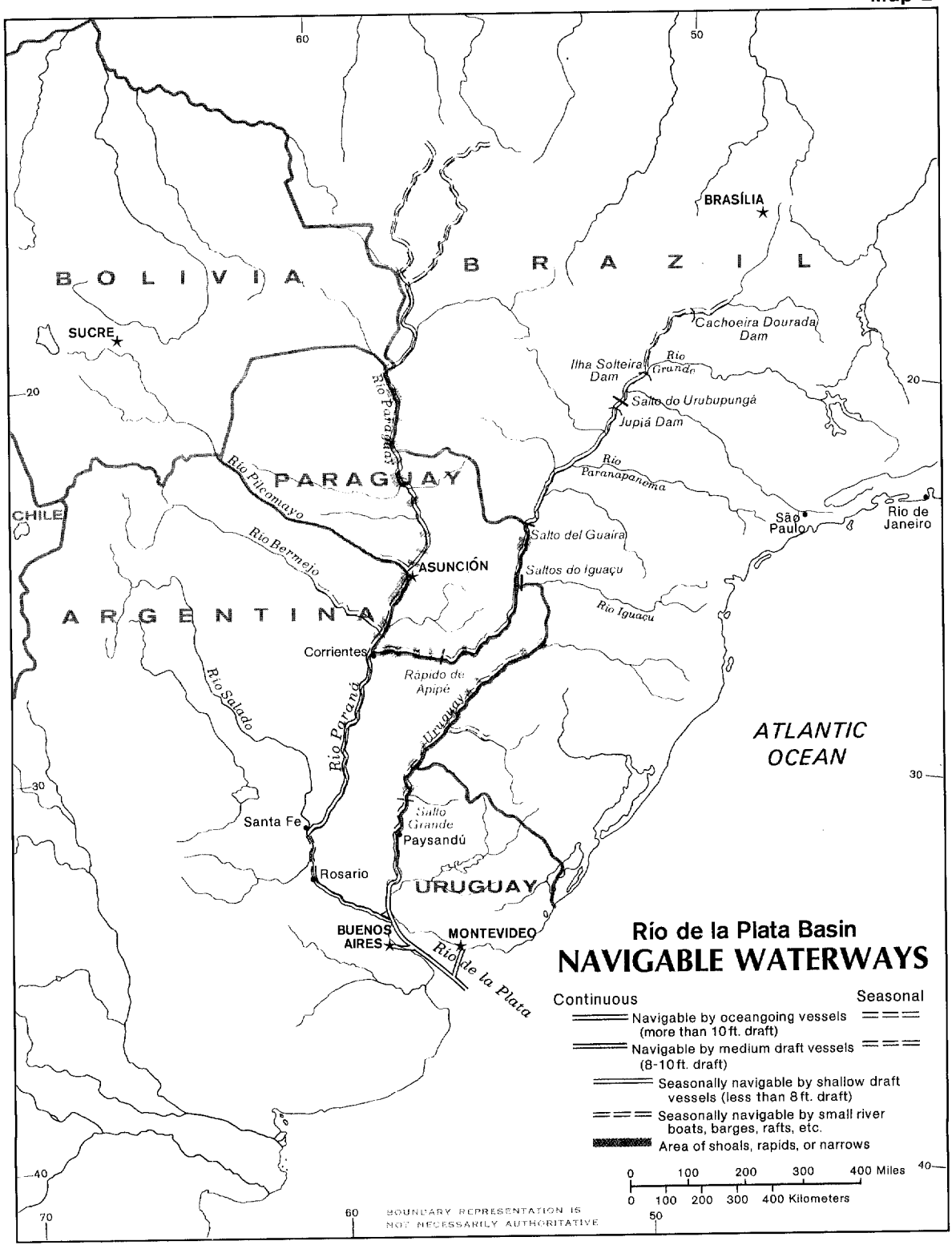
4. The Basin covers one-sixth of the continent, encompassing all of Paraguay and large parts of Argentina, Brazil, Uruguay, and Bolivia; and its rivers link the five nations. Navigation is now limited by natural obstacles and seasonal fluctuations in water level, but when further developed, the river network will provide an important communications system, fostering both intraregional and interregional trade (Map B).

5. The population of the Basin is concentrated on its eastern and southern fringes, with the densest zones of settlement centering on Sao Paulo and Buenos Aires--the largest metropolitan areas. Together with Montevideo, these cities account for 30 percent of the Basin's total population. The sparsely settled areas, in general, lie west of the Parana River, particularly in the Chaco of Argentina, Paraguay, and Bolivia, and in the Brazilian state of Mato Grosso.

6. The natural resource base is broad but not well diversified. Although a relatively small percentage of the arable land is presently under cultivation, agriculture is a significant part of the economy, with coffee, corn, cotton, rice, soybeans, sugar, and wheat all in important roles. Forestry is a major income earner in Brazil and Paraguay and has a good potential for further development.

7. Industry in the Basin is presently highly concentrated in the state of Sao Paulo, Brazil, and in the province of Buenos Aires, Argentina. The industrial base is large and relatively sophisticated, ranging from steel and chemicals to a wide variety of finished consumer goods. Mineral and fuel resources are of more than passing significance but are unevenly distributed within the Basin. Brazil has

Map B



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substantial deposits of iron ore, manganese, and bauxite; and Bolivia possesses significant petroleum, natural gas, and iron ore reserves. Bolivia's petroleum is exported to both Paraguay and Argentina, and a natural gas pipeline to Argentina has been in operation since early 1972. An agreement is being worked out with Brazil to exchange natural gas for assistance in developing an industrial complex in southeastern Bolivia.

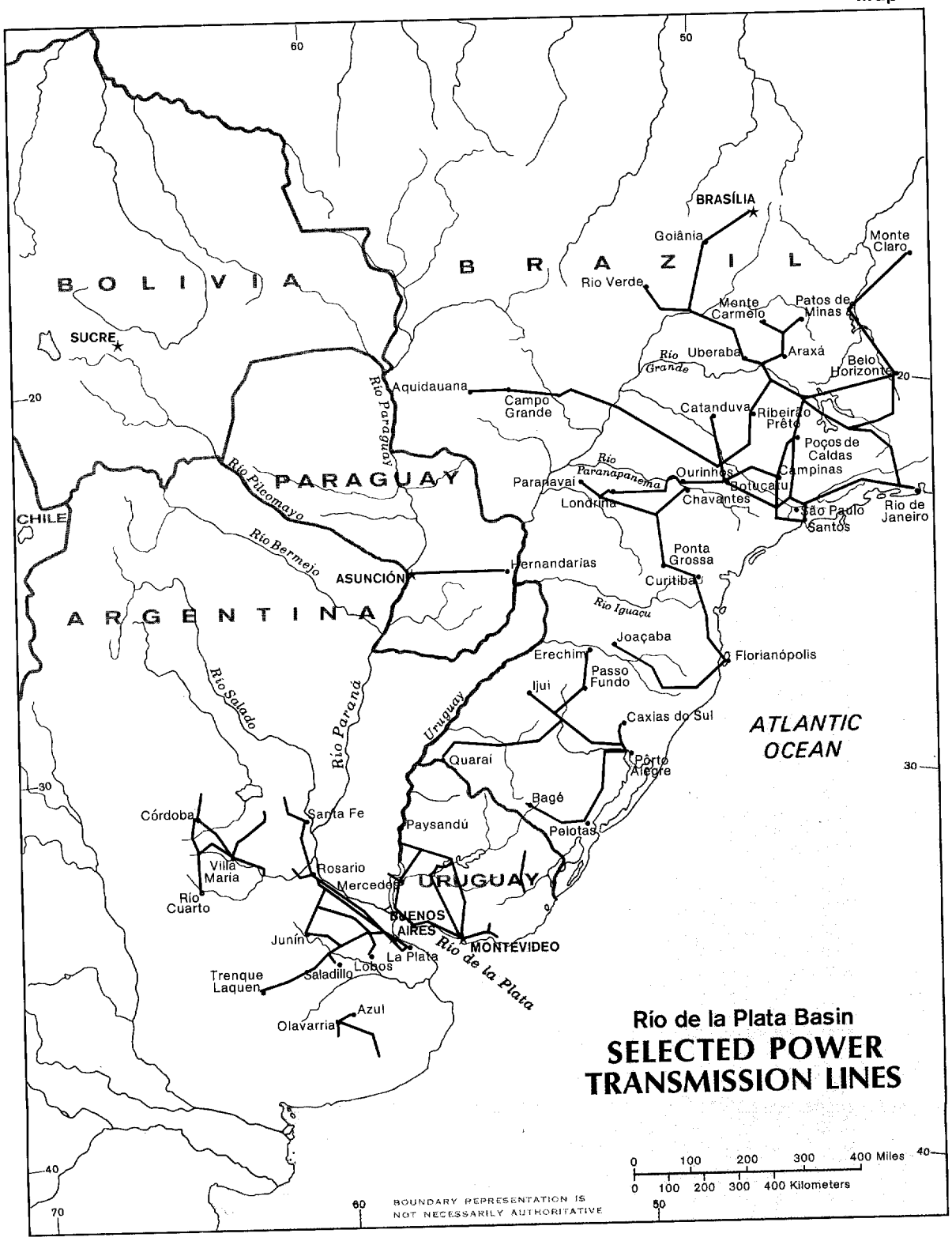
8. One of the most important assets of the Plata Basin is its great potential for hydroelectric power in an otherwise energy-poor region. Proximity of the Basin's hydroelectric resources to the heavily populated industrial areas on its eastern fringes is a major factor in their development (Maps C and D). For at least the next decade water power will play the key role in the development of energy in the Basin.

The Treaty of the Rio de la Plata Basin

9. The need for intraregional cooperation and development of the Rio de la Plata Basin has long been recognized. As early as 1898, at the Inter-American Conference in Mexico City, plans for utilization of the region's natural resources were being formulated. In 1941, representatives of the five Basin countries met in Montevideo to hammer out joint resolutions and to plan regional projects, but few of these efforts led to concrete results. Not until 1966 did the possibility of serious efforts towards cooperation for regional development begin to look promising, when the foreign ministers of the Plata Basin Countries met in Buenos Aires and agreed to establish an Intergovernmental Coordinating Committee. The Committee was set in permanent session in Buenos Aires under the chairmanship of the Argentine foreign minister and with the participation of the ambassadors of the other member states.

10. Five conferences of the foreign ministers of the Plata Basin Countries have been held since establishment of the Intergovernmental Coordinating Committee. At the third and most fruitful, in Brasilia in April 1969, the foreign ministers signed the Treaty of the Rio de la Plata Basin and continued the work of the previous two meetings in reviewing the efforts of the Intergovernmental Coordinating Committee and presenting new proposals for its action.

Map D



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11. The Treaty of the Rio de la Plata Basin, which entered into force 14 August 1970, calls for cooperation and integrated regional development among its signatories -- Argentina, Bolivia, Brazil, Paraguay, and Uruguay. (See Appendix 1 for a summary of the treaty articles.) The Act of Brasilia, drawn up after the signing of the treaty, lays out guidelines for future work of the Intergovernmental Coordinating Committee and establishes principles to safeguard national interests.

12. One of the main objectives of the Basin Treaty is to increase regional commerce through the improvement of transportation and communications facilities and the provision of economical sources of energy, adequate markets, and production centers. Its focus is on the creation of an economic infrastructure sufficiently strong to permit a greatly expanded flow of goods.

13. The treaty has, to some degree, facilitated economic coordination efforts that previously were handled only by ad hoc and bilateral arrangements. Of particular importance, the treaty provides a mechanism through which the five Basin countries can work jointly with international aid givers interested in supporting regional projects. The member countries are free, however, to conclude bilateral or multilateral agreements for development projects outside the treaty mechanism.

14. A number of projects were already underway by the time of the Brasilia Conference. Studies had been made by the Inter-American Development Bank for the construction of Puerto Busch, Bolivia, a port on the Rio Paraguay, and of railroads to link it with the existing network. Hydrometeorological studies and an inventory and analysis of basic information on natural resources in the Basin had been carried out by the Organization of American States. Various other projects involving fishing resources, navigation, and electric power grids were in the planning stage and have subsequently been initiated.

The Hydroelectric Potential

15. The three main rivers and hundreds of tributaries in the Plata Basin have a potential for hydroelectric power development that is among the highest in the world. Although

data are incomplete, its estimated potential of more than 60,000 megawatts is probably exceeded only by the Yangtze basin (217,500 megawatts) and the Congo basin (more than 100,000 megawatts). If developed, this would be enough power to meet the major part of increased electric power demands of the Basin states for at least the next decade. Less than five percent of the potential has yet been tapped, mostly in Brazil (Maps C and D). Plans for energy production through the 1980's call for the construction of a host of national and joint hydroelectric projects as well as the development of nuclear power. (See Appendix 2 for the national programs.) These two energy sources will eventually reduce the present heavy reliance on thermally generated power.

16. Eighty-five percent of the total Plata Basin hydroelectric potential is in the Parana sub-basin, located mainly within Brazil. The Itaipu site on the Parana, below the Guaira Falls (Salto del Guaira), is thought to have the largest hydroelectric potential of any single site in the world, and the output from the planned Itaipu plant will nearly double Brazil's current production when completed.

17. Approximately 13 percent of the total Basin potential is in the Paraguay sub-basin. This will probably be difficult to realize, however, because of problems of excessive silting and low gradients on the main river and unregulated currents on some of its tributaries. Only 2 percent of the total potential falls within the Uruguay sub-basin, wholly accounted for by the Uruguay and Negro Rivers.

The Joint Projects

18. A rash of joint project agreements have been concluded in the past few years as countries jockeyed for position in the hydroelectric power scramble (Map E). Paraguay has been in a particularly good position, with both Argentina and Brazil vying for her cooperation. She has concluded agreements with Brazil for construction of the giant Itaipu facility and with Argentina for the Yacyreta-Apipe project. Paraguay and Argentina have also

authorized a feasibility study for a project to be located along the Corpus sector of the Parana River, between the Itaipu and Yacyreta-Apipe sites; and mention has been made of still a third potential damsite at Itati, near the confluence of the Parana and Paraguay Rivers. In addition, planning is progressing on joint development projects on the Uruguay River: bidding has been opened for construction of the Argentine-Uruguayan Salto Grande Hydroelectric Plant, and preliminary studies authorized by Argentina and Brazil have revealed a potential damsite for joint development near Garruchos. (See Appendix 3 for background data on each of the joint projects.)

19. Of the several joint projects, only the plans for Itaipu have been challenged. The present design calls for a single high dam and a powerplant that will have an installed generating capacity of 10,710 megawatts--the largest in the world (Figure 1 [redacted] It will operate 25X1

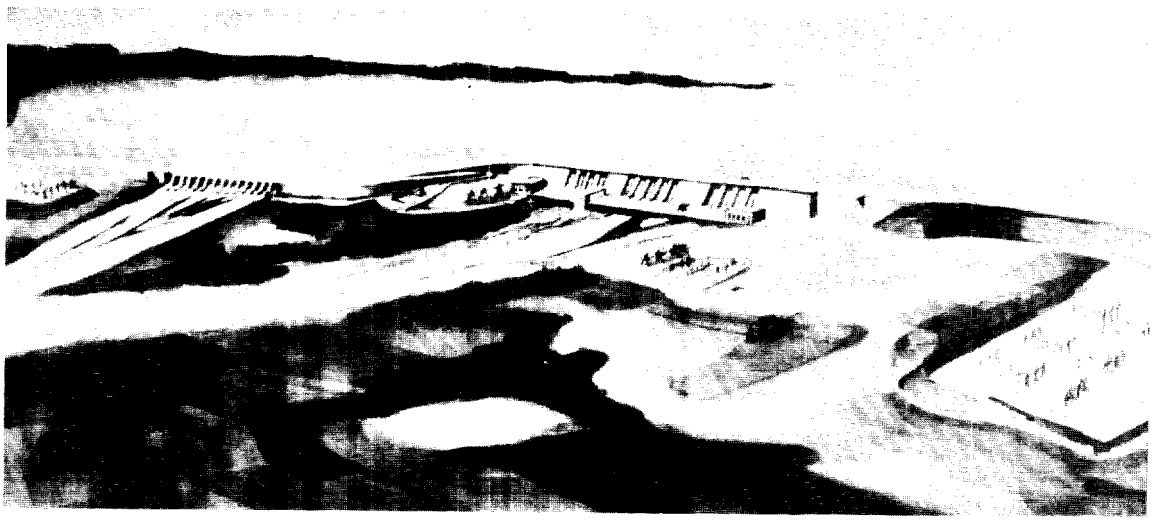

Figure 1. Artist's sketch of the planned Itaipu Hydroelectric Facility.

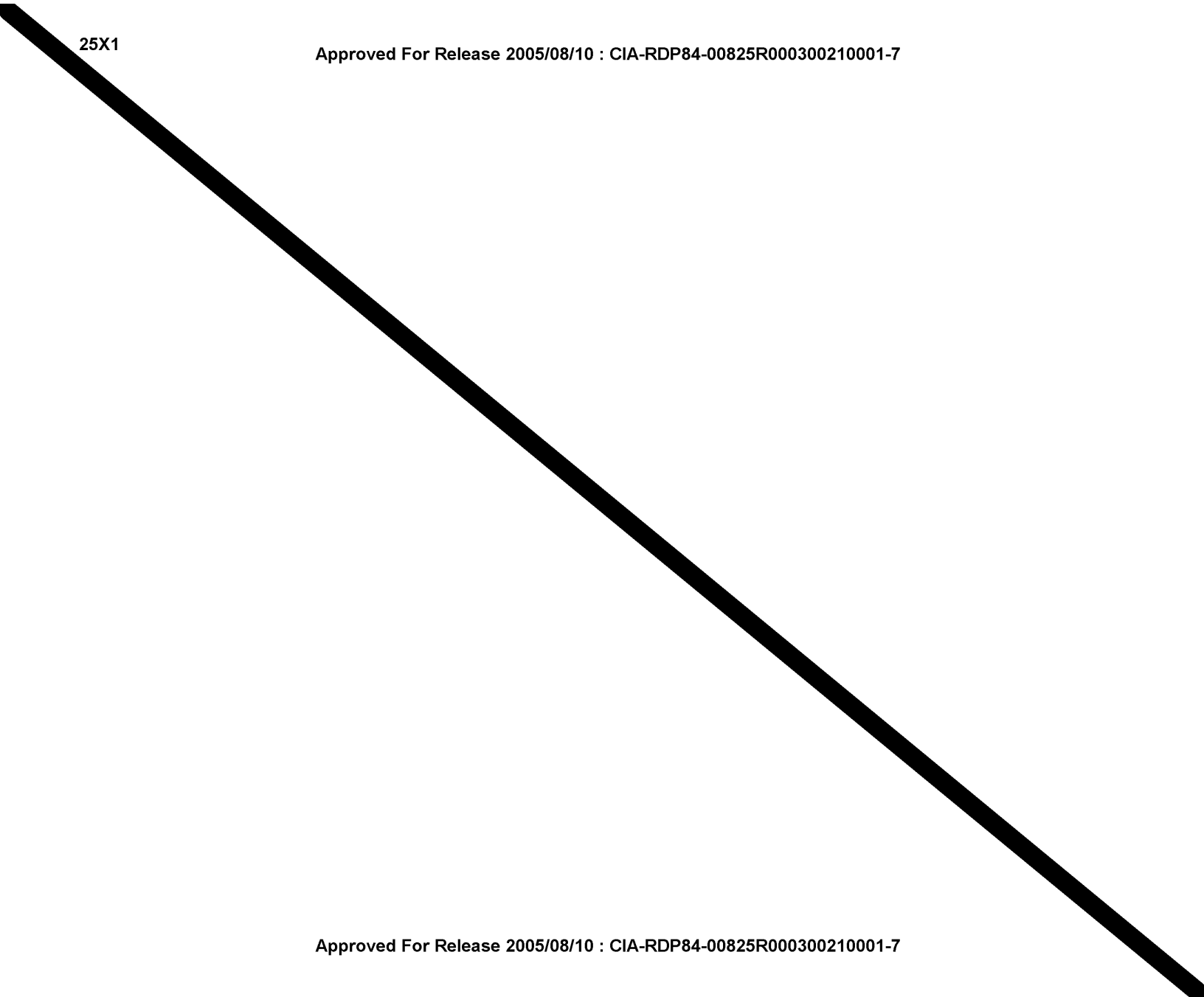

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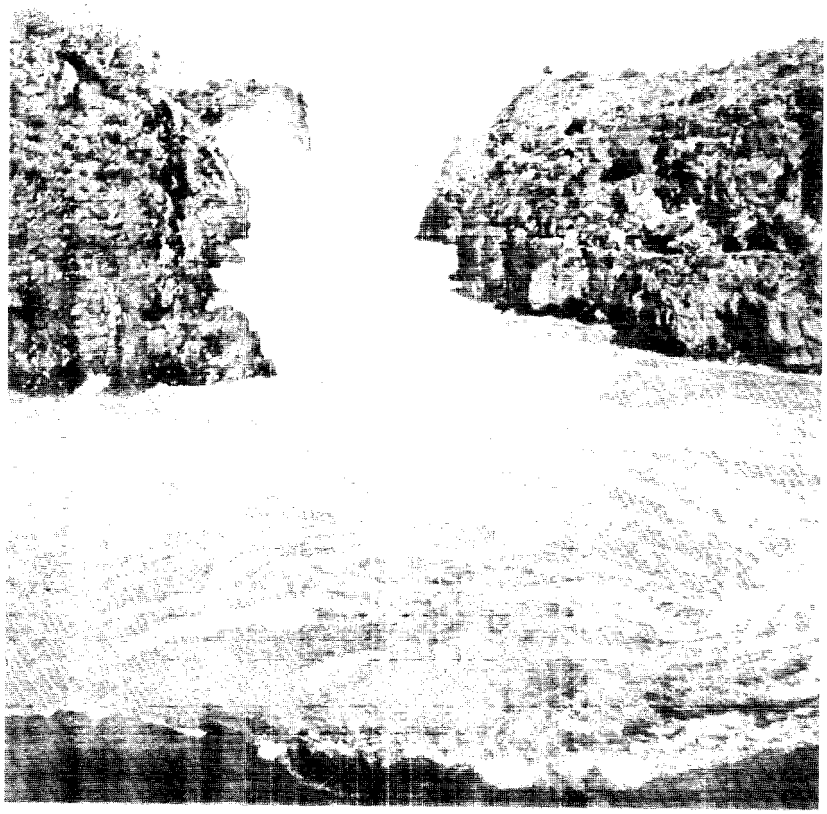
Figure 2. The Parana Gorge, about 500 kilometers (300 miles) long, has a tremendous hydroelectric power potential.



as a base load plant and will generate approximately 56 billion kilowatt hours per year.* The site selected for the dam, 165 kilometers (100 miles) downstream from the

* *A recent report indicates that the final feasibility study will recommend increasing the capacity to 12,600 megawatts by installing 18 turbogenerators of 700 megawatts each rather than 14 of 765 megawatts.*

Guaira Falls, takes advantage of the hydraulic head available from the waterfalls plus the additional hydraulic head that exists within the gorge between the base of the falls and Itaipu (Figures 2 and 3). Thus, at the damsite a gross head of 120 meters (394 feet) can be realized in the drop from the reservoir surface, at an elevation of 220 meters (722 feet), to the tailrace below, at an elevation of 100 meters (328 feet). The fourteen turbogenerator units will be larger than any previously built. It is unlikely that any individual company will have the capability to produce them; a consortium of manufactures will probably be needed.

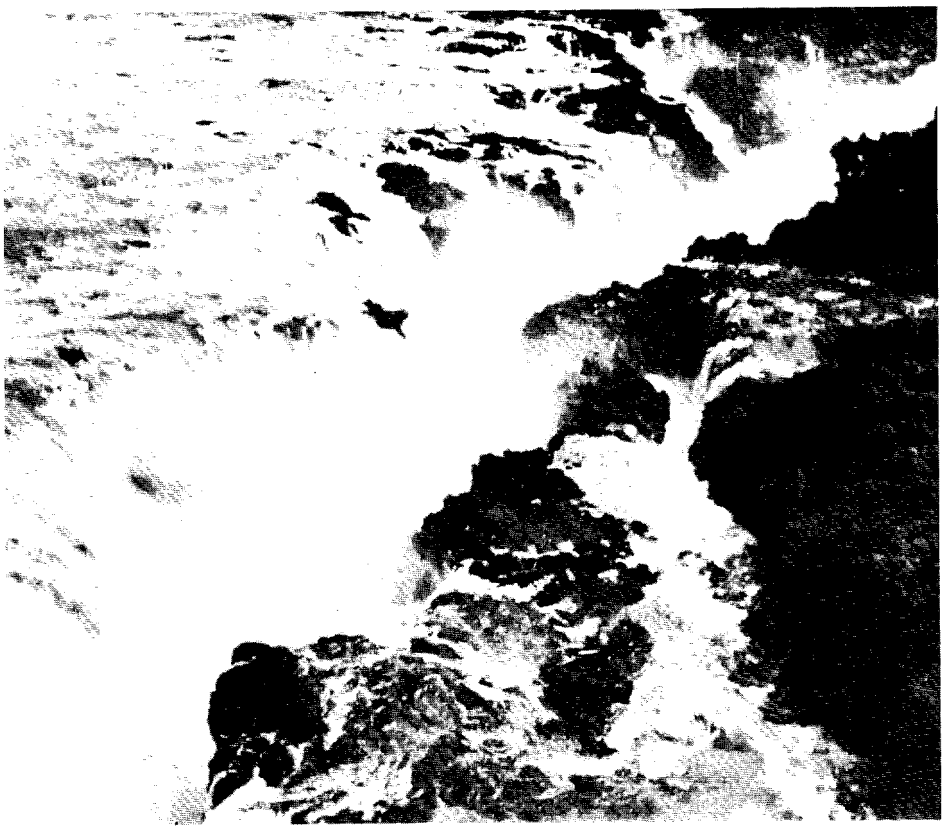


Figure 3. Guaira Falls, at the head of the Parana Gorge, will be obliterated by the Itaipu Reservoir.

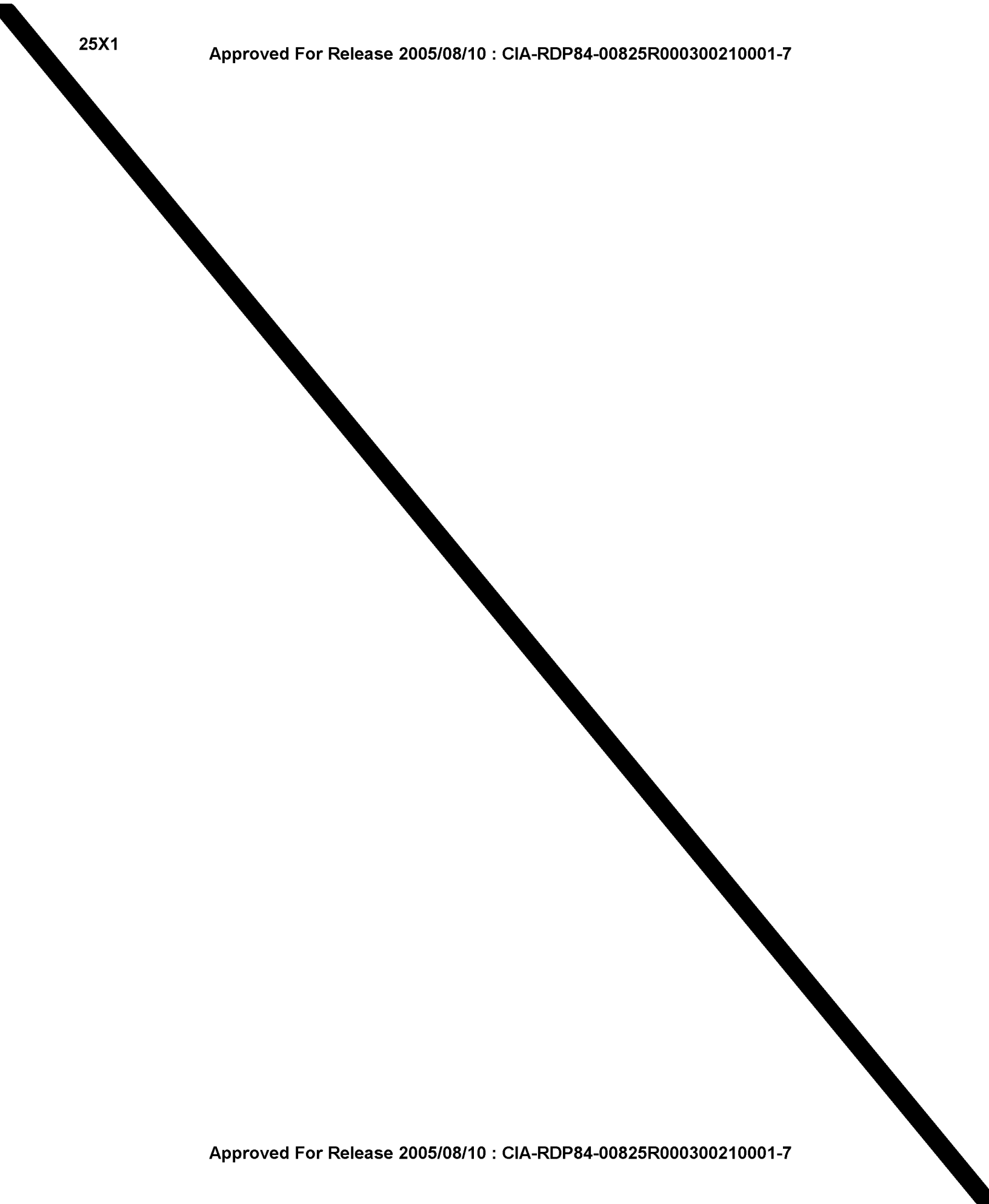
The Controversy

20. As plans for the Itaipu project progressed, a dispute developed between Argentina and Brazil over the use of rivers that flow in succession from one country to another. According to the Argentine interpretation of international law, Brazil and Paraguay are obligated to consult with her before finalizing plans for Itaipu since, she claims, the project will adversely affect Argentine use of the river downstream. Brazil maintains that the project will not affect Argentine use of the river adversely, and that in any case there is no legal obligation for prior consultation. She agrees, however, to provide information about the project to Argentina and recognizes the principle of a posteriori indemnity for damage done by one state to the environment of another state. The controversy thus involves legal and political issues as well as engineering and environmental considerations.

Legal and Political Issues

21. Most riparian states would probably agree that, ideally, hydroelectric development of international rivers should be carried out only with the concurrence of all the governments concerned; but legal rights in this regard are not clearly defined. Hydroelectric projects vary widely in their effects on rivers, and no single legal pattern applies in every case. Even for such ancient uses of rivers as irrigation and navigation, modern techniques have produced new legal problems for which precedents cannot be found. The lack of legal precedents, combined with national rivalries and jealousies within the Plata Basin, has set the stage for protracted international disputes, running contrary to the aim of regional cooperation embodied in the Rio de la Plata Basin Treaty.

22. Much of the current bickering over use of the Rio Parana can probably be traced to Argentina's fears of being completely outstripped economically by Brazil, her traditional rival for continental leadership. Argentina, with a generally higher standard of living, may still be ranked as the more advanced, but Brazil is narrowing the gap. Brazil's rapid industrial expansion contrasts markedly with the slow pace of the Argentine economy.



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23. The three smaller states of the Plata Basin -- Uruguay, Paraguay, and Bolivia -- are perennial targets for the competing influence of their two more powerful neighbors. Even in colonial times Uruguay was a bone of contention between Spain and Portugal; later it served as a battleground for Argentina and Brazil. Its very existence as an independent country was brought about largely by the need for a buffer zone between the two big powers, and its turbulent early history was molded by conflicting external pressures. Recent decades have been comparatively calm. Relations between Uruguay and Argentina have been improved by amicable settlement in November 1973 of a longstanding boundary dispute on the Rio de la Plata and by progress in their joint development of the important Salto Grande Hydroelectric Project on the Rio Uruguay. Uruguayan ties with Brazil have been strengthened by sizable Brazilian loans to help ease Uruguay's serious economic difficulties and by improvement of highway facilities linking the two countries.

24. Paraguay, situated in the heart of the Plata Basin, has also served as a buffer between Argentina and Brazil. In 1870, at the conclusion of the bloody War of the Triple Alliance (Argentina, Brazil, and Uruguay against Paraguay) only the jealousy between the two big powers saved Paraguay from complete obliteration. Both the larger countries did, in fact, slice off broad tracts of Paraguayan territory. (Argentina acquired all of present-day Missiones Province.) Since that time Paraguayan policy has generally been to avoid antagonizing Argentina or Brazil by veering too far to one side or the other. Now, as Brazil's partner in the construction of Itaipu and supporter of that country's position regarding "prior consultation," Paraguay seems to be shifting away from Argentina. Paraguay has, however, also signed a treaty with Argentina for the construction of a dam at the Yacyreta-Apipe site on the lower Parana and has an interest in a similar project in the Corpus area. To further strengthen relations, President Juan Peron of Argentina has promised an official visit to Paraguay sometime in 1974.

25. Bolivia is on the periphery of the Basin's electric power development squabbles but has strong motives for maintaining friendly relations with Argentina and Brazil.

She is negotiating with both countries for the exploitation of energy and mineral resources and for the development of her vast eastern lowlands. Bolivia has had occasional border disputes with Brazil, but relations between the two countries improved with Brazilian agreement to aid in the establishment of Puerto Busch, a Bolivian port on the Paraguay River. Bolivian attitudes toward the use of waterways are influenced by the fact that Bolivia herself controls the upper reaches of a number of international rivers.

26. As negotiations between Brazil and Paraguay proceeded during the 1960's on joint development of the hydroelectric potential of the Parana River in the Guaira Falls sector, Argentina became increasingly concerned about possible adverse downstream effects of the project. Several sites were under consideration for the dam, ranging from the Guaira Falls to the Itaipu rapids, located 165 kilometers (100 miles) downstream and within 24 kilometers (15 miles) of the Argentine border.

27. When Itaipu was finally selected as the damsite in early 1972, Argentina expressed strong criticism of the project, claiming that it might upset the ecological balance and adversely affect agricultural production downstream. She voiced her concern at the United Nations Conference on the Human Environment, held in Stockholm in June 1972, and was successful in focusing international attention on the planned power project. During the conference, the Argentine delegation insisted that Brazil consult with Argentina prior to construction; Brazil objected on the grounds that compulsory prior consultation would be an infringement of national sovereignty. The Argentine position was supported by a large majority of the nations attending the meetings, and an amendment was proposed to the Conference's Declaration of Principles that reflected their views on the requirements for "prior consultation." In order to avoid an embarrassing confrontation, the Uruguayan delegation successfully moved that the controversial amendment be referred to the United Nations General Assembly for resolution.

28. Brazil and Argentina then launched intensive diplomatic campaigns to gain support for their respective positions before the issue was raised in the General Assembly.

But again a compromise, the New York Agreement, was worked out and a draft resolution composed which contained language acceptable to both sides. The words "prior information" were substituted for "prior consultation." The resolution, 2995 (XXVII), was accepted by the General Assembly on 15 December 1972, but its wording is still ambiguous, and the New York Agreement has subsequently been denounced by Argentina.

29. In addition to objecting to the Itaipu project, Argentina protested to the chairman of the Intergovernmental Coordinating Committee in March 1973 that Brazil had not given prior information (as required by UN resolution 2995) before closing the floodgates at the new Brazilian dam at Ilha Solteira on the upper Parana. The Brazilians replied that they had lived up to their obligations fully by announcing, officially and publicly, the closing of the dam. This exchange pointed up the susceptibility of the UN resolution to differing interpretations and reinforced Argentina desires for more clear-cut international rules on "prior consultation."

30. President-elect Hector Campora of Argentina, in April 1973, tried to obtain Paraguay's consent to a delay in the signing of the Itaipu treaty with Brazil until after his inauguration in May. Campora's appeal was not based on environmental considerations but on the possible harmful effect of Itaipu on future Argentine-Paraguayan dam projects downstream. In spite of Argentine protests, accords for construction of the Itaipu complex were signed on 26 April 1973.

31. Argentina next carried the issue of prior consultation to the United Nations Economic and Social Council, which passed an Argentine-proposed resolution on 27 December 1973 calling for consultations among neighboring countries before any party exploits "common resources." In Argentina this was considered a major diplomatic victory over Brazil, directly related to the Itaipu controversy. But Paraguay and Bolivia, as well as Brazil, voted against the resolution, and Uruguay abstained. Therefore, Argentina, while scoring a success of sorts in the world forum, is still isolated at the regional level. Brazil can point to the "Declaration of Asuncion," unanimously adopted at

the Fourth Conference of the Foreign Ministers of the Plata Basin Countries in 1971: it provides that "in the case of international rivers with successive courses and on which there is no joint sovereignty, each state may exploit the water in accordance with its needs and provided it causes no important damage to another state in the basin."

32. The Sixth Conference of the Foreign Ministers of the Plata Basin Countries, originally scheduled to be held in Buenos Aires in December 1973, was postponed -- more or less by mutual consent and largely to avoid renewing debate on the Itaipu issue. The conference is now scheduled to take place in June 1974.

Engineering Considerations

33. Argentina contends that the Itaipu facility will limit the generating capacity that can be developed downstream, that it may adversely affect navigation, and that it may cause flooding and catastrophic ecological imbalances. In particular, she claims that the potential head at the Corpus damsite will be reduced to such an extent that construction of the proposed Argentine-Paraguayan hydroelectric plant will no longer be economically feasible. Argentina attributes the reduction in head to the Brazilian-Paraguayan decisions to: 1) locate the plant at the Itaipu site rather than farther upstream at the Guaira Falls, and 2) to set the normal tailwater level* at 100 meters (328 feet) rather than at 125 meters (410 feet) or higher.

34. Although Argentina apparently accepts the decision on site location at Itaipu as irreversible, she contends that, in the interest of optimum development of a regional resource, the Itaipu normal tailwater level should be raised to 125 meters [redacted] This would permit construction of a facility at Corpus with a reservoir water level of 120 meters (394 feet), a gross head of 35 meters (115 feet), and an installed generating capacity of

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* *The water surface elevation immediately downstream from the powerhouse.*

5,000 megawatts. (Argentina would, of course, prefer to have the reservoir level even higher, at 130 meters (427 feet), in order to attain the maximum generating capacity for the plant.)

35. Argentina admits that raising the Itaipu tailwater level from 100 meters to 125 meters will reduce the Itaipu generating capacity by an estimated 16 percent. (Other estimates range from 10 to 25 percent.) She suggests, however, that this loss to Brazil and Paraguay can be recovered by them through allocation of an equivalent amount of the power generated at Corpus. According to Argentine figures the Corpus plant would still, after the allocation, generate a net balance of about 25 billion kilowatt-hours per year for Argentine and Paraguayan use, giving the region at least 40 percent more power generation than if Itaipu alone were built.

36. Brazil has not commented officially on the Argentine proposals, although she has questioned the reliability of the studies on which they were based. The Brazilian press has held to the theme that there will be sufficient head at Corpus to make construction of the plant economically feasible and suggests that Argentina is, in effect, battling for additional head that nature did not grant her. It concludes that it is unreasonable to expect Brazil to reduce the capacity of a power plant already planned and scheduled in order to safeguard the ideal capacity of a plant for which studies have yet to be made. The Brazilians point out that the highest Corpus reservoir level suggested by Argentina -- 130 meters -- would not only greatly reduce the Itaipu capacity but would also back up the waters of the Acaray River (Rio Acaray), reducing by about one half the power now being generated by Paraguay's only hydroelectric plant.

37. From a strictly technical point of view the Itaipu and Corpus projects do not appear incompatible. The ouput of power at Itaipu would probably be reduced by about 15 percent if the normal tailwater level were raised to 125 meters. The effect of the higher tailwater level could be partially offset, if desired, by raising the Itaipu reservoir 5 to 7 meters (16 to 23 feet) higher than planned.

Turbine efficiency would not be significantly affected by the tailwater change since the turbines are designed for operation at levels ranging from 92 to 138 meters (302 to 453 feet). (Present Itaipu plans call for a maximum normal tailwater level of 125 meters and a maximum flood tailwater level of 138 meters.)

38. Construction of a reservoir at Corpus would benefit the Itaipu plant in one very important respect by obviating the need to maintain a minimum river flow downstream for navigation. Freed from this requirement, the Itaipu plant would gain the operational flexibility to engage in peaking operations*. This option would improve its capability to respond to changing consumption demands and would compensate, in large part, for the overall cut in generating capacity.

Environmental Impact

39. Argentine warnings that construction of the Itaipu project is likely to cause flooding and catastrophic ecological imbalances appear to be greatly exaggerated. On balance, the project is likely to improve the characteristics of the river downstream.

Flooding

40. In designing the Itaipu complex the flooding characteristics of the river were given careful consideration. The spillway was designed to pass the probable maximum floods with safety, and provision was made for a flood surcharge capacity in the reservoir and for floodworks to protect the turbogenerators from a rise in tailwater level at flood stage. The flow of water that will be passed downstream will certainly not exceed the normal flow of the river at flood stage, and it is expected to be less because of the smoothing effect of the reservoir.

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* *In peaking operations, the turbines are operated only during peak load hours. By allowing the pool to build up to a daily maximum, a "maximum" head is available for the few hours of peak load operation. As presently planned, Itaipu will operate only as a base load plant.*

41. The construction of the dam at the Itaipu site will, however, affect the backup of water in the Parana when its tributary, the Iguacu River (Rio Iguacu), floods. Fortunately, flooding in the Iguacu sub-basin normally occurs when the Parana River is low. Nevertheless, when the Iguacu flood crest enters the constricted Parana Valley, it backs up on the main river well beyond the Itaipu site to Porto Mendes. The Itaipu Dam will block this normal backup, causing the river to rise higher than normal below the dam. Although hydrologic gauging data are unavailable for the Iguacu River mouth, an analysis of data available for other stations* indicates that rise in water level stemming from Iguacu backwater should not bring the main river to flood stage unless an abnormal flood occurs on the Iguacu.

42. From the mouth of the Iguacu downstream nearly to Posadas, Argentina, the Parana flows through a gorge, and at flood stage its waters are confined and cause little damage. Downstream from Posadas the valley broadens, and flooding of low areas occurs locally during higher than normal flood peaks. Considerable flood damage has occurred only when peak flows have exceeded 25,000 cubic meters per second; and flood crests on the Iguacu River would be most unlikely to increase the main river flow to this extent.

43. Argentina's claims that the Itaipu project will cause downstream flooding appear unfounded, but the Corpus reservoir proposed by Argentina would, on the other hand, inundate considerable land in Paraguay and some in Brazil if filled to the maximum proposed elevation of 130 meters. The acreage inundated will be considerably less, however, if the lower level of 120 meters is agreed upon**.

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* *Gauging stations on the Parana River at Guaira and Posadas, and on the Iguacu River at Salto Osorio.*

** *Accurate, large-scale topographic maps are not available from which to compute the exact amount of land that would be inundated at either of the specified reservoir levels.*

44. The Itaipu reservoir will completely submerge the scenic Guaira Falls, and the Corpus reservoir will cover the lower part of the famed Iguacu Falls (Saltos do Iguacu). At a reservoir elevation of 120 meters, the average drop of the Iguacu Falls will be reduced from 72 meters (236 feet) to 60 meters (197 feet); and at a reservoir elevation of 130 meters, it will be further reduced to 50 meters (164 feet).

Water Quality

45. Argentina has voiced fears that the Itaipu project will adversely affect the quality of water downstream as well as the quantity. In particular, she has indicated that the potability, salinity, and sediment content may be altered unfavorably.

46. The riparian population downriver from Itaipu is sparse along the Brazil-Paraguayan sector and gradually increases in density along the Argentine-Paraguayan sector. The first large centers are Posadas, Argentina, and Encarnacion, Paraguay. Most of the small settlements are situated on high banks and depend upon groundwater or rainfall for potable water. The costs of river intakes, piping, and water treatment have appeared excessive relative to consumption needs, and only Posadas and Encarnacion draw water directly from the river. None of the towns along the river, not even Posadas and Encarnacion, have sewage treatment facilities. The river water is not presently suitable for consumption without treatment, and in the Posadas area the bacterial contamination is too high for safe swimming or water skiing.

47. Obviously, the danger of pollution will increase if large numbers of people are attracted to the region by the planned development projects. Environmental impact studies were made as part of the overall feasibility studies for both the Itaipu and Yacyreta-Apipe projects, and it is generally agreed that sewage treatment facilities will be required as part of any development along the reservoir shores. Since Brazil and Paraguay are considering establishing the Itaipu reservoir area as an international park -- with boating, fishing, and swimming activities as well as

wildlife and forestry reserves -- it would not serve their interests to disregard pollution controls. Argentina and Paraguay also plan recreational use of the Yacyreta-Apipe reservoir. The one industry mentioned in the Itaipu development plans that may cause pollution problems, if approved, is a wood pulp factory to be located near the dam on the Paraguayan side.

48. Since irrigation is of very minor importance in the Itaipu development plan, the flushing of salts from irrigated land will not affect the salinity of the river downstream. As a conservative estimate, less than 0.2 percent of the average river flow at the Itaipu site will be used for irrigation. The acreage planned for irrigation in Argentina and Paraguay in conjunction with the Yacyreta-Apipe project is much more extensive than at Itaipu, yet its likely effect upon salinity is considered negligible by Argentina.

49. Finally, the impact of Itaipu on river sediment downstream is expected to be insignificant. Within the Plata River system, the Paraguay River contributes 94 percent of the 100 million tons of silt entering the Plata Estuary annually. Only a small amount enters from the upper Parana River, and the minute reduction in silt content (and nutrient materials) will have negligible impact on the estuarine fisheries.

Effects on Navigation

50. Argentina has been particularly concerned that the Itaipu facility will alter the river flow in such a way as to restrict navigation along the middle and lower reaches of the river, either by decreasing the water depth or by increasing the deposition of silt--both of which would reduce the draft limit for navigation. A wave effect from peaking operations might also hamper navigation -- particularly in areas of rapids along the middle reaches.

51. The Itaipu facility will not cause a reduction in flow; in fact, the minimum flow in the low-water period will be increased. The Itaipu plant is planned for base load operation, and the continuous release of water will

exceed the minimum requirements for navigation downstream. During the initial filling of the reservoir and during periods of power plant shutdowns, the required minimum flow will be assured by eight sluices near the base of the dam. Existing Brazilian reservoirs have raised the minimum monthly flow at Posadas from 3,134 to 5,293 cubic meters per second, and the Itaipu dam and reservoir are expected to further raise the minimum flow to 6,230. The pattern of silt deposition may be changed somewhat along the river course, but the overall silt load carried by the river will be reduced, and the amount of silt deposition in the estuary and in the Buenos Aires harbor will not be altered appreciably.

52. Since Itaipu is not planned as a peak load plant, fears that peaking operations will create a wave effect downstream affecting navigation appear unfounded. Peaking operations may become feasible eventually, however, if the Corpus Dam is constructed. In that event, the Corpus Reservoir will dampen out any waves generated by peaking; the Corpus Dam, in turn, will regulate flow downstream into the Yacyreta-Apipe Reservoir; and the latter will completely submerge the Apipe Rapids (Rapido de Apipe) -- improving conditions for navigation.

Disease

53. Argentina has also indicated concern regarding the likely effect of the Itaipu reservoir upon the spread of waterborne diseases to the area. The creation of a lake provides new breeding grounds for the vectors or alternate hosts of diseases such as schistosomiasis, malaria, yellow fever, river blindness (onchocerciasis), and filariasis.

54. Schistosomiasis is of particular concern. It is not now endemic within the area, but the species of snail that act as hosts to the Schistosoma blood fluke larva are present. The creation of the reservoir could lead to a marked increase in the snail population; and an influx of infected humans from endemic areas could introduce the blood fluke into the reservoir via untreated sewage. Once infected, it is extremely difficult to remove the snails or disinfect a reservoir. Since an endemic focus

has already become established about 400 kilometers (250 miles) from the site in Parana State, Brazil, the danger of infecting this area is real. Project planners are aware of the problem and have indicated that careful, pre-employment health screening must be carried out for construction workers on the project.

55. The other diseases of concern are spread by mosquitoes or flies. Although the creation of a reservoir will multiply the breeding sites for these insects, open water is a less satisfactory breeding habitat than marshland, since surface-feeding fish consume the insect larva. Malaria is endemic to the Itaipu area, but planners believe that the aquatic stage of the mosquito can be controlled by maintaining a balance of surface-feeding fish in the reservoir. Yellow fever is not known to be endemic to the area, but should it become established, the disease is preventable by a single vaccination every ten years. Filariasis is rare within the area; however, the species of mosquito and black fly that act as vectors are all present, and the disease is reported in Ponta Grossa, Brazil, about 440 kilometers (275 miles) away. River blindness does not occur in the Parana Basin but has established itself in Mexico and Guatemala, and unconfirmed cases have been reported in Venezuela, Ecuador, and Surinam. The black fly insect vector for the disease is abundant in the Itaipu area and, since it breeds in the water, particularly on submerged tree trunks, is likely to increase in number with construction of the reservoir. However, the spread of these diseases to various parts of the Basin is likely with or without construction of the Itaipu reservoir. Extensive areas of marshland, natural breeding habitats for the disease vectors, occur within the Basin, and many other reservoirs have already been constructed.

Fishing

56. Argentine warnings of potential damage from Itaipu include adverse effects on both river and estuarine fishing that would allegedly stem from a reduction in river flow, a change in river sediment content, a change in salinity, and interference in the movement of migratory fish to spawning areas upriver. As indicated above, the

planned operation of the Itaipu power plant will not reduce river flow downstream and will have a negligible effect on the silt content and salinity of the river downstream. The movement of migratory fish upstream has always been blocked by the Guaira Falls, and the Parana River below the falls to the mouth of the Paraguay River is not a significant spawning area for estuarine fish and does not include any commercial fishing areas. Construction of the Itaipu Dam will therefore not alter the situation appreciably.

57. A marked change can be expected in the fish population in the Itaipu Reservoir itself. This phenomenon is common to all reservoirs in the region and can be anticipated in the Yacyreta-Apipe and Corpus Reservoirs as well. Turbulent waters rich in oxygen will be replaced by deep, quiet waters with lowered oxygen content. The water will no longer be a suitable habitat for swift-water species such as the dourado, and the ecological balance will be tipped in favor of quiet-water, bottom-feeding species such as carp and piranha. The latter, which inhabit the quiet waters along the margins of natural rivers, are normally held in check by their natural enemy, the dourado. In a reservoir, however, the piranha population frequently explodes -- unchecked by natural enemies. It is hoped that, with careful planning, the overall fish population can be increased in a balanced manner as the Itaipu reservoir is filled and becomes stabilized. In the meantime, Brazilian officials are seeking new methods for selective control of the piranha.

Climate

58. Although the establishment of any reservoir will change the microclimate of the immediate area, there appears to be no basis for vague Argentine warnings that Itaipu can cause both uncontrollable rains and tremendous droughts.

Earthquakes

59. The possibility of earthquakes' being generated by the giant Itaipu complex has also been suggested. Occasional earthquakes do occur as a consequence of tectonic readjustment of the earth's crust under the increased weight

of a dam and reservoir. Geologic studies of the Itaipu area, however, indicate that the conditions conducive to this type of earthquake do not exist. The geologic structure of the reservoir area is uniform, and there is no evidence of major regional faulting.

Conclusions

60. Argentine claims that the construction of the Itaipu project will cause flooding and catastrophic ecological imbalances downstream appear unfounded. Certainly the dire predictions apply equally to the Yacyreta-Apipe and Corpus projects that Argentina approves. The Argentine position appears to be based on economic and political rather than purely environmental considerations. Her position that the Parana can be more effectively developed through joint planning, with greater economic benefits for the region as a whole, is certainly valid in theory. It appears that it is technically feasible to make the Itaipu and Corpus projects compatible. However, for design changes to be acceptable to Brazil, the trade-off of less power generation at Itaipu for increased power generation at Corpus presumably must include a compensatory transfer of part of the power generated at Corpus to the Itaipu binational company.

61. Although Brazil and Paraguay may be willing to consult with Argentina on an *ad hoc* basis, it is unlikely that they will accept Argentina's view on "prior consultation" and include her in the Itaipu decision-making process. The prospects are for a continuation of project planning and execution on an essentially binational basis, but perhaps with some agreement tying acceptable modifications in Itaipu design to allocation of part of Corpus output to the Itaipu system. If a compromise agreement is not reached, Argentina and Paraguay may opt for another -- but less desirable -- damsite in place of Corpus for their second joint hydroelectric project. Garupa, about 65 kilometers (40 miles) downstream from Corpus, has been mentioned in the press as a possible alternative.

Appendix A

Treaty of the Rio de la Plata Basin (Summary)

1. The first article is an agreement by the five contracting parties to pool their efforts to promote the development and physical integration of the Plata Basin by rational use of water resources; conservation of plants and animals; improvement of transportation, telecommunications, and electric power facilities; cooperation in matters of education, health, and disease control; and other projects of common interest.

2. The second article stipulates that the foreign ministers will meet once a year to set policy guidelines and to adopt measures necessary for the implementation of the treaty. All decisions made at the meetings require the unanimous vote of the five countries.

3. The third article recognizes the Intergovernmental Coordinating Committee as the permanent body responsible for promoting, coordinating, and following the progress of the programs and of carrying out the decisions of the foreign ministers. The Intergovernmental Coordinating Committee is overned by bylaws approved in 1968. These may be amended only by a unanimous vote of the foreign ministers.

4. The fourth article states that national commissions set up pursuant to the Joint Declaration of Buenos Aires (1967) shall serve as advisory bodies of the governments and may establish bilateral contracts subject to the policies and practices of the countries concerned.

5. The fifth article specifies that collective action undertaken by the contracting parties shall be initiated without prejudice to national projects and undertakings they decide to carry out in their respective territories that are consistent with respect for international law and in accordance with good practices among neighboring friendly nations.

6. The sixth article declares that nothing in the treaty shall prevent the contracting parties from concluding bilateral or multilateral agreements on developing the Basin.

7. The seventh article states that the treaty shall be called the Tratado de la Cuenca del Plata and that it shall be of unlimited duration.

8. The eighth article indicates the effective date of the treaty and stipulates the proceedings for denouncing the treaty, noting that one year after denouncement proceedings have been completed the treaty will cease to have effect for the denouncing party.

Appendix B

The National Programs

Argentina

1. Electric power in Argentina is administered by the Secretary of Energy through Agua y Energia Electrica (AyEE), an autonomous state company created in 1947. AyEE is responsible for the development of hydroelectric resources, flood control, and the unification of the ten regional power grids. Also, AyEE, in conjunction with four electric power producing and distributing entities, operates approximately 95 percent of the country's power system.

2. Although Argentina's hydroelectric potential is estimated at 10 million kilowatts, hydroelectricity accounts for less than 2 percent of installed power. Remoteness of water resources from areas of consumption, loss of electricity in transmission over long distances, the expense of constructing high-voltage lines, and seasonal fluctuations in stream flow have inhibited the development of water resources. However, increasing demand and a desire to conserve petroleum reserves will direct Argentina's future electric power development toward hydroelectricity, supplemented by nuclear plants: tentative plans call for hydroelectric and nuclear power to meet 30 percent and 15 percent, respectively, of the national energy needs by 1980.

3. Most of Argentina's present hydroelectric plants are outside the Rio de la Plata Basin in the provinces of Mendoza, Rio Negro, and Cordoba. Presently under construction within the Basin, near Salta, is the 120-megawatt Cabra Corral facility, which should begin operation in 1974. Its primary purpose is not electric power generation, however, but irrigation and flood control. In conjunction with the present 13.2-megawatt plant at Corrallito, it will supply Salta and San Miguel de Tucuman. Construction of a 200-megawatt, low-velocity plant is tentatively planned at Cayasta, on the Parana River.

4. The major emphasis of Argentine hydroelectric development planning is on joint projects on the Parana and Uruguay Rivers. The Yacyreta-Apipe plant has been approved for joint construction with Paraguay, and plants have been proposed with Paraguay at Corpus and Itati. A plant is now under construction with Uruguay at Salto Grande, and a feasibility study is underway with Brazil for development of a segment of the Uruguay River.

5. The 319-megawatt Atucha nuclear plant near Buenos Aires, South America's first nuclear facility, came into operation in early 1974. A 600-megawatt nuclear plant is planned as a backup facility for three hydroelectric plants on the Rio Tercero.

Bolivia

6. Electric Power in Bolivia is regulated by the Direccion Nacional de Electricidad (DINE). Two companies produce electricity -- the Bolivian Electric Energy Company, a Canadian-owned company; and the Empressa Nacional de Electricidad (ENDE), a semi-autonomous state company. The Bolivian Electric Energy Company supplies the cities of La Paz and Oruru and the northern group of tin mines, and ENDE supplies all other areas.

7. Bolivian power is 85 percent hydroelectric. Most of the hydroelectric facilities are located outside the Plata Basin in the mountains surrounding La Paz and Cochabamba. Within the Basin are two areas of hydroelectric development -- a complex of seven small plants that supplies the Sucre-Potosi region with approximately 40 percent of its needs, and two plants on the Rio Tarija that generate more than 70 percent of the power consumed in Tarija. Although the total hydroelectric potential for the country is estimated to be as high as 7,000 megawatts, present plans for development within the Basin are modest.

Brazil

8. The Brazilian electric power program is administered by an autonomous corporation, Centrais Electricas Brasileiras, S.A. (ELECTROBRAS). It is responsible for programming and coordinating development activities among the various state, municipal, and private electric power companies, as well as its own subsidiaries.

9. Brazil's hydroelectric potential, the largest in South America, is estimated at 150,000 megawatts. More than a third is within the Plata Basin, about 45 percent within the Amazon basin, and the rest in the Northeast and along the coast. Only 10 percent of the total potential has been developed, mostly on tributaries of the Parana River. As the hydroelectric potential close to consumption centers has been utilized, the country has turned to sites on the Parana River itself.

10. The largest hydroelectric facility in Brazil, with an installed capacity of 1,400 megawatts, is at Jupia, on the Parana. The Jupia plant and the new Ilha Solteira facility, 65 kilometers (40 miles) upstream, form the $1-billion Urubupunga complex, which will have a total capacity of 4,600 megawatts when fully operating by 1978. This complex will guarantee electric power to the heavily populated and booming industrial region of the Southeast until the giant Itaipu complex is completed. Other projects planned on the Parana River include Porto Primavera and Ilha Grande, with a combined capacity of 4,600 megawatts. Large plants on tributaries of the Parana include Sao Simao, Itumbiari, Marimbondo, and Furnas, each with a present or planned capacity of more than 1,000 megawatts.

11. Demand for electricity in Brazil is growing at an annual rate of 11 percent. To meet the projected needs through the end of this decade, the country will continue to rely heavily on hydroelectric resources within the Plata Basin; present plans do not call for large-scale development of the hydroelectric potential of the Amazon Basin. Nuclear power will play an increasing role in the national energy program, since by 1990 most of the hydroelectric potential in the Southeast will have been fully utilized.

Paraguay

12. Electric power production in Paraguay is under the control of the government-owned Administration Nacional de Electricidad (ANDE).

13. Paraguay's hydroelectric potential, estimated at 2,200 megawatts, accounts for virtually all its energy resources. The country's energy requirements are modest, and for many years thermally generated electricity supplied the bulk of its needs. ince late 1968, however, most power needs have been met by the Rio Acaray Hydroelectric Plant. The present 90-megawatt capacity of this project is scheduled to be doubled by 1976, and a planned water control dam upstream will raise total hydroelectric capacity to 240 megawatts. In its initial phase, the Acaray plant's main purpose was to replace the Asuncion thermal unit and to supply electric power to 43 interior towns, of which 31 had been electrified as of September 1972. In phase two, the facility is providing badly needed foreign exchange through the sale of power to Argentina and Brazil.

14. Paraguay's joint projects -- Itaipu with Brazil, Yacyreta-Apipe with Argentina, and possibly Corpus and Itati with Argentina -- constitute the major thrust of national development efforts, and the export of electric power should become an important future source of foreign exchange.

Uruguay

15. Electric power production and distribution in Uruguay is administered by the Administracion General de las Usinas Electricas y los Telefonos (UTE), which is responsible for coordinating both national and joint hydroelectric projects. Although the country's hydroelectric resources are large relative to other energy sources, hydroelectricity accounts for less than 50 percent of the total installed capacity. UTE's largest power installations are two hydroelectric plants on the Rio Negro: the 128-megawatt Rincon del Bonete station and, a few miles downstream, the 108-megawatt Rincon del Baygorria station. The reservoir behind the Bonete plant, called the Embalse del Rio Negro, is the largest manmade lake in South America. The national power grid, whose main function is to carry power from the Bonete and Baygorria plants to Montevideo, encompasses only the southwest quarter of the country but interconnects 90 percent of the installed capacity.

16. A new government authority, Comision Mixta de Palmar (COMIPAL), was established in mid-1973 to coordinate planning and construction of a third Rio Negro plant at Palmar. Completion of the 400-megawatt project is planned for 1977 and will help ease the energy deficit which Uruguayan officials say will peak about then. Uruguay's largest undertaking will be the Salto Grande project, being developed jointly with Argentina. When completed, this hydroelectric plant on the Uruguay River will supply 1,620 megawatts to both countries.

Appendix C

Binational Projects

A. Itaipu

1. The signing of accords by Presidents Medici of Brazil and Stroessner of Paraguay on 26 April 1973, followed by Congressional ratification in each country, formalized plans to construct a joint hydroelectric facility on the Parana River at Itaipu. A binational company, "Itaipu," was created to carry out the design and construction of the project. The company is comprised of Centrais Electricas Brasileiras, S.A. (ELETROBRAS) and the Administracion Nacional de Electricidad (ANDE), the respective Brazilian and Paraguayan government-owned power companies.

2. If constructed as initially planned, the Itaipu plant will have the largest generating capacity of any hydroelectric plant in the world -- 10,710 megawatts to be generated by 14 turbogenerator units. Each country will own 50 percent of the power output, and Brazil will have preference in the purchase of that part of Paraguay's share allocated for export. Since Paraguay's anticipated domestic requirements are minimal, Brazil will have practically the entire output at its disposal to meet the rapidly increasing energy requirements of the Sao Paulo industrial region and the southern states. Although a firm schedule has not been established, present plans call for initial output in about 1982.

3. The site for the dam is in the rocky gorge of the middle Parana River (Figure 2). When the reservoir is eventually filled, its waters will extend 165 kilometers (100 miles) upstream, completely covering the spectacular Guaira Falls (Figure 3). Justification for the project is based almost entirely on the generation of low-cost electrical energy, although there will be other uses of secondary importance. Operating as a base load plant, Itaipu will generate approximately 56 billion kilowatt hours per year.

4. One unresolved problem stems from the fact that Brazil uses 60-cycle current, whereas Paraguay uses 50-cycle. Paraguay reportedly has asked that its half of Itaipu energy output be 50-cycle to be compatible with its internal system. Designing the turbogenerators to operate at two different speeds in order to produce electricity at either 50 or 60 cycles will increase the cost of the equipment and reduce the operating efficiency somewhat. Brazil would prefer that Paraguay convert to 60 cycles and has reportedly offered to pay for the conversion. An unconfirmed report received in mid-March, 1974 states that agreement has been reached for installation of static conversion equipment on one turbogenerator unit.

5. The facility was not designed for flood control since the constricted valley lacks the space necessary for any massive storage of floodwaters; but operation of the dam will even out the annual flow somewhat by reducing the peak flow at flood stage and increasing minimum flow during the dry season. Assuming that operation of the Itaipu facility will be integrated with operation of other major facilities located upstream, the cumulative effect should be an appreciable lowering of flood crests downstream from Itaipu.

6. The design for the Itaipu dam incorporates features that will enable later installation of a lock and canal system enabling vessels to move between the middle and upper reaches of the river. Navigation is now blocked by the Guaira Falls and associated rapids. The dam will also afford some immediate benefits to navigation along the middle reaches now partially obstructed by rapids and narrows, especially at low water level. The anticipated increase in minimum river flow will extend the period of navigation for shallow-draft vessels.

7. Although irrigation has not figured as an important design consideration, an abundance of water and low-cost power for pumping will be available. Only about 99,000 acres of land in the project area are considered suitable for irrigation farming. Normal rainfall in the area is generally adequate for agricultural needs, and irrigation water is needed only to supplement rains in water-deficient months.

8. Plans call for developing the reservoir's potential for both commercial fishing and sport fishing. Establishment of an international park is also being considered. The park would include both the reservoir and its surroundings, and zoning regulations would be established to ensure balanced development for recreational and non-recreational uses.

B. Yacyreta-Apipe

9. A treaty providing for a joint Argentine-Paraguayan hydroelectric project at the islands of Yacyreta and Apipe on the Parana River was signed on 3 December 1973 and later ratified by both countries. A binational agency, consisting of the state power companies of both countries, will build the hydroelectric power facilities and improve river navigability within the project area. The power plant, scheduled to begin operation by 1981, will have an installed capacity of 4,050 megawatts rom 30 turbogenerators and a guaranteed capacity of 3,391 megawatts at load centers. The average annual output to load centers will be about 17 billion kilowatt-hours, to be divided equally between the two countries with each having preferential rights for purchase of energy not required by the other for domestic consumption. In practice, Paraguay will sell most of its share to Argentina.

10. The site for the main dam is about 130 kilometers (80 miles) downstream from the gorge of the middle Parana near the Apipe rapids -- a major obstacle to navigation in this sector. Here the river meanders through a broad valley among low islands via a network of interconnecting channels. Considerable diking will be required on the Paraguayan side of the reservoir to avoid inundating valuable land. A re-regulating dam, to be constructed about 90 kilometers (55 miles) farther downstream at Ita-Ibate, will ensure that power plant operation does not impede navigation. Since the main reservoir will be used for daily pondage only, peaking operations at the power plant will cause daily fluctuations in turbine discharge. The re-regulating reservoir will even out fluctuations in water level and

velocity and maintain the minimum flow required downstream for safe navigation. Hazards to navigation between Ita-Ibate and Corpus will be eliminated, and both dams will have locks usable by vessels with a 12-foot draft. Provisions are made for future expansion of locks when justified by increasing river traffic.

11. The project will have negligible value for flood control because of the small volume of the main reservoir. Provision can be made, however, to divert flood crests from the reservoir to the extensive Ibera Swamps on adjacent Argentine territory, which would then serve as a temporary ponding area until the waters drain into the Corrientes River (Rio Corrientes).

12. Irrigation intake structures will be incorporated in the main dam to facilitate future diversion of water to potentially arable land in both countries. Proposed development would entail drainage and irrigation by gravity of up to 200,000 net acres of land in Paraguay and about 15,000 net acres in Argentina.

13. Fish ladders and passing facilities will be provided at the main dam and the re-regulating dam, and the main reservoir will serve as the basis for developing a large fishing industry with potential yields on the order of 8,000 metric tons per year. The fish-passing facilities are designed to control undesirable species, such as piranha and carp, moving upstream. Sport fishing will be a tourist attraction. Of particular interest will be the opportunities for dourado fishing in the swift water of the tailrace.

14. Although water sports facilities are planned, the quality of the Parana is presently below standards suitable for swimming, and sewage treatment facilities will be required for towns around the reservoir. In the meantime, techniques such as zone chlorination can be used to provide safe aquatic recreation conditions.

15. Provision has been made for construction of a highway across the main dam and its lateral dikes. It will connect Argentina Route 12 with Paraguay Route 1.

C. Corpus

16. Much publicity has attended Argentinian claims that construction of the Itaipu Dam will jeopardize their plans for a dam on the Parana River at Corpus. It was not until 13 September 1973, however, after years of talk and little action, that the Paraguayan-Argentine Joint Commission for the Parana River agreed to call for bids for a feasibility study.

17. Although only sketchy preliminary studies have been made, figures have been released indicating the general characteristics of the proposed facility. The most frequently mentioned site for the dam is in the gorge of the middle Parana in the vicinity of Pindoy Island and the Corpus Rapids. Projections of the maximum normal water level of the reservoir range from 100 to 130 meters (328 to 427 feet); if 120 meters (394 feet) is accepted as a likely compromise, the reservoir will extend upstream to the Itaipu Dam. In order to maintain maximum head for hours of peak demand, the reservoir will be used for daily pondage and will not store water for flood control purposes. It is anticipated that the power plant will have an installed capacity of 5,000 megawatts and an annual output of 35 billion kilowatt hours. Presumably the dam will include navigation locks, and the reservoir will be navigable to the Itaipu Dam.

18. Recently, another site has been mentioned in the press as a viable alternative to Corpus should Argentina fail to persuade Brazil and Paraguay to modify the Itaipu design to be compatible with requirements for the Corpus facility. The alternative site is near Garupa, about 65 kilometers (40 miles) downstream from Corpus.

D. Itati

19. A third location on the Parana River, at Itati, has been mentioned as a potential damsite for a joint Argentine-Paraguayan project; however, no detailed studies have as yet been made. The hydraulic head would be low at this site, about 40 kilometers (25 miles) from the confluence of the Parana with the Paraguay River.

A hydroelectric plant would not have a large capacity, and any project planned for the site would presumably be multipurpose. In conjunction with dams at Yacyreta-Apipe, Corpus, and Itaipu, a dam at this site would ensure year-round navigation on the Parana River from the mouth of the Rio de la Plata into south-central Brazil.

E. Salto Grande

20. A loan has been made by the Inter-American Development Bank, and bidding has been opened for construction of the joint Argentine-Uruguayan Salto Grande Hydroelectric Plant. This project, located on the Uruguay River about 11 miles upstream from Concordia, Argentina, has been on the planning boards since 1946.

21. Plans call for installation of twelve turbogenerators with a total installed capacity of 1,620 megawatts. The plant will be run-of-the-river type, and during periods of low river flow energy will be generated only at peak load hours of the day. It will supply power to a 285,000 square-kilometer (110,000 square-mile) area in northeast Argentina and Uruguay. The plans provide for construction of a highway along the crest of the dam and for construction of a lock on the Argentine side of the river to handle river craft of nine-foot draft.

22. The Soviet Union has been awarded the contract for the turbines for the project. It has been estimated that the first power will be generated about five years from the time that construction work is initiated.

F. Argentine-Brazilian Uruguay River Project

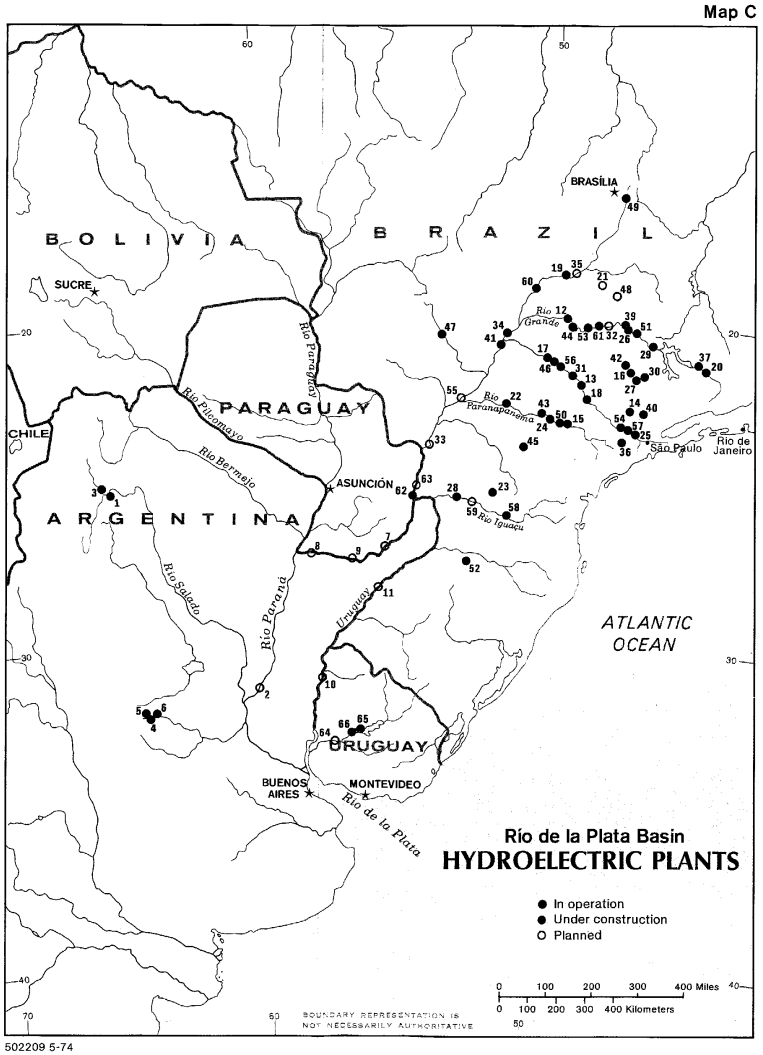
23. In March 1972, an agreement was signed between the state power companies of Brazil and Argentina authorizing studies and surveys of the hydroelectric potential of the Uruguay River and its tributary, the Pepiri Guazu, along the international border. Preliminary geological, hydraulic, and meteorological studies carried out by a consortium of Argentine and Brazilian engineering consultant firms indicate that the best site for a dam and power plant is on the Uruguay River near Garruchos (28°11'S, 55°39'W). The potential capacity at this site is estimated to be between 3,000 and 4,000 megawatts.

Rio de la Plata Basin: Hydroelectric Plants
(Capacity greater than 10 MW.)

	River	Capacity(in MW.) In operation	Under construction	Planned and potential
ARGENTINA				
1. Cabra Corral	Pasaje o Juramento		120	
2. Cayastá	Paraná			200
3. Corralito	Corralito	13.2		
4. Ing. Casaffousth	Tercero	17.28		
5. Ing. Fitz Simon	Tercero	10.8		
6. Ing. Reolin	Tercero	38.4		
ARGENTINA-PARAGUAY				
7. Corpus	Paraná			5,000
8. Itatí	Paraná			3,000
9. Yacyreta-Apipé	Paraná			4,050
ARGENTINA-URUGUAY				
10. Salto Grande	Uruguay			1,620
ARGENTINA-BRAZIL				
11. Garruchos	Uruguay			3-4,000
BRAZIL				
12. Água Vermelha	Grande		900	480
13. Alvaro de S. Lima	Tietê	124		
14. Americana	Atibaia	30		
15. Armando A. Laydner	Paranapanema	85		
16. Armando S. Oliveira	Pardo	28		
17. Avanhandava	Tiete	30		
18. Barra Bonita	Tiete	122.4		
19. Cachoeira Dourada	Paranaiba	420		
20. Camargos	Grande	45		
21. Capim Branco	Araguari			420
22. Capivara	Paranapanema	600		
23. Curucaca	Jordão		5.2	10.4
24. Chavantes	Paranapanema	400		
25. Edgard de Souza	Tietê	16		
26. Estreito	Grande	700	350	
27. Euclides da Cunha	Pardo	94.92		
28. Foz do Chopim	Chopim	44		
BRAZIL				
29. Furnas				
30. Graminha				
31. Ibitinga				
32. Igarapava				
33. Ilha Grande				
34. Ilha Solteira				
35. Itumbiara				
36. Itupararanga				
37. Itutinga				
38. Jacuí				
39. Jaguara				
40. Jaguari				
41. Jupiá				
42. Limoeiro				
43. Lucas Garcez				
44. Marimbondo				
45. Mauá				
46. Miguel Stefano				
47. Mimosa				
48. Nova Ponte				
49. Paraná				
50. Paranapanema				
51. Peixotos				
52. Passo Fundo				
53. Pôrto Colômbia				
54. Pôrto Góis				
55. Pôrto Primavera				
56. Promissão				
57. Rasgão				
58. Salto Grande				
59. Salto Santiago				
60. São Simão				
61. Volta Grande				
PARAGUAY				
62. Acaray				
PARAGUAY-BRAZIL				
63. Itaipú				
URUGUAY				
64. Palmar				
65. Rincón del Baygorr				
66. Rincón del Bonete				

River	In operation	Under construction	Planned and potential
Grande	990		330
Pardo	85		
Tietê	114.48		
Grande			240
Paraná			3,640
Paraná	3,200		
Paranaíba			2,080
Sorocaba	60		
Grande	50		
Jacuí	150		
Grande		424	212
Jaguari	12		
Paraná	1,400		
Pardo	28		
Paranapanema	61.2		
Grande		1,200	
Tibagi	18		
Tietê	14.4		
Pardo	39.6		
Quebra-Anzol			350
Corumbá	25.5		
Paranapanema	11.2		
Grande	475		
P. Fundo Erechim		220	
Grande		360	
Tietê	10.5		
Paraná			960
Tietê		200	
Tietê	14.4		
Iguaçu	15.2		
Iguaçu			450
Paranaíba		2,500	
Grande		400	
Acaray	90	90	60
Paraná			10,710
Negro			400
Negro	108		400
Negro	128		

Map C



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[redacted] XX | PROJECT PROPOSAL | ☐ | RESEARCH ACTIVITY NOTICE

SUBJECT
Hydroelectric Power in the Rio de la Plata Basin -- the Itaipu Controversy

PROJECT NUMBER
66.2683

SUBJECT CODE

REQUESTING OFFICE

REQUESTER
State Department, INR/RAR (Mr. Harvey Summ)

TARGET DATE
Draft 30 Nov 73
Publ. 21 Dec 73

ANALYST/BRANCH
[redacted]

STATEMENT OF PROBLEM

A controversy has developed between Argentina and Brazil over plans for joint construction by Brazil and Paraguay of a hydroelectric installation at Itaipu that will have the largest generating capacity in the world. Argentina claims that the installations may adversely affect her utilization of the Parana River downstream from Itaipu. Claims and counterclaims relate to various environmental, technical, and legal factors -- e.g., flooding, pollution, changes in the ecological balance, changes in power development potential, as well as the legal rights and obligations of riverine states for use of international rivers flowing from one country to another.

State Department anticipates requests for background data and counsel regarding the validity of the various claims, but the data presently at hand are not considered adequate to meet these needs. It has, therefore, requested a geographic research study on hydroelectric power development in the Rio de la Plata Basin to focus particularly on the environmental, technical, and legal factors that pertain to the present controversy over Itaipu.

25X1 [redacted]

A proposed outline is attached.

[redacted]

25X1A

DATE 25 July 73 CHI [redacted] ATE 24July73

25X1A

REPORT RECORD

TITLE

REPORT NUMBER
CIA/BI G

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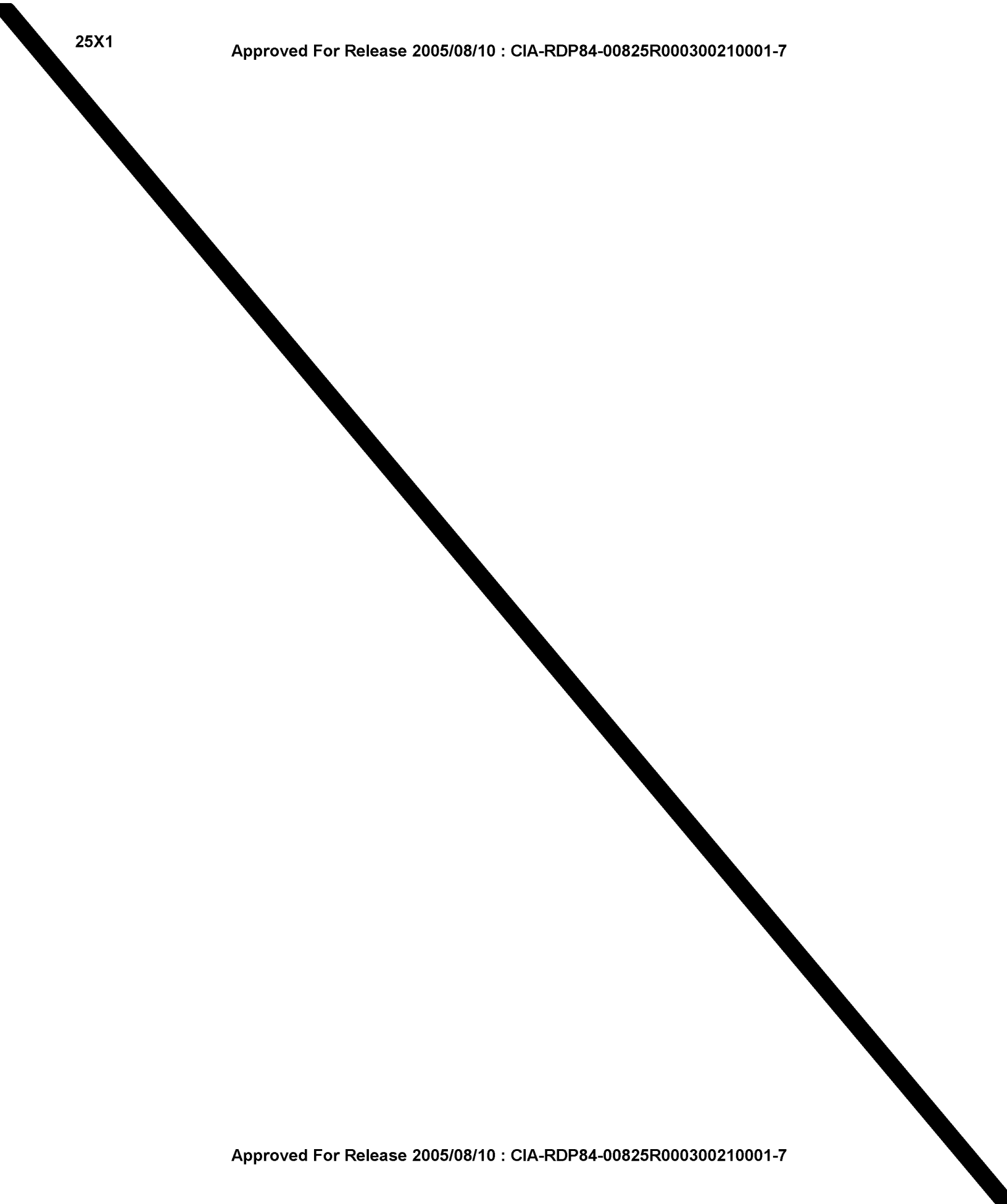

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DEPARTMENT OF STATE

Washington, D.C. 20520

19 JUL 1973

July 18, 1973

STATINTL

MEMORANDUM FOR: [redacted]

SUBJECT : Request for Study on Hydroelectric Power Development in the Rio de la Plata Basin

The Country Directors for Brazil and Argentina have requested that the enclosed memorandum be sent to you regarding a proposed research study which your division may be able to coordinate.

Attachment:
As stated.

G. H. Summ
Director, Office of Research
and Analysis for Africa and
the American Republics
Bureau of Intelligence and Research

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DEPARTMENT OF STATE

Washington, D.C. 20520

FOR OFFICIAL USE ONLY

July 6, 1973

MEMORANDUM

TO: INR/RAR - Mr. Harvey Summ

FROM: ARA/APU - William P. Stedman, Jr.
ARA/BR - Stephen Low

SUBJECT: Request for Research Study on Hydroelectric Power Development in the Rio de la Plata Basin

We have a requirement for research and analysis of the environmental problems arising from the planned construction by Brazil and Paraguay of a large hydroelectric installation at Itaipu on the Parana River. Argentina claims that the installation may adversely affect her own utilization of the river downstream from Itaipu. Claims and counterclaims relate to various environmental, technical, and legal factors--e.g. flooding, pollution, changes in the ecological balance, changes in power development potential, and the legal rights and obligations of riverine states.

The Itaipu Project, as planned, will have the largest generating capacity in the world, and opportunities may arise for U.S. financial institutions and manufacturers to participate in various aspects of the construction phase of the project. We, therefore, anticipate requests for background data and counsel regarding the validity of the various claims. Also, in the event that Argentina should decide to carry her complaints to either the United Nations or the Organization of American States, the U.S. representatives to those bodies would require backstopping. The data presently at hand, however, are not adequate to meet such needs.

In response to informal queries made in October 1972, it was ascertained that intelligence research components in State Department, CIA, and DIA had no ongoing or scheduled research projects on hydroelectric development within the Rio de la Plata Basin.

STATINTL
25X1

More recently, however, it was learned [redacted] 25X1
[redacted]
consider initiating a research project on the Rio de la Plata Basin somewhat similar to CIA/BGI GR 72-10, Amazonian Brazil: Environmental Challenge to Regional Development, if the intelligence need for such a study were established. [redacted] indicated STATINTL that OBGI/GD could focus the study on the environmental problems that obtain with respect to the present controversy. He pointed out that OBGI/GD does not have specialized engineering expertise, but would contact the Bureau of Reclamation or other appropriate U.S. Agencies if assistance were needed in interpreting technical data essential to the report. He indicated that similar procedures would be utilized for legal and other technical aspects of the problem.

Such a project would be of considerable value to our offices. While available source materials are incomplete and some essential data may be unobtainable; as a first step a synthesis of the available data would be most helpful to us. [redacted] 25X1

25X1
[redacted]

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5			
6	DE - To Record		

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XX	APPROVAL		DISPATCH		RECOMMENDATION
	COMMENT		FILE		RETURN
	CONCURRENCE		INFORMATION		SIGNATURE

Remarks:

DD — for info

DDI approved this

I. M.

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