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SUBJECT

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A91-2

FROM: Vice President and Secretary

January 10, 1991

NOTICE OF MEETING

Following an Executive Session (the notice and agenda for which are being distributed separately), commencing at 10:00 a.m. on Tuesday, January 15, 1991, a meeting of the Executive Directors of the Bank and IDA will be held in the Board Room. The agenda is as follows:

AGENDA

1. Annual Report on the World Bank Research Program  
(Fiscal 1990) (R90-239[IDA/R90-158])
2. Proposed Credit - Tanzania (Petroleum Sector Rehabilitation Project)  
President's Memorandum and Recommendation (IDA/R90-162, 7559-TA)
3. Proposed Credit - Djibouti Republic (Second Urban  
Development Project)  
President's Memorandum and Recommendation (IDA/R90-160,  
IDA/R90-160/1, 4692-DJI)
4. Proposed Credit - Uganda (First Urban Project)  
President's Memorandum and Recommendation (IDA/R90-163, 7439-UG)  
-- SPECIAL PROCEDURE --
5. Record of Previous Approvals:
  - (a) India: Bombay Urban Development Project (Credit 1544-IN) -  
Proposed Amendment to the Development Credit and  
Project Agreements (IDA/R90-156)
  - (b) India: Tamil Nadu Water Supply and Sanitation Project  
(Cr. 1454/SF 12-IN) - Proposed Amendments to the  
Development Credit, Special Fund Credit and Project  
Agreements (IDA/R90-161)
6. Other Business:
  - (a) Oral Report on CGIAR Meeting - October 29-November 2, 1990
  - (b) Oral Report on Progress of the Onchocerciasis Control Program
7. Date of Next Meeting

Distribution:

Executive Directors and Alternates  
President  
Senior Vice Presidents  
Senior Management Council  
Vice Presidents, IFC and MIGA  
Directors and Department Heads, Bank, IFC and MIGA  
Secretary, IMF

10

January 10, 1991

Mr. Rajagopalan (o/r)

Subject: Annual Report on the World Bank Research Program (Fiscal 1990)

This is a well written Report; perhaps a bit "smooth" in parts. Interestingly, it gives a great deal of play to sector research both in the review of completed work and future research efforts. It seems to have taken into account the comments at the PRE Committee, particularly on the utility of technical research (in the context of the Highway Design and Maintenance Standards Model).

The Report tries to bring out the link between research, policy and operations rather successfully. It also indicates, perhaps not as clearly as might be required for the large number of new Board members, how Bank policies are formulated and the PRE role in this. In responding to comments it might be useful to try and do this, particularly in view of the current discussion on PRE papers sent to the Board (and Ernie's remonstrations).

The Report also touches briefly on how cross-cutting issues, such as environment, are managed (see last para. xi). Some explanations may be called for.

*Francis*  
Francis

Attachments



# Record Removal Notice



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<b>Document Date</b> 1/5/1991	<b>Document Type</b> Board Record	
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<b>Additional Comments</b> Declassification review of this record may be initiated upon request.		The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information. This Policy can be found on the World Bank Access to Information website.
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## RESEARCH AND PUBLICATIONS POLICY COUNCIL

### Minutes of Meeting of November 6, 1990

Present:

#### Committee

Messrs. W. Thalwitz, Chairman  
V. Rajagopalan, PRSVP  
J. Wood, FPRVP  
G. Pfefferman, CEIED  
A. Shakow, EXTDR  
D. de Tray, RAD  
J. Feather, PUBDR

#### Others

Mr. P. Isenman, PRDDR

### Annual Report on World Bank Research Program

#### INTRODUCTION

Mr. Thalwitz opened the meeting by describing the report as a milestone for this type of endeavor because of its thematic approach and its responsiveness to the Board's desire for an exploration of the relevance of research to the organization. He added that, provided the committee members had equally positive assessments of the report, the conclusions of the meeting would be forwarded to the President's Council on a no-objection basis. He then opened the discussion with two questions which he asked committee members to address. The first concerned the extent to which the report addresses the issue of how RSB research interfaces with other bank research. The second questioned the implications of the lessons drawn in the HDM case study for future technical research initiatives, and more specifically the degree to which the Bank can enter technical research without also engaging in pure or basic research activities.

#### CASE STUDIES

Several speakers made reference to the case studies featured in part I of the report. One commented that these studies establish a good case for how researchers serve the Bank, and help to build bridges between the different functional areas at the Bank. Other comments commended the approach as a unique and interesting way of reviewing the research program, and endorsed the case studies for bringing the research program to life. Another participant referred to the author's memo which summarized and reacted to the points raised in the PRE Management Meeting discussion of the report. The speaker felt satisfied with the author's intention to clarify the purpose and selection criteria for the case studies - to illustrate varied processes and channels of research (memo item 2).

#### TREATMENT OF TECHNICAL RESEARCH

There was general agreement that the lesson the report draws in the HDM case study - that technical research involves collaboration and lengthy involvement - is not in fact a universal problem of technical research, but rather an issue of individual project management. In addition, it was pointed out that the HDM case study implies an element of choice regarding the degree of future Bank involvement in technical research, which is inaccurate since the Bank's commitment to the environment ensures that

there will be significant activity in technical research. Several speakers expressed that the HDM study should draw less limiting and more positive general conclusions for technical research.

#### PERSPECTIVE/TONE OF THE REPORT

One speaker pointed out that the report is written from an insider perspective, and assumes a base of institutional knowledge that new Board members may not have. Another agreed, and suggested that adding an annex of a page or two to provide the context of Bank research (perhaps reprinted from previous reports) would be preferable to changing the body of the report.

#### SCOPE OF THE REPORT

One participant commented that the finance side of Bank is appropriately omitted, since it has not been a major player in the research program. He mentioned intentions for future involvement and several research proposals currently being devised, suggesting a one sentence reference to this potential future activity. In another reference to the memo on the PRE Management Meeting, a participant said that while the report's effort to cover the broad spectrum of Bank-funded research, and not just RSB-supported work (memo item 4), needs to be clarified, it is not a contentious issue. He pointed out the importance of the author's intention to clarify that funding figures do not always accurately reflect the impact of Bank research, which has considerable leverage on external funding as well (memo item 5). Finally, he also remarked that the report's lack of emphasis on administrative detail was a matter of taste and not a critical aspect of the report (memo item 6). A request was also made for citations of research projects and initiatives discussed throughout the report, which the author indicated would be included in the final version.

#### CONCLUSION

Mr. Thalwitz indicated that the conclusions of this meeting would be forwarded to the President's Council on a no-objection basis. He also remarked that there was no operations representation at the meeting, and requested that the author follow up to gain the operational feedback on the report, and to be sure that any relevant operational activity, such as the Argentina Multi-Sector Management Program, is not overlooked.



**Policy,  
Research and  
External Affairs**

## **PRE Policy and Research Papers**

**FY91  
First Quarter**

October 1990

The World Bank

# PRE POLICY AND RESEARCH PAPERS

## FY91 First Quarter

This volume lists papers produced by PRE departments/units in the first quarter of FY91. The classifications are:

- Major Papers
- Books
- Other Policy Papers, Statistical Outputs, Guidelines, Operational Reviews
- Research Papers

Major Papers and Books are listed by author. Other Policy Papers and Research Papers are listed by department, by author.

Bank staff interested in receiving items listed in this volume should contact the originating PRE department/unit.

## GLOSSARY OF UNIT CODES

<i>VP Unit</i>	<i>Department or Other Unit</i>
Development Economics	DECVP Office of the Vice President
	IEC International Economics
	CEC Country Economics
	EDI Economic Development Institute
	RAD Research Administrator
	WDR World Development Report
Sector Policy and Research	PRSVP Office of the Vice President
	AGR Agriculture and Rural Development
	ENV Environment
	INU Infrastructure and Urban Development
	IEN Industry and Energy
	PHR Population and Human Resources
Other	PRESV Office of the Senior Vice President
	EXT External Affairs
	PRD Policy and Review

## MAJOR PAPERS

Ayres, R. "Strategies for the Effective Reduction of Poverty in the 1990s" a joint Bank/IMF background paper for the Development Committee. (EXT)

Ayres, R. and Carter, M. "President's Report to the Development Committee", August 1990. (EXT)

Beckmann, D. "Strengthening the Bank's Works on Popular Participation", July 1990. (EXT)

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Shirley, M. and B. Levy, "Review of the Implementation of the Bank's Action Plan for Private Sector Development and Progress in the Discussion of IFC's Capital Adequacy," Development Committee Paper SecM90-1032. (CEC)

Underwood, J. "The Debt Strategy and Its Impact on Development Prospects for All Severely Indebted Countries," SecM90-1035, September 1990 Development Committee Meeting. (IEC)

Warford, J., "The World Bank and the Environment, First Annual Report, Fiscal 1990." September 1990. (ENV)

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Bulatao, R., et al. World Population Projections, 1989-90 Edition. (PHR)

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Leechor, C. and J. Mintz. "Taxing Foreign Income in Capital-Importing Countries," WPS 499, September 1990.

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Paul, S. "Institutional Reforms in Sector Adjustment Operations: The World Bank's Experience," World Bank Discussion Paper No. 92.

Sheng, A., V. Polizatto, J. Gutierrez, and D. Scott. "Formal Enforcement Powers."

Sheng, A. "Bank Restructuring in Transitional Socialist Economies (TSE): From Enterprise Restructuring to Bank Restructuring," EDI Seminar.

#### DECVP

Chander, R., "Statistical Priorities for Economies in Transition." Paper was presented at Conference on Statistics of Central

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#### EDI

Adamolekun, L., Robert, R., and Laleye, M. "Decentralization Policies and Socio-Economic Development in Sub-Saharan Africa." Prepared Jointly with PAID.

Kudat, A. and Abadzi, H. "Women's Presence in Arab Higher Education: Linking School, Labor Markets and Social Roles," Working Paper.

Long, M. "Financial Systems and Development," Working Paper.

Popiel, P. "Developing Financial Markets in Sub-Saharan Africa," Working Paper.

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Roe, A. "Financial Systems and Development in Africa," Working Paper.

Roe, A. and Popiel, P. "The Restructuring of Financial Systems in Latin America," Policy Seminar Report No. 25.

Saunders, M. "Analysis and Summary of World Bank Activity in Health Insurance," Working Paper.

Sheng, A. "Bank Supervision: Principles and Practice," Working Paper.

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#### ENV

Anderson, D., "Environmental Policy and the Public Revenue in Developing Countries," July 1990. Working Paper No. 36.

Jackson, G., "Pesticides and Pest Management: the Work of the Environment De-

partment 1988-1990," September 1990. Division Paper 13.

Lutz, E., M. Munasinghe, and R. Chander: "A Developing Country Perspective on Environmental Accounting," August 1990. Division Paper 12.

Peskin, H. with E. Lutz: "A Survey of Resource and Environmental Accounting in Industrialized Countries," August 1990. Working Paper 37.

Wilczynski, P., "Environmental Management in Centrally Planned Non-Market Economies of Eastern Europe," July 1990. Working Paper No. 35.

#### EXT

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#### IEC

Claessens, S. "Brief on Commodity Risk Management and Finance."

"Commodity Markets Quarterly Review," September 1990.

Diwan, I. "Extent of World Bank Participation in Brazil's DDSR Operations."

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"Price Data Sheet," July-September 1990.

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"World Bank News: Special Report (Trends in GNP Per Capita and Summary Statistics for 185 Economies)," with EXTIP, September 1990.

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#### IEN

Merrow, and Shangran, "Understanding the Costs and Schedules of the World Bank Supported Hydroelectric Projects," Working Paper 31.

Steel, W., and L. Webster, "Small Enterprise in Ghana: Responses to Adjustment," Industry Series Paper No. 33, September 1990. (IENIN)

Teplitz-Sembitzky, J., "Regulation, Deregulation, or Regulation — What is Needed in the LDC's Power Sector," Working Paper 30.

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Augenblick, M., and B.S. Custer, Jr., "The Build Operate and Transfer (BOT) Approach to Infrastructure in Developing Countries," WPS 498.

Davis, J.D., S. McKnight, IMO Staff, and Others, "Environmental Considerations for Port and Harbor Developments," WB Technical Paper 126.

Douglas, R.A.P., "Port Administration: A Review of the Structural and Legal Aspects," INU 76.

Faiz, A., K. Sinha, M. Walsh and A. Varma, "Automotive Air Pollution: Issues and Options for Developing Countries," WPS 492.

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University of Wales College of Cardiff, "The Management of Port Equipment Maintenance: An UNCTAD Policy Seminar," INU 57.

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- De Melo, J., J. Stanton, and D. Tarr. "Revenue Raising Taxes: A General Equilibrium Evaluation of Alternative Taxation in U.S. Petroleum Industries," *Journal of Policy Modelling*, Vol. 11, No. 3, pp. 425-49.
- De Melo, J. and D. Tarr. "Welfare Costs of US Quotas in Textiles, Steel and Autos," *The Review of Economics and Statistics*, Vol. 77, No. 2, pp. 489-97.
- Devarajan, S. and J. de Melo. "Membership in the CFA Zone: Odyssean Journey or Trojan Horse?" WPS 482, August 1990.
- Easterly, W. "Endogenous Growth in Developing Countries with Government-Induced Distortions," prepared for RAL-II Conference, forthcoming in book.
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- Galal, A. "Does Divestiture Matter? A Framework for Learning From Experience," PRE Working Paper No. 475.
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- Gulati, A. "Incentives for Oilseed Cultivators: Implications for Efficiency," *Journal of Indian School of Political Economy*, May-August, 1990.
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- Jaspersen, F. and K. Shariff. "The Macroeconomic Underpinnings of Adjustment Lending," Working Paper, WPS-511.
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- Lopez, R. and L. Riveros. "Macroeconomic Adjustment and the Labor Market in Four Latin American Countries." In *Towards Social Adjustment: Labor Market Concerns in Structural Adjustment*, edited by G. Standing, ILO-Oxford University Press, Geneva, 1990.
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- Tybout, J., J. de Melo, and V. Corbo. "The Effects of Trade Reforms on Scale and Technical Efficiency: New Evidence from Chile," WPS 481, August 1990.
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- Curran, T. "The Theory and Practice of Agricultural Policy," Policy Seminar Report No. 24.
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- Eguren, A. "Adjustment with Growth in Latin America," Policy Seminar Report No. 22.
- Fernandez, J. "Eficiencia de Mercados y Desarrollo Sectorial Agrario," Working Paper.
- Gulhati, R. "The Making of Economic Policy in Africa," Development Policy Cases — Analytical Case Study No. 4.
- Horton, B. "Morocco: Analysis and Reform of Economic Policy," Development Policy Cases — Analytical Case Study No. 4.
- Lankes, H.P. "Políticas Macroeconómicas y Sectoriales y el Desarrollo Agrario," Working Paper.
- Menéndez, A. and Silva, M. "La Provisión de Agua Potable a los Barrios Periféricos de San Bernardo," Working Paper.
- Moscardi, E. "La Investigación Agrícola en Latinoamerica," Working Paper.
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- ENV**
- Bohm, P., "Efficiency Issues and the Montreal Protocol on CFCs," Working Paper 40.
- Lal, R., and B. Okigbo: "Assessment of Soil Degradation in the Southern States of Nigeria," September 1990, Working Paper 39.
- Lutz, E., and H. Daly, "Incentives, Regulations, and Sustainable Land Use in Costa Rica," July 1990, Working Paper 34.



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## IEC

Acquah, P. and M. Edo. "Role of IMF in Africa," presented at the African External Finance (AEF) Symposium, Washington, D.C., September 17-18, 1990.

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THE WORLD BANK/INTERNATIONAL FINANCE CORPORATION  
**OFFICE MEMORANDUM**

*DVR* *WR* *10/24*  
~~*DFC*~~  
~~*KJ*~~  
RECEIVED  
89 OCT 24 PM 3:28  
1/16  
DEPT. OF ECON. AFFAIRS  
SECTION POLICY & RESEARCH

DATE: October 24, 1989

TO: Mr. Stanley Fischer, Vice President and Chief Economist

FROM: Robert Picciotto, Director, PBD

EXTENSION: 30202

SUBJECT: **Research Support Budget**

1. During the discussion of the FY89 Budget Retrospective at the President's Council meeting on Wednesday, you indicated that the FY89 figures for the Research Support Budget (RSB) on page 1.9 of the report did not reflect the total expenditures of the RSB in FY89. The venue of the meeting did not allow a full elucidation of your concern.

2. In terms of outlays, FY89 expenditures for the RSB actually totalled \$5.6 million. However, of the \$5.6 million, about \$3.0 million had been recorded in previous years' expenditures. With the tightened accrual rules introduced in FY89, the RSB was not authorized to accrue approved but uncommitted RSB expenditures. Therefore, expenses were recorded as \$2.6 million, the net amount expensed after using the "credit" from prior years of \$3.0 million created through the reversal of FY88 accruals. Had the prior accruals practice been continued for another year, an additional \$2.2 million would have been included in the FY89 expenditures estimate which would have reached \$4.8 million, the exact amount budgeted.

3. Thus, while at variance with the "cash outlays" performance of RSB, the \$2.6 million figure is from a budget accounting standpoint correctly stated as the recorded expenses for FY89. In prior years too, recorded expenses were most assuredly different from actual expenses. I agree nevertheless that the shortfall shown in the Retrospective table (although explained in paragraph 1.24) can be misleading, and I propose to include a footnote in all tables showing RSB expenses that will indicate the reason for the variance between FY88 and FY89.

cc: Messrs. Challa  
Murli  
Mrs. Guerra

bc: Mrs. Haug  
Mr. Rajagopalan

**THE WORLD BANK/IFC/MIGA**  
**OFFICE MEMORANDUM**

**DATE:** October 11, 1989

**TO:** RPPC Members 

**FROM:** Dennis de Tray, Research Administrator, RAD

**EXTENSION:** 33480

**SUBJECT:** Draft Annual Report on Research for the Board

1. Please find attached the draft Annual Report on Research prepared for the Board. We will be discussing this at our meeting on Monday, October 16, 1989 at 11:30 in Room D-1204. The draft is scheduled for delivery to the President's Council by c.o.b. October 22th. An accompanying volume, Abstracts of Current Studies, is also being prepared and will describe all the research projects under way in fiscal 1989.

2. If time permits, we will also discuss the attached memo from Richard Lynn to David Hopper on the subject of American Writing Corporation. If not, a second meeting will be scheduled to take up this matter.

Attachments

Distribution: Messrs. D. Hopper  
V. Rajagopalan  
S. Fischer  
A. Karaosmanoglu  
J. Wood  
G. Pfeffermann  
A. Shakow  
J. Feather  
F. Aguirre-Sacasa

The World Bank/IFC/MIGA  
OFFICE MEMORANDUM

DATE: 11-Oct-1989 07:44am

TO: See Distribution Below

FROM: Ann Van Aken, RAD

( ANN VAN AKEN )

EXT.: 31022

SUBJECT: RPPC Meeting

Mr. Hopper has asked me to inform you that the RPPC meeting scheduled for Monday, October 16th at 11:30 in Room D-1204 will only last 45 minutes, and that it is important that you be on time.

DISTRIBUTION:

TO: Visvanathan Rajagopalan	( VISVANATHAN RAJAGOPAL
TO: Stanley Fischer	( STANLEY FISCHER )
TO: Attila Karaosmanoglu	( ATTILA KARAOSMANOGLU
TO: D. Joseph Wood	( JOE WOOD )
TO: Guy P. Pfeffermann	( GUY P. PFEFFERMANN )
TO: Alexander Shakow	( ALEXANDER SHAKOW )
TO: Dennis de Tray	( DENNIS DE TRAY )
TO: James Feather	( JIM FEATHER )
TO: Francisco Aguirre-Sacasa	( FRANCISCO AGUIRRE-SAC

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*Page 7*

*Page 12*

*[Whole papers  
on research  
detail page 15]*

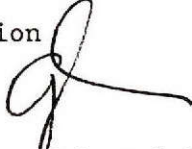
*Part an introductory  
sentence on  
Bank research  
CGIAR  
TDR -  
oncho -*

THE WORLD BANK/INTERNATIONAL FINANCE CORPORATION  
OFFICE MEMORANDUM

~~DWR~~  
2) FXC (his copy)

DATE: October 6, 1989

TO: Distribution

FROM: G. Ingram 

SUBJECT: Discussion of Annual Research Report

RECEIVED  
125  
89 OCT -6 PM 4:38

TO THE VICE PRESIDENT  
SECTOR POLICY & RESEARCH

1. Attached is a copy of the draft Annual Report on Research prepared by the Research Administrator's Office. It is scheduled for discussion at the PPR Managers' meeting which will begin at 2:30 p.m. on Wednesday, October 11, 1989 in Room D-1204. Please note the change from the usual time.

Attachment

Distribution

Messrs./Mesdames W.D. Hopper, S. Fischer, V. Rajagopalan, E. Arrhenius, J. Baneth, R. Chander, R. Chopra, A. Churchill, F. Colaco, D. de Tray, Y. Fortin, A. Hamilton, G. Handwerker, J. Holsen, K. Jones, C. Koenig, R. Liebenthal, J. Linn, M. Petit, R. Picciotto, K. Piddington, L. Pouliquen, A. Shakow, L. Squire, V. Thomas, A. von der Osten, J. Waterston, G. West, C. Willoughby, R. Woodford





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<b>Subject / Title</b> American Writing Corporation				
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<b>Additional Comments</b>		<p>The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information. This Policy can be found on the World Bank Access to Information website.</p> <table border="1"> <tr> <td><b>Withdrawn by</b> Bertha F. Wilson</td> <td><b>Date</b> 15-Jun-23</td> </tr> </table>	<b>Withdrawn by</b> Bertha F. Wilson	<b>Date</b> 15-Jun-23
<b>Withdrawn by</b> Bertha F. Wilson	<b>Date</b> 15-Jun-23			

**ANNUAL REPORT ON BANK RESEARCH**

Date

MEMORANDUM TO THE EXECUTIVE DIRECTORS

BANK GROUP RESEARCH PROGRAM

This is the sixteenth annual review of social and economic research supported by the Bank.

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Recently Completed Projects .....

EXECUTIVE SUMMARY

[to follow]

PART I. THE ADMINISTRATION OF RESEARCH

In July 1987 the World Bank began operations under a new organizational structure and with a new set of institutional priorities. In response to these changes the Bank's research management launched a series of initiatives to rebuild Bank research in ways that would better serve new priority areas. This sixteenth Annual Report on World Bank Research reviews the fruits of this rebuilding phase and discusses research goals and strategies for the next several years.

The base of Bank research is now firm in most critical areas of development policy, reflecting the fact that the program's rebuilding phase is near completion. Some gaps nevertheless remain. The challenge now facing the Bank's research managers is to identify these gaps and to create the institutional environment and incentives to fill them. Making this challenge more difficult is the fact that remaining gaps must be filled in an environment of increasing fiscal austerity but not at the expense of ongoing research programs serving other priority areas.

The first section of this report discusses the Bank's current research priorities and introduces new priorities established in fiscal 1990. It then discusses ongoing activities and new initiatives to increase the value added by the Bank's research resources. The second section reviews the Bank's fiscal 1989 research program administratively and substantively to establish how well the current program is meeting the goals established for research at the time of the reorganization.

## THE EVOLUTION OF BANK RESEARCH

### The Ongoing Program

The Bank's research priorities reflect its operational needs and the President's Special Emphasis areas. Operational needs span almost all areas of economics and the social sciences--and many areas of engineering and physical science. The research response to these needs can be most clearly seen in the structure of



divisions and departments in the Policy, Planning, and Research (PPR) complex--the Bank's principal producers of research--and in their work programs. The second main vehicle for promoting research priorities is the Bank's central research program.<sup>1</sup>

The structure of PPR research and the core of the central research program are heavily influenced by long-standing institutional concerns--macroeconomic policy, trade, agricultural productivity, human resources, infrastructure, and so on. This is as it should be, given the pervasive and enduring nature of these issues. But the Bank and the development problems it faces do evolve and research must evolve apace. The principal signal of these evolving concerns is the President's Special Emphasis Areas.

The President and the Bank's senior management have identified the following areas to receive special emphasis in all aspects of Bank activity: debt, adjustment, financial intermediation, poverty alleviation, food security, environment, natural resources, human resources, the role of women in development, private sector development, and public sector management. Research on these areas of special emphasis now accounts for 70 percent of Bank resources devoted to research. In parallel with ongoing work, new research initiatives are being developed in each of these priority areas, guided by a continuing assessment of issues that need to be addressed in the context of Bank's operational and policy work.

Current work on debt issues is looking at the interwar record on external debt and default to assess its relevance to current problems and policy issues. Work is also under way on the debt problems of middle-income Sub-Saharan African countries that are not eligible for the Bank's Special Program of Assistance (SPA). Investigation of the external financing needs of low-income African countries after the expiration of the SPA in the 1990s has begun and will continue in the next year. So, too, will work on the

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<sup>1</sup> The administrative structure of the Bank's research program is described briefly in appendix 6.

determinants of foreign direct investment flows--to explore ways of expanding direct investment as an alternative to debt finance. In addition to these areas, five other research topics will be emphasized in fiscal 1990: commercial bank behavior and constraints in international lending, the relationship between debt and growth, the relationship between external debt difficulties and internal financial and banking crisis, fiscal aspects of the debt crisis, and continuing analysis of market-based strategies for resolving the crisis.

Research aimed at developing a better understanding of the process of adjustment also forms an important part of Bank's research agenda. A major initiative in this area is the development of macroeconomic models that incorporate key interactions among macroeconomic variables affected by adjustment packages. Other related studies deal with the political economy of adjustment, the role and functioning of labor and financial markets in the adjustment process, the effects of economic policies on domestic saving behavior, and macroeconomic adjustment issues of special relevance to Africa. Stabilization programs also figure prominently in the research agenda. While lessons are being drawn from Latin America's struggle with high inflation, a new study will examine issues of inflation and stabilization in Africa. Another study will trace the macroeconomic aspects of public sector deficits. Studies are also under way on various aspects of adjustment-related reforms including trade policy, public sector finances, financial sector, and public enterprises that will focus on issues of sustainability and sequencing.

Several new studies will also address adjustment issues in the agricultural sector. Modeling efforts are under way to develop a framework for analyzing the consequences of alternative policy packages for reforming agriculture. Work is proceeding as well in the area of agricultural price stabilization and risk management aimed at improving the design of agricultural projects and policies.

New work is beginning in fiscal 1990 on domestic financial intermediation. Small enterprises account for an increasing fraction of industrial output in many developing countries. A major study will

explore the Bank's experience in financing small and medium scale firms over the past 15 years. Another study will look at interrelations between taxation and financial intermediation, and a third will explore financial markets in rural China.

On poverty-related issues, an increasing number of studies are examining the social consequences of adjustment. In particular these studies are looking for targeted policies that are at once affordable and effective in mitigating negative effects of adjustment on the poor. Poverty reduction is also directly or indirectly addressed in an array of sector-specific research. Issues now under investigation with strong poverty components include: raising agricultural productivity on a sustainable basis; facilitating structural change in rural economies; designing effective programs for reducing rural poverty and increasing food security; the efficiency and equity effects of user fees for health, education, water supply, electricity and public transportation; the effects of contractions in the formal market for schooling and employment. Raising the welfare and living conditions of the poor is also the underlying motivation for several studies under way or planned on the effectiveness of family planning and nutrition programs, the causes and consequences of morbidity and mortality, and the contribution of women to household welfare and poverty reduction.

Two major studies are planned that bear on both poverty and food security issues. Population growth and changing patterns of production in Africa are putting new pressure on land tenure systems. A study will explore the role of land rights systems in Africa as a means of understanding the constraints that current systems place on development, and as a basis for designing land rights policies that will foster both economic growth and the efficient use of natural resources. Closely aligned with this study is a second study of rural development policies and the role of rural organizations that will explore how these policies and organizations can be used to promote overall development objectives. A colloquium on "How to Reach the

Poor Through Groundwater Irrigation," organized by the Asia Region in April 1989, has helped identify a number of useful research ideas for future work.

Five projects are planned in natural resource management. A major study will be completed in fiscal 1990 on the political economy of agricultural pricing policies. Smaller studies will be undertaken on the pricing of and investment in natural gas, on hydrological assessment in Africa, on household energy conservation, and on the implications of the boom in metals' prices.

While the research areas described to this point have been singled out to receive special emphasis, they generally are long-standing concerns of the institution. The three remaining areas of special emphasis represent more recent shifts in the institution's priorities. These are: the role of women in development, environmental issues, and the role of the private sector in development.

Women's economic productivity is developing as a new area for Bank research. A recent review of evidence shows that improving women's economic opportunities can achieve gains not only for women but for their families and for the national economy. Ongoing and planned research on women will analyze: the effects of removing barriers limiting women's access to factors of production such as information and credit; the supply of agriculture and other output; the contribution of education, training, and health and family planning services to women's productivity; and the influence of economic policy on women's incentives to work. A major research project just started will explore women's access to and use of public services in Africa.

A growing program of research is also under way in the last two areas of special emphasis, the environment and the private sector. But, in the judgment of the Research Publications and Policy Council (RPPC) and the Research Committee, research programs in these areas have yet to reach a critical mass of

activities. To help promote research in these and other under-researched priority areas, the Research Committee has created a program of Research Special Emphasis Areas, covering issues that frequently cut across institutional boundaries and address newly established Bank priorities. To allow the Research Committee and the Research Administrator's Office to focus resources effectively, the list of topics identified as research emphasis areas is restricted to three to four items--to be reviewed and revised each year, as necessary.

### Research Special Emphasis Areas

Based on a review of the Bank's research needs and of the ongoing research program the Research Committee has singled out three areas for special emphasis in fiscal 1990 and beyond: the environment, the private sector, and socialist economies.

**The Environment.** Environmental concerns are receiving widespread attention throughout the Bank. Topics under study include deforestation and desertification, pesticide management, irrigation and salinity, watershed rehabilitation, and protection of biodiversity. An attempt is also being made to undertake a comparative analysis of air pollution. The groundwork for a policy and research work program, covering both technical/scientific and economic/behavioral issues has been prepared. Economic issues likely to receive priority in research are the relationship between environment and economic growth and poverty, the costs of environmental degradation, and integration of environmental concerns in adjustment lending.

In recognition of environment as a special emphasis area, the Research Committee provided funding to the Environment Department to bring together at the Bank a group of world class experts on environmental issues in collaboration with Environment Department staff. This group, comprising David Pearce (University College, London), Partha Dasgupta (Cambridge University), Antony Fisher (University of California), and Karl-Goran Maler (University of Stockholm) prepared a report setting out a program

of research on the environment. This report, available from the Environment Department or the Research Administrator's Office, serves as a guide to efforts now under way to expand the Bank's research program on environmental issues.

Although the Bank's existing environmental research program is addressing a number of important issues it remains small in comparison to the breadth of issues needing attention. Demands on Environment Department staff to participate in lending operations and to work with groups outside the institution concerned with the environment has limited the development of a program of socioeconomic research on environmental issues to a slower than desired pace. The aim of this research special emphasis effort is to develop the core of a research program that will explore the consequences of development for the environment, as well as the consequences of environmental degradation for development.

**Private Sector Development.** Although the Bank has a long and continuing program of research on public sector management and related issues it has been historically less active on issues of private sector management and the role of private initiative in development strategies. There is now a growing body of evidence indicating that the private sector is leading the resurgence of growth in many developing countries. Promoting private sector growth is not, however, an easy undertaking for the Bank, given its traditional ways of operating. The Bank lends mainly to sovereign governments, deals best with large projects and broad policy advice, and has limited staff resources. And many activities to promote private sector growth amount to doing less rather than more (less regulation, fewer licensing restrictions, and so on), a direction that runs counter to the Bank's traditional activist approach to project development and policy intervention. The Bank's growing emphasis on the private sector as the engine of growth means, therefore, that it must face questions about policy design and implementation--and questions about its role in promoting private sector activities. As with environmental issues, some research is under way, but sustained and in-depth research

on private sector issues has so far been crowded out by the demands for policy advice and operational input on private sector issues.

Studies under way are addressing issues of macroeconomic adjustment and private investment, financial policy and private investment, and the private provision of public services. Studies are also planned on technological change in major manufacturing subsectors, and on the role of strategic alliances and small trading companies for market sharing. Much remains to be done, however. Areas under consideration for future research include the pace and sequencing of private sector development in adjustment programs, issues of regulation and the promotion of competitive markets as a substitute for directed economic interventions, entrepreneurial development in the least developed countries, and privatization of public entities and activities. This list is being augmented by a series of workshops aimed at producing a cohesive strategy for research on private sector issues.

A workshop held in June 1989 and organized by PPR's Public Sector Management and Private Sector Development Division explored key issues in private sector development and proposed a research agenda in the following six areas: private delivery of public services; entrepreneurial development; financial sector development; privatization; enabling environment for private sector development; and regulatory reform. The research topics included some that might be explored through policy or operational work as well as Bank-sponsored research. Participants included staff from AID, UNDP, IFC, MIGA, Bank Operations and PPR, and researchers from universities and research institutes.

**Reform of Socialist Economies.** The economic policy changes under way in almost every socialist planned economy constitute both a remarkable development and a challenge to economic analysis and policy. There appears to be a clear sense that these socialist countries know where they want to end up, but they (and we) are much less certain about how to get there. A growing number of previously planned economies

seem to risk being caught between planning and liberalizing, possibly producing the worst of both worlds. The liberalizing experience of planned economies to date and the challenges for the future have, therefore, been chosen as a third priority research area for the Bank for fiscal 1990 and beyond. The past year has seen a growing interest by the Europe, Middle East and North Africa Region (EMN) and by PPR in research on socialist economies, and the preliminary phases of several research efforts on socialist economic issues are now under way.

During the coming year, the Research Committee will work to accelerate these efforts and to expand them. The starting point for this expansion is a series of workshops designed to produce a coherent game plan for research on socialist economies. Activities in this area have been growing rapidly and significant increases are planned for the future. The Development Economics Department in PPR and the EMN Region co-sponsored a workshop in May 1989. From the workshop, the following topics and sub-topics were suggested as promising areas for future research:

- Conditions of enterprise reform: setting rational prices; insuring competition; providing appropriate incentives to managers; determining ownership relations.
- Effects of economic reforms: performance of firms participating and not participating in reform experiments; performance of state, cooperative and private firms; choice and efficiency of investment; supply response.
- Factor markets and social issues; establishment of capital markets; operation of labor markets; income distribution; safety net.
- Macroeconomic issues: inflation and economic reforms; monetary, fiscal and income policies; foreign trade issues.
- Problems of transition.



A major conference, organized by the International Economics Department, was held in May 1989 that focussed on the issues of measurement and evaluation of the macroeconomic performance of selected centrally-planned economies and Yugoslavia. One of the objectives of the conference was to generate suggestions for fundamental research that would significantly improve the international comparability of CPE statistics and provide a sound basis for economic analysis and policy.

Another major initiative is being launched which will aim, through research and a conference planned for summer 1990, at studying and documenting options for agricultural reforms in socialist countries. It will focus mainly on issues of incentives and organization facing agriculture in Eastern Europe and the USSR. The research work will develop new conceptual approaches and case studies to highlight dilemmas and future possibilities.

The Research Committee, through the Research Administrator's Office, will work closely with Bank staff and external consultants to develop a critical mass of sustainable research in these three research special emphasis areas. Funding will be set aside for workshops and seminars and for the development and support of research projects. In some cases temporary units may be established to promote research in these areas. The objective will be to develop a critical mass of research in these areas that will become self-sustaining within a three-year period.

#### Regional Focus

A special program to improve research on African policy issues is being developed through the Africa Research Initiative and Dissemination (ARID) group, a joint effort by the Africa Region and the PPR's Development Economics Vice Presidency. Under this initiative, three task forces--Macroeconomics and Trade, Public Finance, and Finance and Institutional Development--have been set up to discuss research needs in Africa, to review work presently under way, and to map out a common strategy to get research

started in areas which are of priority but are not getting enough attention at present. The sponsors of the initiative also discussed and endorsed the idea of a conference on African macroeconomic issues for March 1990. The conference would be based on the substantial amount of work already under way in the Bank on African macroeconomic issues. One option under consideration is to hold the conference in Africa at a suitable university or research institute. This would allow for wider interaction with African researchers and assist in capacity building. Another conference is being planned for May 1990 under the theme "Financing Africa's Development During the 1990s." External finance has a critical role to play in the development process in Sub-Saharan Africa. Intensive work now on the appropriate forms of external finance could pay important dividends in the future.

The Africa Region is also launching a program of research on the issues of entrepreneurial development in Africa. With financial support from the Research Committee, a workshop held in November 1988 brought together some twenty international and African practitioners and researchers. Members of the workshop reviewed the state of knowledge on entrepreneurial development in Africa, the constraints impeding it, and the relative merits of different measures to support its development. Issues receiving particular attention were the role and impact of the business/regulatory environment, and the effectiveness of technical assistance/promotion programs and credit schemes in support of micro-enterprises and the informal sector in Africa. The workshop called for the development of a unifying conceptual framework that would link all the issues identified and relate them to broader development goals (aggregate growth and productive employment, enterprise sector development). A research proposal is being prepared that will attempt to articulate such an analytical framework.

#### Other Research

The promotion of research special emphasis topics cannot come at the expense of the many other important areas of development research in which the Bank is active. While recognizing the special needs

of new research priorities, the Bank's research management will continue to encourage work on a broad spectrum of issues that can contribute to a better understanding of development and development policies.

The complexity of the problems it has to deal with requires the Bank to be active in almost all areas of economics and the social sciences--and in many areas of engineering and physical science. To serve these needs for sectoral issues PPR's Sectoral Policy and Research (PRE) Vice Presidency maintains departments in Environment, Industry and Energy, Agriculture and Rural Development, Population and Human Resources, and Infrastructure and Urban Development. PRE's departments and divisions lead Bank research on a host of sectoral issues, many of them long-standing concerns of the Bank and its member countries.

The Development Economics Vice Presidency has two departments to provide research on country and international issues: the Country Economics Department, and the International Economics Department. The divisional structures of these departments signal current research emphases. For Country Economics: Trade Policy, Macroeconomic Adjustment and Growth, Public Economics, Financial Policy and Systems, and Public Sector Management and Private Sector Development. For International Economics: International Trade, Debt and International Finance, International Commodity Markets, International Economic Analysis and Prospects, Socio-Economic Data.

Current research emphases for PPR has been discussed earlier in this report. Details of other research activities can be found in PPR departmental and divisional work programs, brief summaries of which are in appendix 4.

### Building Capacity for Policy Research

In addition to fostering new work in research special emphasis areas, the Research Committee plans to give added emphasis in fiscal 1990 to issues of building capacity for policy research in developing countries, especially those in Sub-Saharan Africa. Building research capacity in developing countries has been a goal of the central research program since its inception, but two features will distinguish this year's capacity-building program from past efforts:

**The development of an inventory of developing country researchers.** With the aid of regional staff and special "recruiting" missions, the Research Administrator will develop a list of developing country researchers and research institutions interested in working with World Bank staff and consultants on problems of common interest. This list will be available to Bank staff and their consultants as they prepare proposals for submission to the Research Committee. The notion here is to lower the cost to Bank sponsors of involving developing country researchers in Bank research to provide a broader forum for on-the-job training in the application of research tools and methods.

**The development and funding of a program of research on the production and dissemination of policy research in Africa.** The past 30 years have seen a substantial investment of resources and effort in attempts to build the capacity for policy research in sub-Saharan Africa. While there are notable successes, one unavoidable message from this experience is that resources alone are not enough. Donors, including the Bank, are poised for another major effort to build research capacity in Africa, yet many ask for assurances that the mistakes of the past will not be repeated. What lessons does the past hold for new capacity-building initiatives? What are the key inputs, both institutional and human, that are essential to the long term sustainability of a policy research facility? Much information exists to provide the base for a systematic assessment of the keys to success in research capacity-building. This program of research will

attempt to codify and analyze this information and to extract from it lessons for the design of future capacity building efforts.

The Research Committee's work on building the capacity for policy research in developing countries will proceed in close association with the Africa Region's African Capacity-Building Initiative and with EDI's continuing program of training and policy seminars in Africa. Although the Africa Region's initiative is taking a broader perspective than just policy research, it clearly recognizes the need in many Sub-Saharan African countries for a serious and sustained investment in research capacity.

#### Research-Related Initiatives

**The Annual Bank Conference on Development Economics.** The Bank's development mandate makes it essential that Bank researchers remain in close contact with the larger development research community. To this end the Research Committee and the Research Administrator's Office have launched a series known as the Annual Bank Conferences on Development Economics. The first of these conferences took place at the Bank in April, 1989 and is described in the next section. Here we preview plans for the second Conference on Development Economics, scheduled for April 1990.

Topics for the second conference range over both sectoral and macroeconomic issues. In keeping with the Research Committee's selection of environmental issues for special emphasis in the research program, one set of papers will be on the theme of environmental sustainability--what we know, and what we need to know, to design effective policy. A second set will consider the transition from stabilization and adjustment to growth. A third will review an area important to the Bank: the evaluation of public development projects and programs, including the role of risk and uncertainty. The final set of papers will focus on the thorny issues that fall under the rubric of population and development. In one sense this is well-trodden ground, but in another it remains an area of high sensitivity and continuing debate. This is

true for issues of the effect of population growth on development and income growth and for issues of the causes of population decline. We hope in this session to clarify the issues and to place the debate on a firmer policy foundation.

To improve the opportunities for discussion and interchange, significant changes have been made in the format of the second conference. Each day of the conference will take the following form. In a morning "plenary" session, two major addresses will be directed to the development community at large, providing reviews and evaluations of research on major policy themes. In the afternoon there will be two concurrent sessions, each focusing on one or two subtopics of one of the broad themes introduced in the morning's plenary sessions. These afternoon sessions will have smaller audiences and are likely to be more technical and analytical. Put another way, the morning sessions will aim to inform a general research audience, and the afternoon sessions will provide a forum for specialists to discuss more technical issues.

**The Research Retreat.** One of the principal roles of the Research Committee and the Research Administrator's Office is to assess the institution's research needs, both current and future. To further this objective, the Vice President and Chief Economist's Office, Policy, Planning and Research, and the Research Administrator's Office sponsored a one and a half day Research Retreat, inviting selected Bank staff and outside researchers. The retreat's purpose was twofold: first, to review the current research portfolio as part of the process of determining areas in which additional research funding is needed; and second, to examine such research-related issues as dissemination and capacity building.

The group discussed the general orientation of Bank research and examined the balance between macroeconomic and sectoral policy research, the balance between longer-term research on basic policy issues and shorter-term research of more immediate operational relevance, and the balance between inward and outward looking research, that is, the extent to which Bank research efforts should be open to outside

research ideas, collaboration, and competition). The group also examined the question of more funding for technical and scientific research as compared with social science research. Participants were unanimous in their views that the Research Committee, besides continuing to fund individual projects, should allocate some funding to encourage programs of research in selected areas. It was based on this recommendation that the Research Committee developed the notion of Research Special Emphasis Areas.

The retreat's discussion of research capacity in developing countries was also useful in shaping the added emphasis in fiscal 1990 on building policy research capacity in developing countries, as discussed earlier in this Report. The retreat also examined the issue of dissemination, to which we turn.

**Dissemination.** Effective dissemination is a perennial issue for the research program. No matter how good or relevant it is, Bank-sponsored research will have little effect on policy if it is inaccessible to development practitioners. Accessibility means more than the presence of a report or article, or the presentation of a technical seminar. Researchers must present results in a fashion that is understandable to nonresearch audiences and that shows clearly the policy implications of the research. This often means downplaying the methods underlying the work and the detail and thoroughness of the work. As the Bank's research program has diversified over the past two years, the challenges of effective dissemination have become ever more acute.

The principal avenue for disseminating research results is the written output of discussion papers, journal articles, and books. Table 6 in the next section shows that Bank researchers were heavy producers of written output during fiscal 1989. The table also highlights the wide array of written products produced by the Bank. While the volume of written material underscores the very high level of research activity at the Bank, it is not, in and of itself, evidence of effective dissemination. A technically complex journal paper comprehensible only to a handful of fellow researchers will not feed effectively into either policy discussions

or policy formulation. The Bank's emphasis on policy research requires its researchers to move one step beyond analytical papers. Careful assessments of the policy implications of findings need to be couched in realistic contexts and in language easily accessible to development policymakers.

Within the Bank's varied written dissemination outlets, Finance and Development (a joint Bank-IMF periodical), The World Bank Research Observer and the Bank's Research News are designed to serve this purpose. The World Bank Economic Review also publishes policy relevant analyses directed to professional economists. But these journals are written for specific audiences and cannot be expected to meet all the Bank's research dissemination needs.

Even with the wide array of dissemination activities, there remains within the institution a concern that we may not be getting full value from each research dollar. This apparent shortfall in the dissemination of research output may be due in part to the Bank's traditional preference for quiet diplomacy over active selling; it may also stem partly from a lack of incentives for staff, or of resources for managers, to pursue effective dissemination activities. Other research organizations generally take a much more aggressive approach to disseminating their products. Bank staff have traditionally shied away from such an approach, but an active dissemination stance may be essential if the Bank is to strengthen its image as a leader in development thinking.

To ensure that research findings achieve their maximum impact, the Office of the Bank's Chief Economist, the Research Administrator's Office, and the Publications Department are reviewing the Bank's research and policy dissemination activities. The aim is to provide an overview of what is being done and of the audiences being served--to determine whether the various elements add up to a defensible whole. The results will not be available for several months, but one point remains clear from the experiences of other research organizations: Good dissemination is costly both in dollars and in staff time. The review



will thus assess the budgetary implications of any proposed changes as well as their likely impact on the value of Bank research.

### The Funding of Research

As the next section shows, departmental allocations of staff time to research have grown substantially since the reorganization, but budgetary authorizations for the centrally administered research program have remained about constant in real terms. This zero growth in the Research Support Budget (RSB) has not been a problem to date. The reason is that the research proposal pipeline was much depleted at the time of the reorganization and has taken several years to build up. Now, however, with the submission of proposals to the Research Committee at an all-time high, the RSB is likely to hit its expenditure ceiling in fiscal 1990.

That the annual RSB authorization will eventually be exhausted through the funding of good research proposals is not, in and of itself, grounds for concern. But a change in the accrual rules governing the RSB means that the date of reaching the RSB budget ceiling will arrive several years earlier than planned. In March this year the Research Administrator's Office was notified that it no longer had the right to carry over RSB funds from one fiscal year to the next. This change in accounting rules resulted in a loss of \$2.2 million of accumulated reserves set aside to service past fiscal year obligations.

Under the new accrual and carryover rules, RSB resources will be much more severely constrained in fiscal 1990 than the Research Committee had any reason to suspect at this time last year. The Bank's management and Board will therefore need to consider much earlier than planned whether the current funding level for centrally administered research projects is consistent with the Bank's research and intellectual leadership goals.

## THE RESEARCH PROGRAM IN FISCAL 1989

Highlights

As the reorganized Bank began operations in fiscal 1987 the Research Publications and Policy Committee and the Research Committee set three goals for the Bank's research program: To shift the emphasis of new work toward questions and issues that would serve the Bank's changing priorities, particularly the President's Special Emphasis areas; to diversify the research project portfolio; to encourage regional staff to participate in the research program. These goals were pursued through departmental and divisional work programs, especially in PPR, and through the centrally funded research program.

One clear indication of management's response to changes in institutional priorities is the organizational structure of PPR's departments and divisions. New departments or divisions were created to serve environmental concerns, issues of the roles of women in development, and private sector issues. Human resource work was strengthened as was policy and research on poverty related issues and food security. Both debt financial intermediation received added emphasis. As table 1 shows under the "Departmental Studies" column, these changes have borne fruit in the form of solid departmental research efforts in most special emphasis areas.

The second major tool for redirecting Bank research is the central research program directed by the RPPC and managed by the Research Committee and the Research Administrator's Office. In the period just prior to the reorganization the centrally funded research program consisted of a few large comparative projects (79 percent of new funding from the Research Support Budget in fiscal 85-86) and many small projects (less than \$50,000) with short durations. To serve new institutional priorities the RPPC and the Research Committee decided to rebuild centrally funded research by redirecting funding away from very large and very small projects and toward medium sized project in the \$100,000 to \$500,000 range.

Table 1. Resources Devoted to Research by Department a/, FY89  
(Current US \$'000; Staffyears)

Department	Centrally Approved Projects				Research Preparation Departmental Studies		Total Research				
	Research Support Budget	Staff		Total Costs	Staff		Staff		Total Research		
	Expenditure b/	Time c/	Cost d/		Time c/	Cost d/	Time c/	Cost d/	Costs e/	%	
<b>DEVELOPMENT ECONOMICS</b>											
International Economics	233.5	1.2	143.2	376.7	16.1	1,982.0	17.2	2,125.3	2,358.8	11.3	
Country Economics	1,082.2	19.1	2,353.8	3,436.0	15.8	1,948.1	34.9	4,302.0	5,384.2	25.7	
Research Administration	888.7	1.4	171.0	1,059.7	1.8	220.3	3.2	391.2	1,279.9	6.1	
VPDEC	31.4	0.3	36.8	68.2	1.0	120.7	1.3	157.4	188.8	0.9	
<b>Total</b>	<b>2,235.8</b>	<b>21.9</b>	<b>2,704.8</b>	<b>4,940.6</b>	<b>34.6</b>	<b>4,271.2</b>	<b>56.6</b>	<b>6,975.9</b>	<b>9,211.7</b>	<b>44.0</b>	
<b>SECTOR POLICY AND RESEARCH</b>											
Agriculture and Rural Development	501.8	4.0	493.2	995.0	6.6	815.9	10.6	1,309.1	1,810.9	8.6	
Environment	20.5	0.7	89.6	110.1	9.5	1,168.5	10.2	1,258.1	1,278.6	6.1	
Infrastructure and Urban Development	189.6	1.2	148.4	338.0	2.7	338.6	4.0	487.0	676.6	3.2	
Industry and Energy	165.3	1.0	119.0	284.3	6.7	825.9	7.7	944.9	1,110.2	5.3	
Population and Human Resources	234.6	3.1	381.5	616.1	19.3	2,381.3	22.4	2,762.9	2,997.5	14.3	
<b>Total</b>	<b>1,111.8</b>	<b>10.0</b>	<b>1,231.8</b>	<b>2,343.6</b>	<b>44.9</b>	<b>5,530.2</b>	<b>54.8</b>	<b>6,762.1</b>	<b>7,873.9</b>	<b>37.6</b>	
<b>REGIONAL OFFICES</b>											
Economic Advisory Office	969.6		0.0	969.6	0.9	139.9	0.9	139.9	1,109.5	5.3	
Africa	182.4	0.0	3.3	185.7	0.1	17.9	0.1	21.3	203.7	1.0	
Asia	62.3		0.0	62.3	0.1	19.2	0.1	19.2	81.5	0.4	
Europe, Middle East & North Africa	134.2		0.0	134.2	4.9	771.5	4.9	771.5	905.7	4.3	
Latin America and the Caribbean	839.4	0.6	92.5	931.9	3.7	586.6	4.3	679.0	1,518.4	7.3	
<b>Total</b>	<b>2,187.9</b>	<b>0.6</b>	<b>95.8</b>	<b>2,283.7</b>	<b>9.7</b>	<b>1,535.1</b>	<b>10.3</b>	<b>1,631.0</b>	<b>3,818.9</b>	<b>18.2</b>	
<b>Other</b>	<b>38.4</b>		<b>0.0</b>	<b>38.4</b>		<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>38.4</b>	<b>0.2</b>	
<b>GRAND TOTAL</b>	<b>5,573.9</b>	<b>32.5</b>	<b>4,032.4</b>	<b>9,606.3</b>	<b>89.2</b>	<b>11,336.6</b>	<b>121.7</b>	<b>15,369.0</b>	<b>20,942.9</b>	<b>100.0</b>	

NOTE: Details may not add due to rounding.

a/ Include all administrative costs except overhead and benefits.

b/ Figures represent disbursements and commitments, and include the \$3.0 million of authorization accrued in prior fiscal years but disbursed in fiscal 1989.

c/ Data on staff time are taken from the Bank's Management Information System. They include regular high level and departmental consultant staff years only.

d/ Cost factors are average unit costs by vice-presidency.

e/ Includes research support budget expenditures and total staff time costs.  
Excludes discretionary funds spent by departments on research activities.

The decision to redirect centrally funded research projects toward medium-sized projects grew out of both substantive and pragmatic concerns. On substantive grounds there was concern in the institution as to the cost-effectiveness and suitability of these large projects for addressing the broad spectrum of policy issues faced by the Bank and its member countries. From a pragmatic perspective, the resource costs of the large comparative studies were such that only a relatively small number of the Bank's research needs could be served at any one point in time. While not ruling out either the comparative approach to research or large projects, the RPPC and the Research Committee instructed the Research Administrator's Office to move quickly to build up a diversified program of medium sized projects aimed at serving the Bank's new agenda of priority issues. Again, as table 1 illustrates, progress has also been substantial in redirecting centrally funded research toward new institutional priorities.

In terms of the substance of Bank research, special emphasis areas now absorb 70 percent of combined departmental and centrally funded research expenditures, with the largest shares going to debt and adjustment (14.7 percent), human resources (11.5 percent), poverty issues (10.8 percent), and public sector management (10.5 percent). However, as we discuss in the first section of this report, in the judgment of the RPPC two special emphasis areas are lagging behind in the development of a "critical mass" of research activities: environmental issues and private sector development. The designation of these two areas as Research Special Emphasis Areas, as described above, should produce a substantial increase in research preparation and research activities in them over the next 12 to 24 months.

The Bank's research portfolio has also diversified substantially since the reorganization because the Research Committee is now processing many more proposals than in the past (86 in fiscal 1989, compared with 53 in fiscal 1988 and 43 in fiscal 1987) and because it is now encouraging projects in the \$100,000 to \$300,000 range. This increase in the research proposal pipeline has led to a 23 percent increase in active projects in comparison to fiscal 1988. And medium-sized projects in the \$100,000 to \$300,000 range now

Table 2. Resources Devoted to Research by PPR Theme a/, FY89  
(Current US \$'000: Staffyears)

By PPR Theme	Centrally Approved Projects				Research Preparation Departmental Studies		Total Research			
	Research Support Budget	Staff		Total Costs	Staff		Staff		Total Research	
	Expenditure b/	Time c/	Cost d/		Time c/	Cost d/	Time c/	Cost d/	Costs e/	%
Adjustment and Growth	1,273.3	3.7	457.1	1,730.4	9.3	1,177.8	13.0	1,634.9	2,908.2	13.9
Private Sector Development and Public Sector Management	526.0	4.0	496.9	1,022.9	8.7	1,099.6	12.7	1,596.5	2,122.5	10.1
Global Outlook, Debt Management	689.0	4.6	568.2	1,257.2	22.0	2,799.9	26.6	3,368.0	4,057.0	19.4
Reforming Financial Systems	280.0	1.1	135.9	415.9	2.3	290.2	3.4	426.1	706.1	3.4
People and Development Process	1,062.5	4.0	490.7	1,553.2	22.7	2,889.1	26.7	3,379.8	4,442.3	21.2
Natural Resource Management	499.0	2.5	314.7	813.7	12.9	1,637.2	15.4	1,951.9	2,450.9	11.7
Technology, Productivity, and Development	173.7	0.0	0.0	173.7	3.2	406.5	3.2	406.5	580.2	2.8
Providing Basic Infrastructure	141.7	11.3	1,397.0	1,538.7	3.9	491.4	15.1	1,888.4	2,030.1	9.7
TOTAL PPR THEMES	4,645.2	31.1	3,860.5	8,505.7	84.9	10,791.7	116.0	14,652.1	19,297.3	92.1
Other			0.0	0.0	2.5	317.8	2.5	317.8	317.8	1.5
Coordination, Publication and Dissemination	928.7	1.4	171.9	1,100.6	1.8	227.1	3.2	399.0	1,327.7	6.3
GRAND TOTAL	5,573.9	32.5	4,032.4	9,606.3	89.2	11,336.6	121.7	15,369.0	20,942.9	100.0

NOTE: Details may not add due to rounding.

a/ Include all administrative costs except overhead and benefits.

b/ Figures represent disbursements and commitments, and include the \$3.0 million of authorization accrued in prior fiscal years but disbursed in fiscal 1989.

c/ Data on staff time are taken from the Bank's Management Information System. They include regular high level and departmental consultant staff years only.

d/ Cost factors are average unit costs by vice-presidency.

e/ Includes research support budget expenditures and total staff time costs.  
Excludes discretionary funds spent by departments on research activities.

Table 3. Resources Devoted to Research by Special Emphasis a/, FY89  
(Current US \$'000; Staffyears)

By Special Emphasis Area	Centrally Approved Projects				Research Preparation Departmental Studies		Total Research				
	Research Support Budget Expenditure b/	Staff Time c/	Staff Cost d/	Total Costs	Staff		Staff		Total Research		
					Time c/	Cost d/	Time c/	Cost d/	Costs e/	%	
Debt Restructuring & Adjustment	1,557.8	2.6	316.7	1,874.5	9.4	1,196.2	12.0	1,512.9	3,070.7	14.7	
Financial Intermediation	178.4	0.8	103.7	282.1	2.3	297.5	3.2	401.1	579.5	2.8	
Food Security	110.6	3.6	444.7	555.5	3.0	377.9	6.6	822.6	933.2	4.5	
Poverty Alleviation	815.0	4.6	575.3	1,390.3	6.8	863.5	11.4	1,438.8	2,253.8	10.8	
Environment	31.8	0.9	117.0	148.8	10.7	1,359.9	11.6	1,476.9	1,508.7	7.2	
Human Resources	417.2	3.9	483.5	900.7	11.8	1,503.1	15.7	1,986.7	2,403.9	11.5	
Women in Development	61.4	0.2	20.5	81.9	3.5	447.5	3.7	468.0	529.4	2.5	
AIDS			0.0	0.0	0.7	89.0	0.7	89.0	89.0	0.4	
Public Sector Management	899.9	4.0	489.7	1,389.6	6.4	812.4	10.3	1,302.2	2,202.1	10.5	
Privatization	364.3	1.4	177.8	542.1	4.0	504.0	5.4	681.8	1,046.1	5.0	
TOTAL SPECIAL EMPHASIS AREAS	4,436.4	22.0	2,729.0	7,165.4	58.6	7,450.9	80.6	10,179.9	14,616.3	69.3	
Other Areas	208.8	9.1	1,131.5	1,340.3	28.8	3,658.6	37.9	4,790.2	4,999.0	25.9	
Coordination, Publication and Dissemination	928.7	1.4	171.8	1,100.5	1.8	227.1	3.2	398.9	1,327.6	6.3	
GRAND TOTAL	5,573.9	32.5	4,032.4	9,606.3	89.2	11,336.6	121.7	15,369.0	20,942.9	100.0	

NOTE: Details may not add due to rounding.

a/ Include all administrative costs except overhead and benefits.

b/ Figures represent disbursements and commitments, and include the \$3.0 million of authorization accrued in prior fiscal years but disbursed in fiscal 1989.

c/ Data on staff time are taken from the Bank's Management Information System. They include regular high level and departmental consultant staff years only.

d/ Cost factors are average unit costs by vice-presidency.

e/ Includes research support budget expenditures and total staff time costs.

Excludes discretionary funds spent by departments on research activities.

accounted for between 50 and 60 percent of new funding, contrasting sharply with the fiscal 1985 and fiscal 1986 figures of 0 percent and 16 percent.

Another important trend is emerging from the growing portfolio of centrally funded research. Although PPR remains the Bank's principal locus of research work, accounting for 82 percent of all research activities, regional involvement in research has grown visibly in the past two years. In fiscal 1987 the regions submitted only eight proposals to the Committee; that number increased to 14 in fiscal 1988 and to 32 in fiscal 1989, a fourfold increase in two years. The regions' increased involvement is reflected in the fact that the operational complex accounted for 25 percent of all research funds approved during fiscal 1989.

Bank research draws on two major sources of funding: the Research Support Budget (RSB) and departmental resources mainly in the form of staff time. The Research Support Budget, administered by the Research Committee, disbursed \$5.6 million in fiscal 1989, compared with \$5.1 million in fiscal 1988 (nominal dollars).<sup>2</sup> This increased expenditure was the result of an increase in the number of centrally funded research projects and from a catching up of delayed expenditures that have resulted in large RSB accrual carryovers for most of the past five fiscal years (see the discussion of accruals at the end of the first section).

The number of staff years reported spent on research or research-related activities (research preparation, for example) increased by 37 percent from fiscal 1988 (88.6 staff years) to fiscal 1989 (121.7 staff years). Virtually all of this increase came in the form of additional inputs into departmentally supported research rather than RSB-supported projects. While this may be partly a recording problem--departments, especially those with active research programs, may find it difficult to separate time spent on RSB-funded

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<sup>2</sup> This disbursement comprised two parts: \$3.0 million from prior fiscal year accruals and \$2.6 million of fiscal 1989 funds.

research from time spent on departmentally funded research--it does represent a significant increase in departmental commitments to research. Even regional staff input into research projects nearly doubled between fiscal 1988 and fiscal 1989, an unexpected trend given the tight staff and budget constraints faced by most regional vice presidencies.

#### Administrative Review

Expenditures on research have absorbed between 3.5 and 3.9 percent of the Bank's administrative budget for the past several years.<sup>3</sup> Research activities represent about 14 percent of all the analytical work the Bank undertakes in support of its operations. Country economic and sector work, and policy analysis, the other two major components of Bank's analytical work account for 60 percent and 26 percent, respectively (table 4).

During fiscal 1989 the centrally funded research portfolio contained 134 projects, of which 64 were new projects, approved during the year; of these 64, 19 were research preparation activities. Forty-nine projects were completed or reached their mandatory closing date during the year. During fiscal 1989 the Research Committee reviewed 86 proposals, 54 from PPR departments and 32 from regional departments. Seventy-two proposals were approved--40 for full funding, 5 for phased funding, and 27 for funding at reduced levels. The approval rate was 84 percent in terms of numbers--that is, 84 percent of proposals submitted were approved--but in dollar terms it was only 55 percent.

Of the 64 new starts in fiscal 1989, 19 were relatively small grants for preparatory work, and the remainder granted funds either for active research or for conferences or colloquia (including the annual conference on development economics). These new starts, which included a relatively high proportion [xx]

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<sup>3</sup> The Bank's research program explicitly excludes research financed under loans and credits and research of a technical nature--for example, the work funded through the Consultative Group on International Agricultural Research.



**Table 4. RELATIONSHIP OF RESEARCH TO OTHER BANK ANALYTICAL WORK AND ADMINISTRATIVE BUDGET**  
**(Current US\$ Million)**

	FY86		FY87		FY88		FY89	
	\$	%	\$	%	\$	%	\$	%
Research	17.5	16.9%	17.0	15.0%	17.4	15.1%	17.6	14.3%
Economic & Sector Work	56.7	54.9%	64.5	56.9%	67.9	58.9%	73.6	60.0%
Policy Work	29.1	28.2%	31.8	28.1%	29.9	26.0%	31.5	25.7%
<b>Total Analytical Work</b>	<b>103.3</b>	<b>100.0%</b>	<b>113.3</b>	<b>100.0%</b>	<b>115.2</b>	<b>100.0%</b>	<b>122.7</b>	<b>100.0%</b>
Memo Item: Research as a % of Bank Administrative Expenses a/	3.9%		3.5%		3.7%		3.5%	
Memo Item: Research Expenditure in constant 1989 dollars	19.2		17.9		17.9		17.6	

a/ Excludes prorated Reorganization transition costs.

**Table 5. New Starts in Fiscal 1989, by Research Theme****ADJUSTMENT AND GROWTH**

- 675-08** Inflation, Price Controls, and Fiscal Adjustment in Africa
- 675-26** Poverty and the Social Dimensions of Structural Adjustment in the Cote d'Ivoire
- 675-30** Macroeconomic Aspects of Foreign Exchange Markets in Developing Countries
- 675-31** Macroeconomics of Public Sector Deficits

**PRIVATE SECTOR DEVELOPMENT AND PUBLIC SECTOR MANAGEMENT**

- 674-72** Land Fragmentation in Rwanda
- 674-80** Conference on Rural Development Policies and the Theory of Rural Organization
- 675-06** Electric Power Utility Efficiency Study
- 675-10** Evaluation of Tax Incentives for Industrial and Technological Development
- 675-12** Diamond and Gold in Sierra Leone: The Small-Scale Sector and Its Role
- 675-20** Taxation in Mexico
- 675-21** Labor Redundancy in the Transportation Sector
- 675-25** Lessons from the Chilean Privatization Experience

**GLOBAL OUTLOOK, DEBT MANAGEMENT, AND TRADE**

- 674-77** Evaluation of Tax and Pricing Policies for Perennial Crop Producers
- 674-89** Costs and Benefits of Market-Based Debt Reduction
- 674-94** Currency, Commodity Price, and Interest Rate Risks
- 674-98** Consequences of Temporary Trade Shocks on Developing Countries
- 675-15** Testing for Systematic Differences in Initial and Final Project Evaluation
- 675-18** Trade Policy Simulation Package

**REFORMING FINANCIAL SYSTEMS**

- 674-88** Taxation of Financial Assets and Financial Intermediation
- 674-92** Capital Markets, Official Finance, and the Third World

**PEOPLE AND THE DEVELOPMENT PROCESS**

- 674-68** Response of Firms in Developing Countries to a Change in Trade Regimes: The Export Subsidy cum Import Tax in Cote d'Ivoire
- 674-81** Expansion of Female Employment in the EMENA Region
- 674-84** National Educational Achievement in Brazil
- 674-85** Effectiveness and Efficiency of Vocational Training and Technical Education
- 674-86** Colloquium on Groundwater Irrigation and the Poor
- 674-87** Household Labor Supply Response to Economic Change, Phase I
- 674-93** Nigeria: Health Care Costs, Financing, and Utilization
- 675-01** Econometric Study of Food Aid in Africa
- 675-02** Adult Health in the Americas
- 675-04** Policy Analysis of Poverty: Applicable Methods and Case Studies, Phase I
- 675-05** Poverty in Nepal
- 675-09** Poverty Alleviation and Adjustment in Malaysia
- 675-14** Women, Public Services, and Income Generation
- 675-22** Poverty, Female-Headed Families and the Welfare of Children and Youth
- 675-23** Collection of Community Data on Access to Family Planning in Zimbabwe
- 675-27** Income Change and Savings: Cote d'Ivoire and Thailand
- 675-28** Human Capital Accumulation in Post-Green-Revolution Rural Economies: Pakistan
- 675-29** Poverty, Growth, and Adjustment in Pakistan

Table 5 (continued)

**NATURAL RESOURCE MANAGEMENT**

- 674-73 Impact of Rural Capital and Labor Availability on Smallholder Tree Planting in Kenya
- 674-91 Consumption Smoothing and Investment in Animal Traction
- 675-07 Management of Instability in Agricultural Export Prices: The Case of Costa Rica

**TECHNOLOGY, PRODUCTIVITY, AND DEVELOPMENT**

- 674-69 New Technologies, Location, and Trade: An Empirical Analysis

**PROVIDING BASIC SERVICES**

- 674-75 Transportation and Agricultural Supply Responses in Africa

of medium-sized (\$100,000 to \$300,000) projects, respond to the priorities of the President's Special Emphasis Areas and to the research themes used by PPR (see table 5).

### Dissemination

Published research output for fiscal 1989 included some [xx] books and [xx] journal articles (see table 6). Policy, Planning and Research staff also produced some [xx] papers for the Policy and Research series and the PPR working paper series. Bank discussion, technical, and occasional papers by PPR staff numbered [xx].

The Bank's two research journals, The World Bank Economic Review and The World Bank Research Observer, as well as the widely circulated Finance and Development (published jointly by the Bank and the International Monetary Fund), already spread the results of Bank research throughout the world, as does the quarterly newsletter Research News. Free distribution of these periodicals in developing countries helps to get research results, particularly results of research funded by the Bank, to libraries, researchers, students, and policymakers with limited access to professional journals. The Review has over 9,000 subscribers in developing countries, the Observer 4,000. The visibility and professional acceptance of both journals have increased markedly under the editorship of Professor Richard Snape, who directed the journals during a two-year leave of absence from Australia's Monash University. This year the journals are being guided by Professor Ravi Kanbur who has joined the Bank on a two-year leave of absence from Warwick University. Professor Kanbur is a distinguished scholar with a very broad interest in development economics. Research News now goes to more than 10,000 subscribers, and several of its popular Research Briefs have recently been highlighted in publication summaries on development education for U.S. secondary schools. To ensure that all those interested in development economics are aware of this considerable output and to keep policymakers apprised of the cutting edge of Bank research, we are launching a monthly Research Bulletin in January 1990.

Table 6. Published Research Output, Fiscal 1989

### Update of Comparative Studies

The comparative studies are a special category of Bank research: long-running, comprehensive studies of basic development issues that extract policy messages through the comparison of experiences among countries. Two of the studies highlighted in part II of this report are completed and in publication; others are nearing completion. The studies have produced a wide array of output, from detailed case studies for individual countries to the synthesis volumes aimed at providing guidelines for policymakers in the Bank and in the developing world in general.

- The Timing and Sequencing of a Trade Liberalization Policy (673-31). Launched in 1984, this study examined trade liberalization in 19 countries, drawing lessons on how to move from a restricted trade regime to an open one. Three volumes, containing eight country studies, are in press and will be on the bookshelves by late 1989. Three other volumes of country studies and a synthesis volume are to be published in 1990.
  
- The Political Economy of Agricultural Pricing Policies (673-64). This study, begun in 1985 and scheduled for closing in December 1989, examines the evolution of agricultural pricing policies in 18 countries and the effect of those policies on trade, output, consumption, income distribution, and resources and the budget. The country studies are being published in the World Bank Comparative Studies on the Political Economy of the Agricultural Pricing Policy. The study on Portugal has been published, the one on Zambia has gone to press, and others are being edited [update]. The country chapters will also appear in three volumes, two of which will go to press by late 1989, and the third by early 1990. A complete draft of the synthesis volume will be available in spring 1990.
  
- The Political Economy of Poverty, Equity, and Growth (673-73). This study explores 21 countries for the interactions among conventional economic variables and public policy goals, the instruments

for pursuing these goals, and the broader social and political context. The individual country studies, begun in 1985, and the comparisons of "twinned" countries with similar or contrasting experiences, were completed in mid-1988. The draft synthesis volume, in four parts, was completed in summer 1989.

- Macroeconomic Policies, Crisis, and Long-Term Growth (673-99). Launched in 1986 and to be completed in 1990, this study focuses on three central questions: Why have some countries succumbed to crisis, and others not? How can countries best get out of crisis and return to a path of sustainable growth? What is the relationship between macroeconomic management in the short and medium terms and long-term development? Phase I of the project comprised studies of 17 countries and workshops on the draft reports of those studies, in June 1987, May 1988, and April 1989. Phase II analyzed critical episodes in each country's study; drafts of the analyses were presented at a workshop in May 1988. Phase III examined the relationship between macroeconomic policies and sustainable growth. Published work includes two papers in the World Bank Research Observer, an article in a Colombian journal of political economy, and the Ohlin Lectures (forthcoming). The completed findings are to appear in separate country volumes and in a synthesis volume that will be published by the Bank in collaboration with a commercial publisher.

- Managing Agricultural Development in Africa (673-04). The MADIA study, completed in 1989, was another large-scale study that was not, properly speaking, among the comparative studies, but it was more like them than other Bank research endeavors. Begun in 1984, the project was intended to fill an analytical gap in understanding the role of external assistance in African countries--and to explain the nature and sources of the agricultural crisis. In June 1989 a symposium of senior policymakers from African countries and the donor agencies that participated in the MADIA study was held in Annapolis, Maryland. Funded by USAID, the meeting focused on ways to disseminate the study's findings and to identify follow-up actions to improve agricultural performance in Africa. Participants concluded that the study's lessons should be translated into donor actions and government policy as soon as possible. They stressed that the

participatory approach of the study should be applied to a broader range of countries and issues. Absorbed by the Africa Regional Office, the MADIA effort has now moved into its operational phase.

#### Outreach and Development

In fiscal 1989 the Research Administrator's Office undertook several "outreach" efforts. Some were designed to lower the cost of operational staff involvement in research work, including funding workshops to help define current knowledge, and to identify research to extend that knowledge. These workshops have produced research agendas in a variety of subjects, such as African entrepreneurship, and a number of proposals are being prepared for submission to the Research Committee in fiscal 1990. Other outreach efforts include the Visiting Research Fellow Program, a series of conferences on development economics, and preliminary work on the development of a research information system.

Visiting Research Fellow Program. The Visiting Research Fellow Program, which brings outside scholars to the Bank for three to six months, is meant to draw the best development research scholars worldwide into the Bank's research activities. The program's goals are to broaden and deepen the Bank's future research capabilities--and to enhance scholarly understanding of the Bank's development research activities, its country and financial operations, and the global challenges it faces. The program brings to the Bank the insights of outside scholars and policymakers who have grappled with development issues and hold independent and diverse views. At the same time, their exposure to the Bank's activities gives them a unique window on development, generating a flow of policy experience and data across a wide range of sectors and countries. Each fellow is expected to foster and shape research initiatives and proposals; take part in research and policy seminars; participate informally in research and policy reviews within the sponsoring unit; consult informally with other parts of the Bank on research issues; prepare publishable papers on development methods, policies, and issues; and prepare a concise report on research priorities for the Bank in his or her area of expertise. The Research Administrator's Office manages the program; the



Central Research Budget covers the cost of research fellows' appointment travel and salary and salary-related expenses. During fiscal 1989 the program was operated on a pilot basis, and seven fellows visited the Bank (see appendix 3 for details).

Annual Bank Conference on Development Economics. The Bank held the first of an annual series of conferences on development economics at the end of April 1989 in Washington, D.C. The aim of the conferences is to bring together Bank staff, development researchers, practitioners, and policy advisors from around the world to focus on important issues confronting development economics today. The conferences are an important vehicle for the Bank to assert its intellectual leadership in development issues. The conferences are also intended to send a signal to the academic and policy communities in the Bank's member countries that the Bank is willing to listen carefully to them in its attempts to find innovative solutions to conceptual and practical problems.

The 1989 conference's keynote address was by Mr. Manmohan Singh, Secretary General of the South Commission in Geneva. Participants discussed six major papers that dealt with the following topics: the Uruguay Round of multilateral trade negotiations; saving behavior in developing countries; social sector pricing policy (mainly in health and education); the role of institutions in development; the policy implications of the new strategic trade theories; and agricultural output response and public policy. About 50 outside researchers, most from Part II countries, attended the conference; more than 400 staff members from all the Bank complexes attended at some time during the conference's two days. The proceedings are being published in a special joint supplement to The World Bank Economic Review and The World Bank Research Observer and will be disseminated widely in the development community.

Research Information System. The Research Administrator's Office began preliminary explorations of the form, requirements, and structure of a research information system for in-house research. To be used first for centrally funded research projects, the system will provide users with the ability to query and search

for research projects by various characteristics, including research theme, topic, regions, individuals involved (both Bank staff and outside researchers), data sets used, and materials published. The system will provide extensive cross-referencing facilities. The Research Administrator's Office has explored linking the Bank's system to research information systems in use at other development research funding agencies. Design work will start in fiscal 1990, and a prototype is likely to be available by the end of the year.

**Appendix 1. RESEARCH AND PUBLICATIONS POLICY COUNCIL**

The Research and Publications Policy Council (RPPC) is the Bank's policy-setting body for both research and publications. It is chaired by the Senior Vice President for Policy, Planning, and Research, with members drawn from senior managers throughout the Bank and the IFC. The RPPC establishes the broad agenda and makes recommendations for Bank research and publication activities. It meets twice a year, more often if necessary.

**Research and Publications Policy Council Members**

David Hopper	Chairman, Senior Vice President Policy, Planning, and Research
Visvanathan Rajagopalan	Vice President Sector Policy and Research
Stanley Fischer	Vice President, Development Economics and Chief Economist
Attila Karaosmanoglu	Vice President Asia Regional Office
Joseph Wood	Vice President Financial Policy and Risk Management
Guy Pfeffermann	Director, Economics Department and Economic Advisor (IFC)
Alexander Shakow	Director, Strategic Planning and Review Department (ex officio)
Dennis de Tray	Research Administrator Policy, Planning, and Research (Research Secretariat)
James Feather	Director, Publications External Affairs (Publications Secretariat)
Francisco Aguirre-Sacasa	Director, External Affairs

## Appendix 2. RESEARCH COMMITTEE

The Research Committee (RC) translates the RPPC's guidelines into a specific agenda for future Bank research, evaluates past research efforts, and oversees applications for funding from the Research Support Budget. The RC meets every month to advise its Chairman, the Bank's Chief Economist, on the disposition of research proposals submitted to it. The Committee judges on the technical merits of these proposals and determines whether they are within the guidelines set by the RPPC. The Chairman of the RC, on the advice of its members, will rule on proposals of \$100,000 or more. A subcommittee of the Research Committee, chaired by the Research Administrator, decides on proposals between \$20,000 and \$100,000, with the Research Administrator alone acting on smaller requests. All proposals are subject to review by external experts and Bank staff, with the extent of review depending on the size and complexity of the proposal. The Research Committee also has responsibility for evaluating broad areas of Bank research and for establishing specific research priorities based on guidelines set forth by the RPPC.

Details of structure and procedures of proposal reviews are spelled out in the Operational Directive 16.00 in Appendix 5.

### Research Committee Members

Stanley Fischer	Vice President, Development Economics and Chief Economist
Dennis de Tray	Research Administrator Policy, Planning, and Research
Nancy Birdsall	Chief, Population and Human Resources Division Latin America and the Caribbean, Country Department I (Brazil)
Anthony Churchill	Director, Industry and Energy Department
Vittorio Corbo	Chief, Macroeconomic Adjustment and Growth Division Country Economics Department
Vinod Dubey	Director, Economic Advisory Staff
Amnon Golan	Director, Asia Technical Department
John Holsen	Director, Country Economics Department
Ravi Kanbur	Editor, <u>The World Bank Economic Review</u> and <u>The World Bank Research Observer</u>
Inderjit Singh	Senior Economist, Industry and Finance Operations Division Asia Country Department III (China)

<b>Lyn Squire</b>	<b>Lead Economist, Country Operations Division Western Africa Department</b>
<b>Andrew Steer</b>	<b>Chief Officer, Country Risk, Risk Management and Financial Policy Department</b>
<b>Ardy Stoutjesdijk</b>	<b>Director, Europe, Middle East, and North Africa Country Department III</b>
<b>Oktay Yenil</b>	<b>Chief Economist, Office of the Regional Vice President Asia Regional Office</b>

**Appendix 3. VISITING RESEARCH FELLOW PROGRAM**

Appendix 4. RESEARCH DIVISIONS IN PPR

Sector Policy and Research

Population and Human Resources Department

Education and Employment  
Women in Development  
Population, Health and Nutrition  
Welfare and Human Resources

Environment Department

Economics and Policy

Agriculture and Rural Development Department

Agricultural Policies  
Production and Services

Industry and Energy Department

Industry Development  
Energy Development  
Energy Strategy, Management and Assessment

Infrastructure and Urban Development Department

Transport  
Urban Development  
Water and Sanitation

Development Economics

International Economics Department

International Trade  
Debt and International Finance  
Commodity Markets  
International Economic Analysis and Prospects

Country Economics Department

Trade Policy  
Macroeconomic Adjustment and Growth  
Public Economics  
Financial Policy and Systems  
Special Studies (MADIA)  
Public Sector Management and Private Sector Development

# Operational Directive

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## Procedures for Review of Research Proposals

### Introduction

1. This directive outlines the rules, procedures, and responsibilities for the review of research proposals by the Research Committee (hereinafter referred to as the Committee). The Committee was established by the Research and Publications Policy Council (RPPC) in January 1988. The functions, responsibilities and membership of the RPPC and the Committee are set out in Annexes A and B, respectively. The Committee establishes overall research priorities (set out in the Bank's annual Reports on the World Bank's Research Program), and evaluates and makes recommendations on individual research proposals submitted for funding from the Research Support Budget. The Vice President, Development Economics and Chief Economist, and the Research Administrator are ex-officio Committee Chairman and Deputy Chairman, respectively. The other members are appointed by the Chairman of the RPPC on the advice of RPPC members.

2. The main objectives of the research proposal review process are the following:

- (a) to ensure that proposals conform to the research priorities laid down by the Committee under the guidance of the RPPC, and to place responsibility with line managers for the substance and operational relevance of the proposals;
- (b) to ensure the technical quality of research proposals; and
- (c) to expedite the research proposal review process.

### Institutional Relevance of Proposals

3. Line managers should consult widely within the Bank to ensure that research proposals have institutional relevance and conform to the research priorities laid down by the Committee.

Department directors whose staff are planning to submit major research proposals are strongly encouraged to organize a workshop to inform interested staff of these plans early in the process. The workshop should be scheduled when the basic approach, data sources, focus (global, institutional, sector, or country) and methodology have been thought through, but before researchers are fully committed to a particular design.

### Regional Coordination and Support

4. Sponsoring departments should coordinate studies involving specific countries or Regions with the appropriate Regional units in Operations. After the studies have been formally submitted to the Committee, the Secretary will arrange for their review by the appropriate chief economist(s) to assess the extent of Regional support and commitment.

### Submission of Research Proposals

5. Proposals may be submitted at any time to the Secretary of the Committee: (a) for proposals below \$20,000, 5 copies should be submitted; (b) for those between \$20,000 and \$100,000, 15 copies; and (c) for those above \$100,000, 30 copies. Form 1699 (Request for Research Support Budget Funding) should be attached to every proposal. The form is available upon request from the Committee's Secretary.

### Duration of Research Projects

6. The Committee will normally consider research projects with planned completion dates of within three years. It will report exceptions to the RPPC.

### Research Preparation Funds

7. The Committee will fund preparatory work on research proposals where necessary, but such funding will not guarantee favorable consid-



eration of the research proposal that follows. Acceptance of research preparation funds constitutes an agreement on the part of the sponsoring department to submit a research proposal to the Committee within six months. Decisions on requests for research preparation funds are made by the Deputy Chairman who may consult other Committee members before reaching a decision.

### Review and Decision Procedures

8. Requests for funding from the Research Support Budget are subject to the following procedures:

- (a) For requests below \$20,000, the Deputy Chairman will decide.
- (b) For requests between \$20,000 and \$100,000, the Deputy Chairman will decide, in consultation with an ad hoc subcommittee which he appoints, and with at least one reviewer outside the Bank. He may also seek other internal reviews from staff with relevant expertise.
- (c) For requests above \$100,000, the proposal will be reviewed by at least two external reviewers and, if necessary, other Bank staff with relevant expertise, and then by an ad hoc subcommittee appointed by the Deputy Chairman. The subcommittee will report on the proposal to the full Committee, which will discuss it and make a recommendation to the Chairman, who will take the final decision.

9. All reviewers, internal and external, will be anonymous. External reviewers will be chosen from an international roster maintained by the Committee. Before formal consideration of research proposals by the Committee or its subcommittees, the sponsors shall receive copies of all reviewers' reports, and may send written responses to the Secretary for submission to the Committee within seven days of receiving the reviews.

10. When a decision is made on a proposal, a Committee memorandum outlining the basis for it will be sent to the sponsors. A synopsis of decisions made on all requests shall be circulated at regular intervals to the Committee and the RPPC.

### Appeal and Resubmission Procedures

11. Decisions on requests for under \$20,000 are final. Adverse decisions on requests for \$20,000-\$100,000 may be appealed, with documented justification to the full Committee, whose decision will be final. For funding requests above \$100,000, appeals may be made to the Chairman of the RPPC. An appeal must be made within one month of receiving the Committee's decision memorandum. A final decision on the appeal will normally be communicated to the sponsor within a month (two months for complex proposals).

12. Unless the Committee explicitly states otherwise in its decision memorandum, any rejected proposal may be revised and resubmitted as a new proposal.

### Supplementary Funding

13. Only under exceptional circumstances will the Committee consider requests for supplementary funding of work previously authorized in an ongoing research project. Requests for supplementary funds to finance research additional to that in the original proposal will be subject to the same review and decision processes as new research proposals.

### Closure of Projects and Completion Reports

14. The Committee will close a project six months after the authorized completion date (as shown in the original proposal), unless the Committee agrees in writing to a request for an extension for a specified period. Sponsors are required to file completion reports on their projects no later than the date of their closure. Completion report forms are available upon request from the Committee's Secretary.

# Operational Directive

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## Quorum

15. The Committee will have a quorum of at least seven members.

## Chairmanship

16. In the Chairman's absence, the Deputy Chairman will act on his behalf. When the Deputy Chairman is absent, the Chairman will designate in writing another Committee member to act as Deputy Chairman. When both are likely to be absent, the Chairman will, in advance, designate in writing another Committee member to act as Chairman or Deputy Chairman, as circumstances require.

## Conflict of Interest

17. No Committee member with direct involvement or with a substantive interest in a proposal under review shall be involved in any way in the review or decision process. Members of an ad hoc subcommittee set up to review a research proposal should not include staff from the department(s) of the proposal's sponsor(s), nor the chief economist(s) if the sponsor is from the chief economist's office. No person having any substantive interest or direct involvement in a proposal shall be appointed as an internal or external reviewer.

Appendix 6. THE RESEARCH PROGRAM IN BRIEF

**Appendix Table 1. RESEARCH SUPPORT BUDGET  
FINANCIAL STATUS OF ONGOING AND RECENTLY COMPLETED PROJECTS  
(Current US\$'000)**

**THE WORLD BANK/IFC/MIGA**  
**OFFICE MEMORANDUM**

**DATE:** October 5, 1989

**TO:** See Distribution

**FROM:** Dennis de Tray, <sup>dt</sup> Research Administrator, RAD

**EXTENSION:** 33480

**SUBJECT:** 1989 Draft Annual Report on World Bank Research

Each year the Office of the Bank's Chief Economist and the Research Administrator's Office are required to report to the Board on the state of the Bank's research program. The attached draft is being circulated to you for your comments and suggestions prior to review by the Research and Publications Policy Council (RPPC) and the President's Council.

As you will quickly note, this is, indeed, a draft. We are still in the process of collecting the last of the data necessary to finalize the report. However, the overall tone and message of the report should be clear in this draft and it is tone and message with which we are most concerned at this stage.

Those of you who participate in the PPR Managers' meetings will have an opportunity to discuss the draft next Wednesday. For those not attending that meeting I would be most grateful for either written comments or a telephone call to me (ext. 33480) or Phi Anh Plesch (ext. 31063) by c.o.b. Friday, October 13.

Many thanks in advance for your suggestions and guidance.

Distribution:

PPR Managers  
Research Committee Members  
Chief Economists  
B. Kavalsky  
D.C. Rao

*attached out: 10/10/89  
vusion*

THE WORLD BANK/IFC/MIGA  
OFFICE MEMORANDUM

DATE: July 11, 1989

TO: Stanley Fischer, VPDEC

FROM: Dennis de Tray, Research Administrator, RAD

EXTENSION: 3-3480

DRAFT

SUBJECT: Research Support Budget - FY90

1. As you know, the Controller's Office (Kim Hannemann) informed us earlier this year (March 28, see Attachment 1) that the Research Support Budget ("RSB") would no longer be allowed to carry over uncommitted funds at the RSB-level from one fiscal year to the next. As I have indicated to both PBD and the Controller's Office, such an abrupt change would materially affect the growth and nature of the Bank's research program at a crucial stage in its post-Reorganization development. I give below a brief history of how we got where we are, and what effect changing the rules will have on the FY90 research program.

2. The debate over how best to manage the central Research Support Budget can be traced back to 1980 and before. There is a substantial paper trail documenting this history which is available through my office, but, for the sake of brevity I discuss here only the principal document governing management of the RSB prior to this year's proposed change. This is a memorandum and attachment to Bank staff from Anne Krueger dated December 20, 1984 (Attachment 2). There is ample evidence that both Accounting and Budget approved the content of Mrs. Krueger's memorandum and the attachment.

3. Mrs. Krueger's memorandum and the attached "Guidelines for the Financial Administration of RSB-Funded Research Projects" state the following: For RSB funded projects "commitments and accruals may be disbursed any time during the authorized duration of the project." That is to say, commitments made in year one of a three-year project stay in effect for the full three years of the project (or, of course, until they are disbursed within the three years).

4. At the RSB level, in recognition of the difficulty of coordinating expenditures from 50 to 100 independently managed research projects, the Research Administrator's Office was permitted to "program and monitor the RSB on a multi-year basis, thereby allowing the RSB to carry over the unused balance of any one-year allocation at year-end -- up to a maximum of 10 percent -- to the subsequent year's budget to accommodate the annual fluctuations in project-level expenditures."

5. Between FY85 and the Reorganization there was a shift in the way in which this carry-over policy was implemented. In FY86, Accounting changed the

way in which accruals and commitments were reported, making it exceedingly difficult to sort out project-level commitments, project-level unspent authorizations, and RSB-level unspent authorizations (see the memo by Mike Gillette dated November 27, 1985, Attachment 3). As a consequence, Laura Cleave, the then Budget Office for VPERS, came to an agreement with Accounting that both project and RSB roll-over would be handled at the RSB level. In practice this amounted to rolling over the difference between each fiscal year's total authorizations (including any past roll-overs) and that year's actual expenditures.

6. This is the system I inherited when I took over the Research Administrator's Office in June, 1987. Pursuing the previously approved practice, my staff continued to accrue allocated but unspent RSB funds from one fiscal year to the next.

7. This practice has led to the accumulation of approximately \$2.5 million of past fiscal year obligations (i.e., project funds originally scheduled for expenditure in previous fiscal years). A significant portion of this slippage occurred in FY88, the first fiscal year following the Reorganization.

8. In previous years Accounting has allowed the Research Administrator's Office to carry over the funds required to service these past-year obligations. The proposed change in the actual method of calculating accruals (see Kim Hanneman's memorandum of June 30, 1989 at Attachment 4) would stop the carry-over of funds at the RSB level to service the obligations, but not of the past obligations themselves. The effect of this change on FY90 research activities is discussed in the following paragraphs. The figures set out below are derived from the table shown as Attachment 5.

9. The FY90 RSB budget allocation is \$5.1 million. Assuming that no FY89 monies are carried forward at the RSB level, from this \$5.1 million we would have to find funds for:

- a. estimated FY90 expenditures, from previously approved projects, of \$3.1 million. This is based on projects ending in FY90 spending 90 percent of the \$1.6 million remaining in their budgets, and continuing projects committing 70 percent of their authorizations (the historical ratio is approximately 60 percent; we expect a tightening of activities as a result of our directives to supervisors to this effect).
- b. estimated expenditure on "administrative" projects (journals, annual conference, Visiting Research Fellow Program) of \$0.6 million.
- c. estimated FY90 expenditures by new research projects (but excluding new initiatives discussed in paragraph 10 below) of \$2 million. This is based, in part, on new FY90 projects already approved by the Research Committee, and on proposals

fully submitted to the Committee and for which we have used a dollar approval rate of 60 percent; we estimate that FY90 expenditures from such projects approved by August 1989 will amount to approximately \$0.63 million. (This is in contrast to the equivalent year-to-date amount for FY89 of \$0.21 million.) As you know, many of the proposal preparation grants made over the course of the last year are now maturing into full-fledged proposals, so we only see an expansion of the proposal pipeline over the foreseeable future.

10. In addition to these "regular" activities, the Research Committee has plans for two new initiatives, the funding for which is not included in 9(c) above. The first of these is a step-up in our efforts to build research capacity in developing countries, especially in Africa. This, we estimate, will take \$500,000 of FY90 funds. The second is the launching of our Special Research Emphasis programs through which we will underwrite research programs (as opposed to projects) in four selected areas. FY90 expenditures on these new programs are estimated to be approximately \$450,000 (90 percent of \$500,000).

11. Projected expenditures on 9(a) and 9(b) above amount to \$3.7 million, which would leave the Research Committee with only \$1.4 million for 9(c) and the new initiatives described in paragraph 10.

12. Based on the above analysis it is clear that no RSB-level carryover from FY89 to FY90 means no new programs, and a likely freeze on new proposals for lack of FY90 funds. Needless to say, I believe that this is exactly the wrong time to be applying the brakes to a carefully nurtured upward trend in centrally funded research activity, especially when the slow-down is a result of an unanticipated accounting change, not any over programming on our part.

13. While I accept the procedures for project-level accruals set out in Kim Hanneman's memorandum, we must have a year to adjust to those procedures. Allowing the continuation of accruals at the RSB level for one additional year would enable us to make good on previous fiscal year obligations which we have carried so far for projects without curtailing new project activity. It will, as well, give project supervisors time to adjust to the new regime.

cc: D. Hopper  
G. Ingram  
R. Picciotto  
K. Challa  
K. Hannemann  
L. Davis  
T. Guerra  
S. Shah  
P.A. Plesch



The World Bank/IFC/MIGA  
O F F I C E M E M O R A N D U M

DATE: 28-Mar-1989 11:37am EST

TO: Phi Anh Plesch ( PHI ANH PLESCH )

FROM: Kim Hannemann, CTRMI ( KIM HANNEMANN )

EXT.: 76857

SUBJECT: FY89 Accruals for Research Projects

As you have probably heard, the accrual process is changing this year. Perhaps reverting is a better term - we're going back to accruing based on specific commitments, which we did prior to FY86. This will have an impact on the current accrual/reversal arrangements for Research Support projects, and there may well be significant budget implications for the Research Support area arising from these changes.

The present arrangement calls for you to provide us with an estimate, by expense category, for the whole of the Research Support expenses for the year. We deduct the June 30 expenses from that estimate, and accrue the balance in 671-99. At end-October - or when accrual expenses are closed, usually a bit later - we "reverse" the balance of the accrual accounts to the current year's Research Support accounts. This has usually resulted in a substantial reduction in current-year expenses - some \$2 million in FY89.

Under the "new" regime, essentially only outstanding and specific consultant, travel and purchase commitments will be accrued. This will probably result in a much lower RSB accrual (and reported FY89 expense), and, in FY90, a much smaller accrual balance reversal. In fact, rather than seeing a large credit entry in FY90, you could just as easily wind up with a small net charge if the projects happen to underestimate their individual commitments.

I would be happy to discuss the situation further with you if you think it would be useful.

CC: Teresa Tidwell ( TERESA TIDWELL )  
CC: Thelma Guerra ( THELMA GUERRA )  
CC: Vilma Mataac ( VILMA MATAAC )

**OFFICE MEMORANDUM**

DATE December 20, 1984

TO See Distribution

FROM Anne O. Krueger, VP, ERS *AK*

EXTENSION 69001

SUBJECT Changes in the Financial Management of the Research Support Budget

At its meeting on September 13, 1984, the Research Policy Council discussed and approved in consultation with PBD and ACT a new system of budgetary control of the Research Support Budget (RSB). Its purpose is to permit better planning and more effective use of RSB resources. It will also permit tighter management and control of the aggregate research budget as well as of individual research projects which are centrally funded.

More specifically, a program budgeting system will be implemented which will permit VPERS to program and monitor the RSB on a multi-year basis, thereby allowing the RSB to carry over the unused balance of any one-year allocation at year-end -- up to a maximum of 10 per cent -- to the subsequent year's budget to accommodate for the annual fluctuations in project-level expenditures. The system will also mean that research project managers will be able to monitor their expenditures against their project's total funding authorizations and not just on a year-to-year basis. All commitments for a given year will be considered as expenditures for that year against the project's total budget, regardless of the timing of the actual delivery of the goods ordered or services contracted. Thus, for RSB-funded projects, there will no longer be any necessity to "decommit" expenditures because a project is delayed or there is a delay in the rendering of goods and services. To help VPERS to better monitor and forecast the aggregate budget, research project supervisors will be asked to submit a status report on each project to the Research Administration Unit in VPERS at regular intervals (three times a year).

These new budgeting and expense monitoring procedures which should make it easier for project managers to track their expenditures are described in the attached "Guidelines for the Financial Administration of RSB-Funded Projects."

The responsibility for adherence to project total funding authorizations will lie with project supervisors and their departments.

The Council also approved the recommendations from the Research Projects Approval Committee that VPERS seek reimbursement for all overexpenditures that were already incurred, either on projects that have been closed or on current ones. For projects closed before September 30, 1984, it has decided to grant a moratorium to all over-expenditures below \$5,000. Such a moratorium does not apply to projects ongoing as of October 1, 1984.

Distribution: Vice Presidents  
Department Directors  
Regional Chief Economists  
Division Chiefs  
ERS Senior Economists  
OPS Senior Economists  
EIS Senior Economists  
Department Administrative and Budget Officers

PAP:

## **Guidelines for the Financial Administration of RSB-Funded Research Projects**

### **General Rule**

Project managers and their departments are responsible for remaining within each project's total funding authorizations. The procedures outlined below will help project sponsors maintain close financial control over their projects and monitor their expenditures, both against each project's yearly authorization and against its total budget. No overexpenditures will be possible under the new system.

### **Commitments and Accruals**

Commitments made in a given fiscal year are considered as expenditures for that year. For RSB-funded projects, there is no longer the necessity to "decommit" expenditures because a project is delayed or because there is a delay in the delivery of services or goods ordered. Commitments and accruals may be disbursed at any time during the authorized duration of the project. For procedures regarding outstanding commitments at the close of a project, see below. ("Outstanding Commitments on Completed Projects".)

### **Budget Transfers**

Where a departmental contribution is agreed upon as part of research funding, a budget transfer to the RPO will normally facilitate tracking of expenditures. Any expenditures, in excess of the RPO budget, should be charged to the relevant budget account. No transfers out of research project budgets will be possible except to correct for mischarges of expenditures. The ACT department will not process any budget transfer from or into an RPO project's account unless it is cleared by VPERS staff. Please submit any requests for budget transfers to Mrs. P. A. Plesch (Room I8-172) for clearance and indicate the reasons for the transfer in the remarks section of the form. The form will be forwarded directly to ACT with a copy returned to the sponsor.

### **Requests for Payment for Equipment**

Any request for payment for equipment to be charged against a project's budget should be first approved by VPERS before being sent to ACT for processing. Please submit such requests to Mrs. P. A. Plesch, (Room I8-172), with a brief explanation as to the intended disposition of the equipment when the project is completed.

## Status Reports

The continued development and support of an effective research program in accordance with the Research Policy Council's guidelines make it imperative that there be good management of the aggregate Research Budget. To assist VPERS and the Research Administration Unit in this task, procedures have been established for improving the information flow between VPERS and individual researchers or research supervisors. These will also help research supervisors to maintain close financial control over their project expenditures.

The Status Report will be our primary management information tool. It contains the financial data and any other information pertinent to the progress and status of the project. This report which will be henceforth distributed three times a year (end-July, end-November and end-March) will request research supervisors to update or reprogram the expenditure flow they expect to incur in their RPO budgets for the current fiscal year as well as for the coming years. The report should be returned to VPERS respectively on August 15, December 15 and April 15.

To allow accurate tracking of aggregate expenditures from the Research Support Budget, it is hoped that research supervisors will report their projected expenditures for the current fiscal year as accurately as possible. As in the past, Status Reports for each project will be sent to the person responsible for channelling the required information and returning the forms to us. Attached is a sample form of the Status Report. The Research Administration Unit in VPERS will supply additional forms upon request.

## Outstanding Commitments on Completed Projects

A project should normally be completed by the date specified in the original proposal. However, according to Operational Manual Statement No. 9.70 paragraph 14, every project is granted a six-month grace period, beyond its authorized completion date and before its account is closed, to allow research managers to tie up loose ends, pay outstanding bills and prepare the completion report. The completion report must be submitted to this office no later than the mandatory closing date of the project. It should include a list of any remaining outstanding commitments on the project along with their numbers and dates. We shall forward that list to ACT so that outstanding commitments continue to be paid subject to the following conditions:

- (i) commitments may be disbursed provided they were made before the project's closing date.
- (ii) Commitments made in excess of the funds authorized for a project will be charged to the department responsible for the project when such commitments were made.
- (iii) Any expenditures or commitments made after the closing date of a project will also be charged to the department responsible for that project.

- (iv) As noted in (i) the cut-off date for outstanding commitments is in principle the mandatory closing date of the project. However, if a completion report is submitted and approved before the project's due closing date, the project is considered closed on the date of the submission and the date will be used as the cut-off date for all outstanding commitments on the project.

Departmental Transfers of Research Projects

When a research supervisor of an RSB-funded project is transferred to another department, the project is automatically transferred to his/her new department unless alternative arrangements for departmental supervision and responsibility have been agreed upon. He/she should notify this office of the transfer and its effective date. Overexpenditures, if any, remain the responsibility of the department(s) under which they were incurred.

Research Administration Unit

December 1984

Litma

File

THE WORLD BANK INTERNATIONAL FINANCE CORPORATION

## OFFICE MEMORANDUM

DATE: November 27, 1985

TO: Mmes. Cleave (ERSVP), Hines (SECGE), Suarez (VPAVP), Via (LEGVP)  
Messrs. Dickerson (CFPPB), Perch (SVPPD), Ruddy (SVPMS), Steel (VPE)

FROM: M. J. Gillette, ACTDR

EXT: 61053

SUBJECT: Yearend Accruals in FY86

1. The process of determining yearend accruals in FY85 was as painful and time-consuming as ever. For several years this exercise, driven by obsession with minute detail, has required a great deal of effort on the part of your staff and mine while contributing little to the accuracy of the final reported expenses. Neither you nor we can continue expending such effort without visible effect.
2. We have long searched for a methodology that would permit us to reduce this effort yet retain sufficient detail for yearend reporting without compromising the financial integrity of the Bank's books, consistency with accounting conventions for determining accruals or the concept of decentralized budget accountability. Some time ago we discussed widely the use of a model based on historical experience for this purpose; however, many of you objected to this suggestion because of unresolved accountability issues. Meanwhile, we have independently concluded that expense patterns are too volatile for this model to produce consistently reliable results.
3. Our review of alternatives led us to consider an avenue we had not previously followed - that of using your third-quarter estimates, generally prepared at the VP level for all expense categories, to indicate what the final numbers should be, then simply deducting the expenses actually recorded through June 30 to arrive at estimated accruals for your VP units. We see the following advantages to this approach:
  - (a) it reduces the overall accrual process effort substantially. No longer will each division have to provide ACT with estimates of 8-10 minor discretionary categories and make petty adjustments (now totalling 12-15,000 transactions or items each June) to individual travel, consultant and other commitments. Instead, the summary estimates you supply us in mid-April each year in connection with the third-quarter review will be used for the purpose of generating accruals at the end of June. Thus one major effort is eliminated without being supplanted by another; and,
  - (b) it keeps the accountability for expense estimates squarely and unequivocally where the budgets and expenses are managed - with the VP units who constitute the business centers of the institution.

4. No approach would guarantee accuracy. We would, however, expect that your estimates will be as accurate as you can make them. In comparing your FY85 third-quarter estimates for several major discretionary and overhead categories to the results to date, we find that in total your figures are reasonably close to the mark - the "mark" being actual disbursed expenses.

5. In conjunction with implementing this approach, we will also do the following:

(a) to dispel the fear of marginally underestimating expenses, we will remove the current policy regarding underaccruals which at present states,

"If accruals of an MC vice-presidential unit are underestimated for the current fiscal year, the balance will show as an expense of the next fiscal year and will be charged to the budget unit which incurred the expense. The budget of the next fiscal year will not be adjusted. The effect of the underaccrual will be that the expenditure authority of the budget unit in the next fiscal year will be diminished by the amount of the underaccrual." (FY86 Budget Implementation Guide, paragraph 4.4)

*RSB will be charged as present credit for over*

Not only is it intimidating, but it has also caused those who understand its implications to inflate their estimates, driving the accruals upward.

(b) in fulfillment of ACT's controllership responsibilities, we will each December - after all payments against accruals have been recorded - prepare a report for your VP units on the final actual expenses of the preceding year, with appropriate reference to your estimates. We also intend to provide a full comparative report on actual results by MC unit to the Managing Committee.

These steps are targeted towards improving estimating accuracy by eliminating the incentives to overaccrue inherent in the present underaccrual policy, and by providing feedback to you on the success of your units' estimating efforts. The report should be considered not a club, but an informative tool to assist you in the subsequent year's budget and forecasting exercises.

6. You are invited to meet with us on Wednesday, December 11 at 2:30 PM in room I-4-206 to air your questions, comments or suggestions regarding this approach. You should contact Pilar San Jose or Kim Hannemann if you wish to discuss beforehand any aspect of particular concern to your area.

cc: Messrs. S. Asanuma/K. Challa (PBD)



The World Bank/IFC/MIGA  
O F F I C E M E M O R A N D U M

DATE: 30-Jun-1989 02:14pm

TO: Phi Anh Plesch ( PHI ANH PLESCH )

FROM: Kim Hannemann, CTRMI ( KIM HANNEMANN )

EXT.: 76857

SUBJECT: Research Support Accrual Practices

1. Earlier today you asked me for a written statement concerning the accrual practices to be applied to research projects. As I have explained on the telephone, in person, and in various written communications, there is no plan to change the practice in place for the last five years whereby Controller's shows against the current year budget, for research projects only, the balances remaining from prior year accruals after the accruals have been deemed paid (usually the end of October). In the case of overaccruals, this will result in an apparent credit or reduction to current year expenses; and in the case of underaccruals, current year expenses will appear to be debited or increased.

2. For accounting purposes, all over- or underaccrued expenses from a previous period have to be reflected in the current year's expenses. The difference for research projects is that, by prior agreement amongst RAD, PBD and CTR, these adjustments are allowed to be reflected against the current year's budget as well - an exception permitted for no other units, but one which does not affect the Bank's financial presentation of expenses, income, or other accounts in the current year.

3. What is apparently causing a budget predicament for Research Support is not any change in the agreement described above, but a change in the method of determining the yearend accruals. For many years the Bank determined accruals using a combination of transaction-specific (using consultant, purchase order and travel commitments) and division-level estimating techniques, which, given the state of budget information systems at the time, was cumbersome, time-consuming, and prone to inaccuracy. This was, however, the method in use when the above agreement was designed, and there was never any intention to permit the accruals for research to encompass any amounts greater than the expenses incurred for the year.

4. In FY86, the method of determining accruals was changed in an attempt to improve overall accuracy and simplify the process. CTR accepted from units, generally at the VP level, estimates by expense category which were supposed to reflect their honest appraisal of expenses incurred. From these estimates, CTR subtracted expenses actually paid by June 30 to arrive at expenses remaining unpaid (accruals). This change in accrual practices, coupled with the arrangement already in effect, unintentionally enabled the research

program accruals to be set to any desired level - up to the budget, for instance - with the knowledge that any unspent funds would remain available in future years.

5. Now, with improved systems, we have returned to a transaction-specific method of determining yearend expense accruals. To create an accrual it is necessary that an action to procure goods or services from an outside supplier or consultant has taken place, that the goods or services are deliverable by June 30, and that the action is recorded in the administrative system (BAS) by the appropriate deadlines. This is really no more or less than what the units' estimates, in past years, should have based upon; since the research program estimates were apparently based on something else, the research program now perceives a budget problem.

6. It must be emphasized that this is a budget problem, not an accounting one. Hiding the problem through accounting mechanisms such as accruals would require that expenses be deliberately misstated, a "solution" which would resolve nothing, and one which is certainly not acceptable to CTR. As we have noted in our recent meetings concerning this issue, we in CTR stand ready to provide whatever assistance we can in an effort to improve the budget management process, but we cannot support suggestions which would lead to a deterioration of the accuracy of the Bank's financial accounts.

CC: Tom Hoopengardner  
CC: Thelma Guerra

( TOM HOOPENGARDNER )  
( THELMA GUERRA )

## Estimated Partial FY90 RSB Expenditures (Includes New Projs Apprvd upto Aug1989 Only)

	<u>Ratios</u>	<u>Authorizations</u>	<u>Est. Expenditures</u>
<b>EXISTING PROJECTS (Recorded upto May 5, 1989)</b>			
FY90 Project Close - Scheduled		\$105.00	
Exp/Authorization Ratio	90%		\$94.50
FY90 Proj Close - Carryover: CStudies (3)		\$1,064.10	
Exp/Authorization Ratio	90%		\$957.69
FY90 Proj Close - Carryover Other		\$474.20	
Exp/Authorization Ratio	90%		\$426.78
Total		\$1,643.30	\$1,478.97
Beyond FY90 Project Close - Scheduled		\$1,111.00	
Exp/Authorization Ratio	70%		\$777.70
Beyond FY90 Project Close - Carryover		\$1,195.00	
Exp/Authorization Ratio	70%		\$836.50
Total		\$2,306.00	\$1,614.20
<b>Total for Existing Projects</b>		<b>\$3,949.30</b>	<b>\$3,093.17</b>
<b>NEW PROJECTS (Apprvd upto Aug 1989 only)</b>			
FY90 New Projs Already Apprvd		\$505.20	
FY90 New Projs Submitted		\$906.80	
Historical \$ Approval Rate by RC	60%		
FY90 Proj Likely Apprvd		\$544.08	
Tot FY90 Projs (by Aug 1989)		\$1,049.28	
Exp/Authorization Ratio	60%		\$629.57
FY90 Admin Projs (entire FY)		\$600.00	
Exp/Authorization Ratio	100%		\$600.00
FY90 Capacity Projs (Entire FY)		\$500.00	
Exp/Authorization Ratio	100%		\$500.00
FY90 Program Funding (Entire FY)		\$500.00	
Exp/Authorization Ratio	90%		\$450.00
<b>Total New Projects (Apprvd upto 8/1989)</b>		<b>\$2,649.28</b>	<b>\$2,179.57</b>
<b>EST. PARTIAL FY90 TOTAL</b>		<b>\$6,598.58</b>	<b>\$5,272.74</b>
<b>(only includes projects likely to be apprvd by Aug 1989)</b>			

**THE WORLD BANK/IFC/MIGA**  
**OFFICE MEMORANDUM**

RECEIVED<sup>113</sup>

1989 JUL 11 PM 3:22

OFFICE OF THE VICE PRESIDENT  
SECTOR POLICY & RESEARCH

*MD*  
7/12

**DATE:** July 10, 1989

**TO:** Distribution

**FROM:** Dennis de Tray, Research Administrator, RAD

**EXTENSION:** 33480

**SUBJECT:** RPPC Meeting - July 12, 1989

1. The RPPC will meet on Wednesday, July 12, 1989 at 4:00 in Room D-1204.
2. Attached is an agenda and supporting materials for the upcoming meeting of the RPPC. This meeting will deal principally with research issues.

DDT:ava

Attachments

Distribution: D. Hopper  
V. Rajagopalan  
S. Fischer  
A. Karaosmanoglu  
J. Wood  
G. Pfeffermann  
A. Shakow  
J. Feather  
F. Aguirre-Sacasa

*Biotechnology →*  
*Irrigation →*

# RESEARCH AND PUBLICATIONS POLICY COMMITTEE

July 12, 1989 Meeting

## AGENDA

### 1. Research Priorities

### 2. Centrally Funded Research Portfolio

The profile of the current RSB funded research project portfolio will be presented for review. Several tables (attached) summarize reviewed research proposals in terms of number, budget size, source, topic, and disposition.

### 3. Visiting Research Fellow Program

The final guidelines for the Visiting Research Fellow Program (attached) will be presented for discussion and comment.

### 4. Other Matters

The Committee will be briefed on the status of year to year RSB budget accruals and how the accrual process may change.

## WORLD BANK RESEARCH PRIORITIES

World Bank research priorities reflect the institution's operational needs and the President's Special Emphasis Areas. The clearest manifestation of these priorities is to be found in structure of divisions and departments in PPR, and in their work programs. The second main vehicle for promoting research priorities is the Bank's central research program.

### PPR Research Priorities

A list of PPR's research divisions, and brief statements of their research goals is attached. The Bank is active in virtually all areas of economics, the social sciences, and several engineering and physical science areas; so, too, is its research program. The primary policy issues now guiding research in PPR divisions are:

- Ecological sustainability in agricultural policy and project development
- Poverty reduction
- Advancing the role of women in development
- Competition and private sector development
- Technology and its role in development
- Macroeconomic adjustment and sustainable growth
- Institutional capacity and economic growth
- International trade and the Uruguay round
- The debt problem, future financial flows, and sustainable growth
- Improving and broadening dissemination of the Bank's data bases.

### The Central Research Program

About half the Bank's research is supported by funds from the central Research Support Budget (RSB). Proposals submitted for funding through the RSB are reviewed for technical merit and policy relevance by a Research Committee made up of individuals from the PPR, Operations, and Finance complexes. In addition to its review mandate the Committee sends each year to the Research and Publications Policy Council recommendations on areas which in its judgment need emphasis above and beyond that given in divisional and departmental work programs. These research special emphasis areas frequently cover issues that cut across institutional boundaries and often address newly established Bank-wide priorities. The list of topics identified as research emphasis areas will be reviewed and revised each year. There will generally not be more than four topics on the list at any point in time.

## Areas of Research Special Emphasis

Because they are under-represented in the Bank's current research portfolio, the Research Committee identified the following three areas for special emphasis in the FY90 central research program:

- The environment — *bring individual, conference activities*
- The role of the private sector in development and how best to encourage it
- Economic reforms in socialist economies —

The Committee, through the Research Administrator's Office, will work closely with relevant Bank staff to develop a critical mass of sustainable research in these areas. Special funding will be set aside for workshops, seminars, and the development and funding of research projects. The Committee has also agreed to emphasize the central research program's research capacity building goals during FY90. Emphasis on capacity building will take two forms in FY90:

- Research on the development of high quality, sustainable policy research institutes in developing countries
- The granting of priority access to central research funds for proposals which, through collaborative arrangements, would strengthen research capacity in developing countries

In addition to its active role in fostering new work in research special emphasis areas, the Research Committee will each year publish a longer indicative list of research topics on which it believes additional research efforts are needed. Research proposals in these areas will, at the margin, receive preference for funding. The Indicative List for FY90 is:

- Urban infrastructure, management, and pollution ?
- Capital flows after the debt crisis
- Population, family planning, and development especially in Sub-Saharan Africa
- Sources and patterns of economic growth ?
- Technology and technology transfer in development ?
- Supply responses during and after structural adjustment
- Social costs of alternative policy paths: adjustment versus non-adjustment —
- The transition from adjustment to self-sustained growth

While these topics will receive priority in terms of central research funding, it remains the case that the Research Committee welcomes any promising research proposal that will contribute to a better understanding of development and the effects of development policies.

*Do literature survey on these: what policy directives can we get out of these?*

*Social Side  
progressing  
Social Security*

*what to ask a line?  
Economists don't have  
an answer?*

*scientific  
Quite a lot going on  
outside Bank  
Some type of  
forum to manage  
an enlarged  
annual program*

*Leadership  
infrastructure } critical  
knowledge base } activities  
development*

*Why not bank  
OECD  
Dev. Research  
Centre  
both that?*

*Land Tenure  
issues*

*more Sectoral  
orientation*

April 30, 1989

TABLE 1

SUMMARY OF RESEARCH COMMITTEE FUNDING ACTIVITY - YTD FY89

<u>Size Category</u>		<u>A</u>	<u>B</u>	<u>C</u>	<u>Total</u>
<u>Total Applications</u>	#	13	19	42	74
	\$th.	3008	1382	660	5050
Pending Proposals	#	7	3	1	11
	\$th.	1065	246	17	1869
<u>Total Approvals</u>	#	5	15	35	55
	\$th.	609	851	442	1902
At Full Funding	#	1	9	19	28 <del>x</del> 29
	\$th.	214	655	310	1179
At Reduced Fund	#	2	4	16	20 <del>x</del> 22
	\$th.	200	161	132	493
At Phased Fund.	#	2	2	0	4
	\$th.	195	35	0	230
<u>Total Rejections</u>	#	1	1	6	8
<hr/>					
%Funds Approved		31%	75%	69%	60%
%Proposals Approved		83%	83%	85%	87%

Note      A: Requests above \$100,000  
               B: Requests between \$20,000 and \$100,000  
               C: Requests below \$20,000



April 30,1989

TABLE 2

DISTRIBUTION OF PROPOSALS BY SIZE CATEGORY AND BY VICE-PRESIDENCY

FY88 AND FY89(YTD)

	Total	A	B	C
<u>All Applications</u>	<u>127</u>	<u>27</u>	<u>34</u>	<u>66</u>
PPR	82	23	22	37
PRE	40	15	10	15
DEC	42	8	12	22
REGIONS	43	4	10	29
Africa	12	2	3	7
EMENA	8	1	2	5
Asia	7	--	2	5
LAC	16	1	3	12
OTHER	2	--	2	--

Note: A: Requests above \$100,000  
B: Requests between \$20,000 and \$100,000  
C: Requests below \$20,000

April 30, 1989

TABLE 3

CENTRAL RESEARCH FUNDING DECISIONS - FY87, FY88, FY89

	<u>FY87</u> (REPAC)	<u>FY88</u> (RC)	<u>FY89(YTD)</u> (RC)
(a) Total number of applications	43	53	63 <sup>a/</sup>
(b) Total amount requested (\$th.)	4,842	5,037	3,181
(c) Total number of approvals <sup>b/</sup> % of all applications	25 58%	46 87%	53 87%
(d) Total amount approved (\$th.) % of all amount approved	1,342 28%	2,866 57%	1,902 60%

55 in Table 1

a/excludes pending applications

b/include all projects approved for full, reduced or phased funding

April 30, 1989

TABLE 4

REGIONAL PARTICIPATION

FY87, FY88, FY89(YTD)  
(Amount in \$ thousand)

	<u>FY87</u>	<u>FY88</u>	<u>FY89</u> (YTD)
# of Regional Applications	8	14	29
% of All Applications	19%	26%	39%
\$ Amount Requested by Regions	\$270	\$1,183	\$1,019
% of All \$ Amount Requested	6%	24%	20%
\$ Amount Approved for Regions	\$234	\$ 712	\$433 <sup>a/</sup>
% of All \$ Amount Approved	17%	25%	23% <sup>a/</sup>

a/excluding pending proposals

RESEARCH COMMITTEE FUNDING  
ACTIVITIES BY SUBJECT CATEGORY  
(July 1, 1988 - May 10, 1989)

	Number of Proposals	%	Amount Requested (in th.)	%	Amount Approved (in th.)	%	Approved As % of Requested
<b>Special Emphasis Areas</b>							
Debt and Adjustment	10	15.4	223.9	6.3	144.5	6.4	64.5
Financial Intermediation	5	7.7	148.7	4.2	145.6	6.4	97.9
Food Security	1	1.5	20.0	0.6	20.0	0.9	100.0
Poverty Alleviation	9	13.8	784.9	22.3	439.3	19.4	56.0
Environment	2	3.1	61.2	1.7	29.2	1.3	47.7
Human Resources	10	15.4	538.2	15.3	420.6	18.5	78.1
Women in Development	1	1.5	213.7	6.1	213.7	9.4	100.0
AIDS	1	1.5	12.8	0.4	7.0	0.3	54.7
Public Sector Management & Private Sector Development	3	4.6	35.0	1.0	29.0	1.3	82.9
<b>Total</b>	<b>42</b>	<b>64.6</b>	<b>2,038.4</b>	<b>57.8</b>	<b>1,448.9</b>	<b>63.8</b>	<b>71.1</b>
<b>Other Areas</b>							
Macroeconomics and Int'l Trade	5	7.7	179.7	5.1	147.8	6.5	82.2
Agriculture & Rural Development	7	10.8	587.0	16.6	351.1	15.5	59.8
Industry and Energy	6	9.2	568.7	16.1	181.4	8.0	31.9
Urban Development	2	3.1	18.9	0.5	11.5	0.5	60.8
Other	3	4.6	134.0	3.8	129.0	5.7	96.3
<b>Total</b>	<b>23</b>	<b>35.4</b>	<b>1,488.3</b>	<b>42.2</b>	<b>820.8</b>	<b>36.2</b>	<b>55.2</b>
<b>GRAND TOTAL</b>	<b>65</b>	<b>100.0</b>	<b>3,526.7</b>	<b>100.0</b>	<b>2,269.7</b>	<b>100.0</b>	<b>64.4</b>

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - JUNE 30, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
1. Income Change and Savings: Cote d'Ivoire and Thailand	PHR	J. van der Gaag	\$98,000	8/25/88	12/12/88	Approved. Awaiting sponsor's response to two conditions. (Decision delayed by delayed completion reports.
					1/30/89	Response to condition received.
					12/12/88	Approved; Subject to sponsor having access to 3rd year data; conditions not yet fulfilled.
2. Poverty and the Social Dimensions of Structural Adjustment in Cote d'Ivoire: Policy Oriented Analysis, 1985-88	AF1	C. Grootaert	\$265,000	9/19/88		Approved at reduced funding (\$75,000 maximum) if resubmitted as research application.
					2/23/88	Sponsor appealed decision to Fischer.
					4/11/89	Sponsor submitting supplementary statement with a revised budget requested.
					5/2/89	Approved for \$100,000
3. Policy Analysis in Poverty: Applicable Methods and Case Studies Phase I	AGR	M. Ravallion	\$120,000	10/25/88	2/10/88	Staged funding recommended. Phase I (\$25,000) approved. Funding of Phase II (\$95,000) conditional on resubmission of acceptable revised proposal.
					4/4/89	Revised Part II submitted;
					5/12/89	Phase II approved.

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - JUNE 30, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
4. Consumption Smoothing and Investment in Animal Traction	LA2	H. Binswanger	\$20,000	10/19/88	11/22/88	Approved
5. Electric Power Utility Efficiency Study	IEN	G. Schramm	\$400,000	11/8/88	2/3/89 2/7/89 2/14/89	Pilot study required; should not cost more than \$75,000. Additional funding conditional on resubmission of revised proposal. Conditions agreed. Funds release for pilot phase (\$75,000).
6. Inflation, Price Controls & Fiscal Adjustment in Africa	CEC AF6	A. Chibber M. Walton	\$75,500	11/2/88	2/22/89	Approved
7. An Evaluation of Tax Incentives for Industrial and Technological Development: Empirical Approaches and Applications	CEC	A. Shah	\$93,400 \$99,900	11/4/88 1/17/89	1/10/89 2/6/89	Subcommittee asked for clarification. Clarification provided with new budget. New budget approved.
8. Management of Instability in Agricultural Export Prices: The Case of Costa Rica	AGR IEC	P. Hazell T. Priovolos	\$99,500	11/30/88	2/16/89	Approved
9. Costs and Benefits of Market Based Debt Reductions	IEC IEC	S. Claessens I. Diwan	\$17,000	11/1/88	11/15/88	Approved
10. Currency, Commodity Price & Interest Rate Risks	IEC IEC	T. Priovolos S. Claessens	\$20,000	11/2/88	12/12/88	Approved
11. Taxation of Financial Assets and Financial Intermediation	CEC CEC	P. Honohan C. Leechor	\$20,000	11/8/88	11/14/88	Approved

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - JUNE 30, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
12. Impact of Growth and Adjustment Policies on Four African Countries (Res. Prep.)	AFR	S. O'Brien	\$19,000	11/8/88	12/5/88	Approved for \$7,500 Awaiting sponsor's response.
13. Public Sector Deficits, Stabilization and Growth (Res. Prep.)	CEC	V. Corbo	\$18,500	11/08/88	12/5/88	Approved for \$12,000;
14. Formal and Informal Private Market Contractual Arrangements (Res. Prep.)	LAT	T. Glaessner S. Goswami	\$6,000	11/09/88	12/2/88	Approved for \$4,000;
15. African Entrepreneurship/Private Sector Development Study (Research Preparation)	AFT	P. Ballard	\$20,000	11/15/88	11/21/88	Approved
16. Economic Impact of Adult Deaths from AIDS in Sub-Saharan Africa (Res. Prep.)	PHR	M. Over	\$12,760	11/28/88	12/9/88	Approved at smaller budget (\$7,000);
17. Women, Public Services and Income Generation	PHR PHR	A. Duncan B. Herz	\$213,700	12/14/88	3/10/89	Approved
18. Int'l Fisheries Research	AGR	E. Loayza	\$200,000	12/29/88	2/27/89	Rejected, because nature of work is not research; but offer of seed money for proposal preparation
19. Poverty Alleviation and Adjustment in Malaysia	AS2	H. Kharas	99,800	12/8/88	2/22/89	Approved, but funds to be released in 2 tranches; 1st tranche \$20,000

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - JUNE 30, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
20. Comparative Study of the Political Economy of Agriculture Pricing Policy (Supplemental Request for RPO 673-64)	CEC	M. Schiff	80,700	12/21/88	1/10/89	Approved at reduced budget (\$50,000)
21. Testing for Systematic Differences in Initial and Evaluations	IEC OED	R. Duncan P. Duane	\$97,950	12/29/88	3/14/89	Approved
22. Econometric Study of Food Aid in Africa	AFR AFR	S. Reutlinger	\$20,000	12/19/88	1/4/89	Approved
23. Electric Power Utility Efficiency Study (Res. Prep.)	IEN	G. Schramm	\$9,000	12/19/88	12/23/88	Approved for \$6,500
24. <u>Adult Health in the Americas</u>	LA1	J. Briscoe	\$15,000	12/22/88	1/9/89	Approved
25. Trade Policy Stimulation Software	CEC	J. de Melo	\$20,000	12/23/88	2/3/89 3/14/89	Approved up to \$10,000 on cost share basis. Cost-sharing accepted.
26. Poverty, Growth and Adjustment in Pakistan	PHR EMI	J. van der Gaag M. Cohen	\$216,000	1/27/89	4/6/89	Part A and C rejected with possibility of resubmission. Part B approved with 2 provisos.
27. Vetiver Grass and Its Role in Soil & Moisture Conservation (Research Preparation)	AST	R. Grimshaw	\$42,000	01/11/89	2/3/89 3/13/89	Approved at a reduced budget (\$10,000) Sponsor accepted
28. School Quality and Education Outcomes in Rural Brazil (Supplementary for Dissemination) (RPO 672-93)	EMT	R. Harbison	\$19,910	01/26/89	2/21/89	Approved



RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - JUNE 30, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
29. Mega-Cities Project (Research Preparation)	INU	K. S. Lee	\$10,000	01/31/89	2/21/89	Rejected in principle; because of scepticism about approach to the study; but offer to co-share half of the cost. No response yet from sponsor.
30. Policies for Addressing Regional Unemployment (Research Preparation)	EM4	Y. Sumi	\$10,000	1/27/89	3/6/89	Approved for \$6,000
31. Expanded Analysis of Rural Education Policies: Primary School Achievement in Rural Northeast Brazil (Supplement for RPO 672-93)	PHR	R. Harbison	\$62,000	2/23/89		Approved for \$58,000
32. Poverty in Nepal	AS1	Karcher	\$19,700	2/3/89	2/6/89	Approved
33. Antidumping: A Problem in International Trade (Research Preparation)	DEC	M. Finger	\$3,800	2/7/89	2/8/89	Approved
34. Consumption Smoothing with Commodity Bonds and Evolution of Sovereign Debt Contracts	IEC	T. Priovolos	\$20,000	2/8/89	3/6/89	Rejected because of bad quality of proposal
35. Diamond and Gold in Sierra Leone: The Small-Scale Sector and Its Role in the Economy	AF4 AF4	R. Fennell L. Squire	\$18,000	2/27/89	3/6/89	Approved
36. Planning Conference on Centrally Planned Economies	IEC	J. O'Connor	\$41,900	5/04/89	3/28/89	Approved at reduced budget (\$18,000); No response from sponsor yet.

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - JUNE 30, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
37. Workshop on Research on Socialist Economies	EM4	F. Dhanji	\$16,000	3/6/89	3/8/89	Approved
38. Taxation in Mexico	LA2	I. Nabi	\$17,600	3/6/89	3/10/89	Rejected
39. Political Economy & Management of State Oil & Mining Companies (Research Preparation)	CEC	A. Israel	\$9,000	3/2/89	3/9/89	Approved at a reduced budget (\$5,00)
40. Health Insurance in Developing Countries (Research Preparation)	LAT	J. Andreu	\$6,500	3/6/89	3/10/89	Approved
41. Labor Redundancy in the Transportation Sector (Revised Proposal)	INU	A. Galenson	\$189,010	4/3/89	5/9/89	Approved
42. Taxation in Mexico (Resubmission)	LA2	I. Nabi	\$17,600	4/1/89	4/20/89	Approved
43. Macroeconomic Aspects of Foreign Exchange Markets in Developing Countries: Multiple Markets and Black Markets	CEC	M. Kiguel	\$265,000	3/20/89	6/27/89	Approved
44. Lessons from the Chilean Privatization Experience to Help the Brazilian Privatization Process	LA1	S. El Baroudy	\$65,000	3/15/89	5/26/89	Approved
45. Human Capital Accumulation in Post Green Revolution Rural Economies: Pakistan	EM1 EM1	M. Cohen C. Allison	\$84,000	3/15/89	6/10/89	Approved
46. Macroeconomics of Public Deficits	CEC CEC CEC	W. Easterly K. Schmidt-Habel C. Rodriguez	\$315,000	4/7/89	6/30/89	Approved

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - JUNE 30, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
47. Policy Analysis of Poverty: Applicable Methods & Case Studies (Resubmission of Part II)	AGR	M. Ravallion	\$95,000	4/4/89	6/12/89	Approved
48. Trade Reforms in SAL: A Positive Analysis of Performance and Sustainability	CEC	J. de Melo	\$96,750	4/29/89	6/30/89	Approved
49. Female Headed Households in Brazil	LA1	L. Fox	\$17,150	4/28/89	5/26/89	Approved
50. Planning Conference on Centrally Economies	IEC	J. O'Connor	\$18,000	5/4/89	5/26/89	Approved
51. Collection of Community Data Access to Family Planning in Zimbabwe	PHR	S. Cochrane	\$20,000	5/18/89	5/26/89	Approved

# FOR YOUR INFORMATION

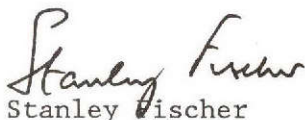
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FYI/89/75  
July 10, 1989


## VISITING RESEARCH FELLOW PROGRAM

We are pleased to announce the launching of a Visiting Research Fellow Program for the Bank. This program is one of several new initiatives designed to increase the flow of information and ideas between Bank staff and the larger world of policy researchers and development specialists.

The attached Research Update sets out the program's rationale, defining characteristics and application requirements. Application forms may be obtained from the Secretary to the Research Committee, Ms. Phi Anh Plesch. Questions should be directed to Mr. Shekhar Shah (ext. 31062), Deputy Research Administrator, who will oversee the program.



Stanley Fischer  
Vice President, Development Economics  
and Chief Economist  
Policy, Planning, and Research



Dennis de Tray  
Research Administrator  
Policy, Planning, and Research

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# UPDATE

## Visiting Research Fellow Program

The World Bank is launching a Visiting Research Fellow Program to draw the best development research scholars worldwide into its research activities. The program will be funded by the Bank's Research Committee through the central Research Support Budget, and will be managed by the Research Administrator's Office in PPR. The program has two objectives. The first is to broaden and deepen the Bank's future research capabilities. The second is to enhance scholarly understanding of the Bank's development research activities, its country and financial operations, and the global challenges it faces.

The Bank's research activities are aimed at a greater understanding of the development process and the factors that enhance and constrain it. In this undertaking, it is vital that the Bank use the insights of outside scholars and policymakers who have grappled with development issues and who can bring independent and diverse views on development to the Bank. Particularly in new areas of development research, visiting fellows can do much to shape the Bank's future research activities, and thereby increase the potential effectiveness of our country operations.

At the same time, the Bank's activities themselves provide a unique window on development, generating a continuous flow of policy experience and data across a wide range of sectors and countries. The Visiting Research Fellow Program will provide an opportunity to make this information more accessible to outside researchers and thus to increase its potential value, both within and outside the Bank, as a basis for understanding development processes and policies.

During their term of a minimum of three to a maximum of six months, research fellows will be sponsored by one or more units of the Bank in Washington, D.C., where they will be based. They will have considerable latitude

in their work. However, an essential requirement of the program is that the visiting fellow should generate *research externalities* for Bank staff, in the sponsoring unit and in other parts of the Bank. The following activities are expected to generate such externalities:

- Fostering and shaping new research initiatives that would result in one or more research proposals to be submitted to the Research Committee from the sponsoring unit
- Taking part in relevant research and policy seminars at the Bank
- Participating informally in the research and policy review activities of the sponsoring unit
- Informal consulting with other parts of the Bank on research issues
- Preparing publishable research papers on development methods, policies, and issues

In addition, each fellow will be required to prepare, based on the Bank visit, a concise report (not more than five single-spaced pages) for the Research Committee on research priorities for the Bank in his or her area of expertise.

Candidates sponsored by different parts of the Bank are likely to have different backgrounds. Research-oriented units, principally but not exclusively in PPR, would be expected to nominate outstanding scholars who are working at the frontiers of knowledge in their fields. Other units — principally those in the Operational, Financial, and Legal complexes and in IFC — may also nominate fellows, who, while possessing strong research interests and orientation, are also engaged in innovative applications of existing methods to the design and implementation of development policy. In all cases the sponsoring unit must make clear why the nominee is a candidate for this program, and not a candidate for a regular consulting position. A primary reason for this difference, and hence the justification for funding from the Research Support Budget, would usually lie in the research externalities to be generated.

Sponsoring units and research fellows are required to submit brief evaluations to the Research Administrator's Office at the end of the fellowship term. These separate reports should cite ongoing and completed activities, including any research papers and proposals, arising out of the visit. Research papers written at the Bank by research fellows will be first considered for publication in the Bank's professional journals, the *World Bank Economic Review* and the *World Bank Economic Observer*.

The Research Support Budget will cover the cost of research fellows' appointment travel, and salary and salary-related expenses. Where justified by the work being proposed, sponsoring units may also include, as part of their nomination statement, a request for funding to cover research assistance, mainframe computer expenses, and (in rare situations) research travel. The host unit will be expected to make appointment travel arrangements, and to provide office space, secretarial and support services, and a desktop computer.

### **Nomination and Selection Procedures**

Any Bank unit that wishes to host a research fellow should submit a nomination to the Secretary of the Research Committee in the Research Administrator's Office. A data sheet for this purpose is available from the Secretary. Nominations from outside the Bank will not be accepted. Nominations must include the following:

- The candidate's curriculum vitae.
- A concise statement by the candidate (not exceeding five single-spaced pages) discussing his or her proposed activities as a research fellow.
- A concise statement by the sponsoring unit (not exceeding three single-spaced pages) of how the proposed candidate is likely to fulfill the program's objectives, and departmental approval for the visit. In particular, the statement must discuss:
  - (1) The expected impact of the research fellow on new research initiatives in the Bank unit where the fellow would be based.
  - (2) Consultations with other parts of the Bank that are likely to directly benefit from the research fellow's visit.
  - (3) Why the candidate should be considered for the program, rather than as a consultant as part of the regular work program of the sponsoring unit.
- A completed data sheet with details about the proposed duration of the fellowship, starting date, and the candidate's previous or current consulting assignments, if any, with the Bank.

Selection procedures for the Visiting Research Fellow Program will be similar to the decision procedures that the Research Committee follows for research proposals. Decisions on nominations will be made by the Chairman with the advice of the Committee. These procedures will be subject to periodic review based on the experience gained from managing the program.

# OFFICE MEMORANDUM

DATE: June 7, 1989

TO: Distribution *James Feather*

FROM: James Feather, PUBDR (J 2241)

EXTENSION: 37516

SUBJECT: Minutes of a meeting of the Research and Publications Policy Council - May 17, 1989 at 3:00 p.m.

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OFFICE OF THE VICE PRESIDENT  
SECTOR POLICY & RESEARCH

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*7/3*

1. Present were: Mr. de Tray, Mr. Feather, Mr. Fischer, Mr. Hopper (Chairman), Mr. Karaosmanoglu, Mr. Rajagopalan and Mr. Shakow.

### Pricing of Bank publications

2. Mr. Feather stated that the most prevalent price of Bank publications was, in fact, zero because of the extensive free distribution. Those publications that were sold were priced according to accepted commercial principles.

3. The question was asked whether price was a constraint in developing countries. Mr. Feather said the question was arguable. He believed that the market for Bank publications was, for the most part, institutional and Bank prices were in general acceptable to institutions. Where there was no institutional market, as in sub-Saharan Africa, free distribution was really the only means of reaching readers. He pointed out that free distribution was not without cost, not only in shipping but also in building up and maintaining accurate mailing lists.

4. Mr. Hopper asked whether the issue was whether or not we should adopt a policy of a zero price for all publications. Mr. Feather said he did not think that issue could be re-opened. Sales brought in nearly \$1.5 million a year and were central to the Bank's international publications distribution network. He pointed out that a great many Bank publications had a strong external relations function and most of the copies printed were given away. A notional price put the publication into the marketplace and made it available to those who were not already part of a Bank constituency.

5. A member said he thought that for academics Bank prices were, on the whole, too high and that the Bank was, in fact, subsidizing free distribution by charging individuals too much. He thought that many individuals would buy the World Debt Tables if the price were lower.



6. Mr. Feather thought that the central issue was whether the main market for Bank publications was institutional - he believed it was - or whether the Bank should try to attract more individual buyers.

7. A member said he did not feel sufficiently informed to comment on the issue and he thought that the objective of the discussion had not been clarified. He wanted more information about the current policy.

8. Mr. Hopper thought the RPPC should return to the subject when more information was available. He thought a breakdown of sales should be produced together with information about the Bank's publications costs relative to sales. It was suggested that Mr. Feather should synthesize earlier reports that had been produced on the subject.

### **Translations**

9. Mr. Feather reported that current practice was to publish seven translations of the World Development Report (cost of translation \$183,000) and six translations of the Annual Report (\$123,00). Other translations were undertaken usually at the request of the initiating department and often after negotiation about who would pay since the Publication Department's budget would not accommodate all the requests for foreign language editions.

10. Mr. Hopper said that he had just returned from francophone Africa where there was a widespread feeling that the Bank was not issuing sufficient publications in French. The European office also needed far more publications in French and Spanish.

11. Mr. Hopper asked Mr. de Tray and Mr. Feather to prepare a report for discussion at a future meeting.

### **Publications policy**

12. Mr. Feather said the issue was whether the Bank needed more formal procedures than it now seemed to have. Since the Reorganization, many documents seemed to fall outside the review processes that are in place. It was pointed out that discussion papers from the regions have a very loose review process. Directors sign off on papers without recognizing that they have a review function. An informal system of external review for such documents was recommended.

13. Mr. Hopper said that he would be opposed to any change in the current system whereby regional vice presidents were responsible for publications concerned with

their own region. He thought that the issue was linked to the issue of the spread of desktop publishing technology which enabled authors to produce polished looking documents extremely quickly and cheaply. Mr. Feather said that desktop publishing did no more than produce camera-ready copy. Publications still had to be printed and bound and, more importantly, distributed.

14. Mr. Feather said that an informal group consisting of Mr. Kohli, Mr. Lynn, himself, and other members of GSD and ITF staff had agreed to prepare a report on the issues raised by desktop publishing.

#### **Vacancies in the Editorial Committee**

15. Mr. Hopper suggested that the names of candidates for vacancies be circulated to members of the RPPC.

#### **Next meeting**

16. Mr. Hopper said he would like to hold another meeting in mid June to address the research issues on the agenda that had not been discussed at this meeting.

17. The meeting adjourned at 4:10 p.m.

c.c. and cleared with Mr. Hopper

#### **Distribution:**

Mr. Aguirre-Sacasa  
Mr. de Tray  
Mr. Feather  
Mr. Fischer  
Mr. Karaosmanoglu  
Mr. Pfeffermann  
Mr. Rajagopalan  
Mr. Shakow

THE WORLD BANK/INTERNATIONAL FINANCE CORPORATION  
OFFICE MEMORANDUM

DATE: May 12, 1989  
TO: Distribution  
FROM: W. David Hopper, PPRSV *WDH*  
EXTENSION: 75678  
SUBJECT: RPPC Meeting - May 17, 1989

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OFFICE OF THE VICE PRESIDENT  
SECTOR POLICY & RESEARCH

*WDH*  
*5/16*

1. The RPPC will meet on Wednesday, May 17, 1989 at 3 p.m. in Room D1204.
2. Attached is an agenda and supporting materials for the upcoming meeting of the RPPC. This meeting will deal principally with publication issues and will include reports on the status of a few matters on the research side.
3. Mr. Fischer is holding a Research Retreat in the next few days and would like to present some substantive and procedural research issues for the Committee's consideration in about two months time.

Attachments

Distribution

V. Rajagopalan, S. Fischer, A. Karaosmanoglu, J. Wood, G. Pfeffermann,  
A. Shakow, D. de Tray, J. Feather, F. Aguirre-Sacasa

## RESEARCH AND PUBLICATIONS POLICY COMMITTEE

May 17, 1989 Meeting

### AGENDA

#### Publications

##### 1. Pricing of Publications

A brief summary of current practice in this area is appended as Attachment 1. Should any changes be considered?

##### 2. Translation

Many Bank documents are translated each year (Attachment 2), but there is little codified practice as to what is translated. Should there be a more formal policy about what gets published in which languages?

##### 3. Publication Policy

University press publications are accepted or rejected after a peer review process managed by the Editorial Committee. Bank Discussion Papers and Technical Papers are accepted for publication on the recommendation of a department director and provided it is demonstrated that the author has received and reacted to some feedback from peers. Between these extremes is a whole range of publications for whose issuance there are no articulated policies. Recent examples include Developing the Private Sector, and Africa's Adjustment and Growth in the 1980s. Should an attempt be made to codify how different categories of Bank publications ought to be published?

##### 4. Membership of the Editorial Committee

At its first meeting the RPPC appointed the members of the Editorial Committee. Vacancies arise as members leave the Bank and as a result of nonattendance. How does the RPPC wish vacancies to be filled?

##### 5. Desktop Publishing

Desktop publishing integrates editing, layout, and the production of camera ready copy into a single process that can speed production and lower costs. How should the Bank proceed to integrate this new technology into its publication procedures?

#### Research

##### 1. Centrally Funded Research Portfolio

The profile of the current RSB funded research project portfolio will be presented for review. Several tables (Attachment 3) summarize reviewed research proposals in terms of number, budget size, source, topic, and disposition.

2. Visiting Research Fellow Program

The proposed guidelines for the Visiting Research Fellows Program (Attachment 4) will be presented for discussion and comment.

3. Other Matters

The Committee will be briefed on the status of year to year RSB budget accruals and how the accrual process may change.

PRICING

Pricing of publications was on the agenda of the old Managing Committee in 1982 and 1984, and was kept under review by the old Publications Committee.

Current practice for books co-published with university presses is to set prices as they would be set by a university press itself. The co-publishers are consulted and Publications staff monitor the pricing practices of comparators such as other international organizations and research institutes. Our average price per page for hardbacks in the past two fiscal years has been 10.6 cents, and for paperbacks 6.3 cents.

World Development Report, although co-published with Oxford University Press, has a lower price (\$12.95) than is recommended by the co-publisher, and is sold in developing countries at \$3.95 (\$1.00 in China).

For non-university press publications prices are set according to Publications staff's judgment of the market. We do not mark up a unit cost of manufacture, which--with publications produced in-house--can be difficult to determine.

Statistical publications--such as World Debt Tables (which is really a subscription item since purchasers receive three supplements without additional charge)--can have low costs of manufacture but still represent a very heavy cost in staff and computing to the Bank. In such cases we try to determine a price that reflects the value of the information provided and that will not deter the institutional buyer.

Software and data on diskette are priced after discussions with the originators and after examination of what is happening in the marketplace. The market does not give strong and consistent signals here as it does in the case of books, and there is still a certain amount of trial-and-error in this case.

*What is our current Policy?  
What prices/page at (X) depend on number of pages.  
What is our current budget? Costs, Sales  
Are we going after individual Sales or Institutional Sales?  
What are we trying to accomplish?*

TRANSLATION

The Bank's present practice is to publish the Annual Report in seven languages (Arabic, Chinese, English, French, German, Japanese, and Spanish) and the World Development Report in eight (the foregoing plus Portuguese).

Important policy documents are often published in English, French, and Spanish, as are books that seem likely to have appeal in French- and Spanish-speaking countries. Originating departments frequently press for foreign language editions to be produced when they perceive a particular need: French editions of works on T & V for West Africa, for example, or Portuguese editions of works on Sub-Saharan Africa, or French and Spanish editions of the text of the Debt Tables.

There is no codified practice for translation, but much ad hoc negotiation in which the resources available to the Publications Department figure largely. Frequently Publications can take on a foreign language edition only if the originating department can provide funds for the translation.

- Translation costs \$183,000 for 7 languages WDR.  
\$123,000 for 6 " Annual Report.
- There is no policy (apart from big documents) for translation.  
why don't Jim propose a policy.
- Do some background work, get details -  
when, how, who translates - Quality assurance.

VISITING RESEARCH FELLOW PROGRAM

The World Bank is launching a Visiting Research Fellow Program (VRFP) to draw some of the best development research scholars worldwide into the Bank's research activities. The Program will be funded by the Bank's Research Committee through the central Research Support Budget, and will be managed by the Research Administrator's Office in PPR. The Program has two objectives: first, to broaden and deepen the Bank's existing and future research base; and second, to enhance scholarly understanding of the Bank's development research activities, its country and financial operations, and the challenges it faces.

The Bank's research activities are best seen as investments that yield greater understanding of the development process and the factors that constrain it. In enhancing the returns on these investments, it is vital that the Bank utilize the insights of outside scholars and policy makers who have grappled with these issues, and do so in a manner designed to spread that knowledge across as wide a cross-section of the Bank as possible. Particularly in new areas of development research, visiting fellows can play a crucial role in shaping the Bank's prospective research activities.

At the same time, the Bank's activities themselves provide a unique window on development, and generate a continuous flow of policy experience and data across sectors and countries. The Visiting Research Fellow Program will provide the opportunity to introduce some of the best minds in development research to this information, and thereby increase its potential value, both within and outside the Bank, as a basis for understanding development processes and policies.

Visiting research fellows may be based in one or more units of the Bank in Washington, D.C. during their fellowship term, usually a minimum of three months to a maximum of six months. Research fellows will have considerable latitude in their work at the Bank. However, an essential requirement of the fellows will be that their presence generate research externalities for Bank staff not only in the sponsoring unit, but also in other parts of the Bank. These externalities should include the following:

- fostering and shaping new research initiatives in the sponsoring unit that would result in one or more research proposals to the Research Committee;
- active participation in relevant research seminars at the Bank;
- informal participation in ongoing research activities of the sponsoring unit;
- availability for informal consultation by other parts of the Bank;
- preparation of a concise report, based on the Bank visit, on research priorities in their area of expertise for the Research Committee.

The nature of potential candidates for the VRFP is likely to be different for different parts of the Bank. Research-oriented units, principally in PPR, would be expected to nominate scholars with outstanding



academic backgrounds who are working at the frontiers of knowledge in their fields. Other units, principally those in the Operational, Financial and Legal complexes, may nominate fellows, who, while possessing strong research interests and orientation, are also engaged in applying existing methods to the design and implementation of development policy. As indicated below, in all cases Bank sponsoring units must make clear why the nominee is a candidate for the VRFP, and not a candidate for a regular consultant position.

Sponsoring units and research fellows are required to submit short terminal evaluations to the Research Administrator's Office within two weeks of the end of the fellowship term. Research papers written at the Bank by the fellow would generally be first considered for publication in the Bank's professional journals, the World Bank Economic Review, and the World Bank Economic Observer.

#### **Nomination and Selection Procedures**

Nominations for visiting research fellows may be submitted to the Secretary of the Research Committee by any Bank unit which wishes to host a research fellow. A data sheet for this purpose is available from the Secretary. Nominations from outside the Bank will not be accepted. Nominations must include the following:

- a. the curriculum vitae of the candidate;
- b. a concise statement by the candidate (not to exceed five single-spaced pages) discussing their proposed activities as a research fellow;
- c. a concise statement by the sponsoring unit (not to exceed three single-spaced pages) of how the proposed candidate is likely to fulfill the objectives of the VRFP, and departmental approval for the visit. In particular, the statement must discuss:
  - (1) the expected impact of the research fellow on new research initiatives in the Bank unit where the fellow would be based;
  - (2) consultations with other parts of the Bank that are likely to directly benefit from the research fellow's visit; and
  - (3) why the candidate should be considered for the VRFP, rather than as a consultant as part of the regular work program of the sponsoring unit.
- d. a completed data sheet with details about the proposed term of the fellowship, starting date, and the candidate's previous or current consulting assignments with the Bank.

Selection procedures for the VRFP will be similar to the decision procedures followed by the Research Committee for research proposals. Decisions on nominations will be made by the chairman of the Committee with the advice of the Committee. These procedures will be subject to periodic review based on the experience gained from the program.

The Research Support Budget will cover the cost of research fellows' appointment travel, salary and salary-related expenses. Where justified by the nature of the work being proposed, sponsoring units may also include, as

part of the nomination, a request for funding to cover research assistance, mainframe computer expenses, and, on rare occasions, research travel. The host unit will be expected to provide office space, secretarial services, and where required, access to a personal computer.

April 30, 1989

TABLE 1

SUMMARY OF RESEARCH COMMITTEE FUNDING ACTIVITY - YTD FY89

<u>Size Category</u>		<u>A</u>	<u>B</u>	<u>C</u>	<u>Total</u>
<u>Total Applications</u>	#	13	19	42	74
	\$th.	3008	1382	660	5050
<u>Pending Proposals</u>	#	7	3	1	11
	\$th.	1065	246	17	1869
<u>Total Approvals</u>	#	5	15	35	55
	\$th.	609	851	442	1902
At Full Funding	#	1	9	19	28
	\$th.	214	655	310	1179
At Reduced Fund	#	2	4	16	20
	\$th.	200	161	132	493
At Phased Fund.	#	2	2	0	4
	\$th.	195	35	0	230
<u>Total Rejections</u>	#	1	1	6	8
<hr/>					
%Funds Approved		31%	75%	69%	60%
%Proposals Approved		83%	83%	85%	87%

Note

A: Requests above \$100,000

B: Requests between \$20,000 and \$100,000

C: Requests below \$20,000

April 30,1989

TABLE 2

DISTRIBUTION OF PROPOSALS BY SIZE CATEGORY AND BY VICE-PRESIDENCY

FY88 AND FY89(YTD)

	Total	A	B	C
<u>All Applications</u>	<u>127</u>	<u>27</u>	<u>34</u>	<u>66</u>
PPR	82	23	22	37
PRE	40	15	10	15
DEC	42	8	12	22
REGIONS	43	4	10	29
Africa	12	2	3	7
EMENA	8	1	2	5
Asia	7	--	2	5
LAC	16	1	3	12
OTHER	2	--	2	--

Note: A: Requests above \$100,000  
B: Requests between \$20,000 and \$100,000  
C: Requests below \$20,000

April 30, 1989

TABLE 3

CENTRAL RESEARCH FUNDING DECISIONS - FY87, FY88, FY89

	<u>FY87</u> (REPAC)	<u>FY88</u> (RC)	<u>FY89(YTD)</u> (RC)
(a) Total number of applications	43	53	63 <sup>a/</sup>
(b) Total amount requested (\$th.)	4,842	5,037	3,181
(c) Total number of approvals <sup>b/</sup> % of all applications	25 58%	46 87%	53 87%
(d) Total amount approved (\$th.) % of all amount approved	1,342 28%	2,866 57%	1,902 60%

a/excludes pending applications

b/include all projects approved for full, reduced or phased funding

April 30, 1989

TABLE 4

REGIONAL PARTICIPATION

FY87, FY88, FY89(YTD)  
(Amount in \$ thousand)

	<u>FY87</u>	<u>FY88</u>	<u>FY89</u> (YTD)
# of Regional Applications	8	14	29
% of All Applications	19%	26%	39%
\$ Amount Requested by Regions	\$270	\$1,183	\$1,019
% of All \$ Amount Requested	6%	24%	20%
\$ Amount Approved for Regions	\$234	\$ 712	\$433 <sup>a/</sup>
% of All \$ Amount Approved	17%	25%	23% <sup>a/</sup>

a/excluding pending proposals

RESEARCH COMMITTEE FUNDING  
ACTIVITIES BY SUBJECT CATEGORY  
(July 1, 1988 - May 10, 1989)

	Number of Proposals	%	Amount Requested (in th.)	%	Amount Approved (in th.)	%	Approved As % of Requested
	-----		-----		-----		-----
<b>Special Emphasis Areas</b>							
Debt and Adjustment	10	15.4	223.9	6.3	144.5	6.4	64.5
Financial Intermediation	5	7.7	148.7	4.2	145.6	6.4	97.9
Food Security	1	1.5	20.0	0.6	20.0	0.9	100.0
Poverty Alleviation	9	13.8	784.9	22.3	439.3	19.4	56.0
Environment	2	3.1	61.2	1.7	29.2	1.3	47.7
Human Resources	10	15.4	538.2	15.3	420.6	18.5	78.1
Women in Development	1	1.5	213.7	6.1	213.7	9.4	100.0
AIDS	1	1.5	12.8	0.4	7.0	0.3	54.7
Public Sector Management & Private Sector Development	3	4.6	35.0	1.0	29.0	1.3	82.9
<b>Total</b>	<b>42</b>	<b>64.6</b>	<b>2,038.4</b>	<b>57.8</b>	<b>1,448.9</b>	<b>63.8</b>	<b>71.1</b>
<b>Other Areas</b>							
Macroeconomics and Int'l Trade	5	7.7	179.7	5.1	147.8	6.5	82.2
Agriculture & Rural Developmen	7	10.8	587.0	16.6	351.1	15.5	59.8
Industry and Energy	6	9.2	568.7	16.1	181.4	8.0	31.9
Urban Development	2	3.1	18.9	0.5	11.5	0.5	60.8
Other	3	4.6	134.0	3.8	129.0	5.7	96.3
<b>Total</b>	<b>23</b>	<b>35.4</b>	<b>1,488.3</b>	<b>42.2</b>	<b>820.8</b>	<b>36.2</b>	<b>55.2</b>
<b>GRAND TOTAL</b>	<b>65</b>	<b>100.0</b>	<b>3,526.7</b>	<b>100.0</b>	<b>2,269.7</b>	<b>100.0</b>	<b>64.4</b>

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - MAY 12, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
1. Income Change and Savings: Cote d'Ivoire and Thailand	PHR	J. van der Gaag	\$98,000	8/25/88	12/12/88	Approved. Awaiting sponsor's response to two conditions. (Decision delayed by delayed completion reports.
					1/30/89	Response to condition received.
					12/12/88	Approved; Subject to sponsor having access to 3rd year data; conditions not yet fulfilled.
2. Policy Analysis in Poverty: Applicable Methods and Case Studies Phase I	AGR	M. Ravallion	\$120,000	10/25/88	2/10/88	Staged funding recommended. Phase I (\$25,000) approved. Funding of Phase II (\$95,000) conditional on resubmission of acceptable revised proposal.
					4/4/89	Revised Part II submitted;
					5/12/89	Phase II approved.
3. Consumption Smoothing and Investment in Animal Traction	LA2	H. Binswanger	\$20,000	10/19/88	11/22/88	Approved
4. Electric Power Utility Efficiency Study	IEN	G. Schramm	\$400,000	11/8/88	2/3/89	Pilot study required; should not cost more than \$75,000. Additional funding conditional on resubmission of revised proposal.
					2/7/89	Conditions agreed.
					2/14/89	Funds release for pilot phase (\$75,000).



RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - MAY 12, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
5. Inflation, Price Controls & Fiscal Adjustment in Africa	CEC AF6	A. Chibber M. Walton	\$75,500	11/2/88	2/22/89	Approved
6. An Evaluation of Tax Incentives for Industrial and Technological Develop- ment: Empirical Approaches and Applications	CEC	A. Shah	\$93,400 \$99,900	11/4/88 1/17/89	1/10/89 2/6/89	Subcommittee asked for clarification. Clarification provided with new budget. New budget approved.
7. Management of Instability in Agricultural Export Prices: The Case of Costa Rica	AGR IEC	P. Hazell T. Priovolos	\$99,500	11/30/88	2/16/89	Approved
8. Costs and Benefits of Market Based Debt Reductions	IEC IEC	S. Claessens I. Diwan	\$17,000	11/1/88	11/15/88	Approved
9. Currency, Commodity Price & Interest Rate Risks	IEC IEC	T. Priovolos S. Claessens	\$20,000	11/2/88	12/12/88	Approved
10. Taxation of Financial Assets and Financial Intermediation	CEC CEC	P. Honohan C. Leechor	\$20,000	11/8/88	11/14/88	Approved
11. Impact of Growth and Adjustment Policies on Four African Countries (Res. Prep.)	AFR	S. O'Brien	\$19,000	11/8/88	12/5/88	Approved for \$7,500 Awaiting sponsor's response.
12. Public Sector Deficits, Stabilization and Growth (Res. Prep.)	CEC	V. Corbo	\$18,500	11/08/88	12/5/88	Approved for \$12,000;

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - MAY 12, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
13. Formal and Informal Private Market Contractual Arrangements (Res. Prep.)	LAT	T. Glaessner S. Goswami	\$6,000	11/09/88	12/2/88	Approved for \$4,000;
14. African Entrepreneurship/Private Sector Development Study (Research Preparation)	AFT	P. Ballard	\$20,000	11/15/88	11/21/88	Approved
15. Economic Impact of Adult Deaths from AIDS in Sub-Saharan Africa (Res. Prep.)	PHR	M. Over	\$12,760	11/28/88	12/9/88	Approved at smaller budget (\$7,000);
16. Women, Public Services and Income Generation	PHR PHR	A. Duncan B. Herz	\$213,700	12/14/88	3/10/89	Approved
17. Int'l Fisheries Research	AGR	E. Loayza	\$200,000	12/29/88	2/27/89	Rejected, because nature of work is not research; but offer of seed money for proposal preparation
18. Poverty Alleviation and Adjustment in Malaysia	AS2	H. Kharas	99,800	12/8/88	2/22/89	Approved, but funds to be released in 2 tranches; 1st tranche \$20,000
19. Comparative Study of the Political Economy of Agriculture Pricing Policy (Supplemental Request for RPO 673-64)	CEC	M. Schiff	80,700	12/21/88	1/10/89	Approved at reduced budget (\$50,000)
20. Testing for Systematic Differences in Initial and Evaluations	IEC OED	R. Duncan P. Duane	\$97,950	12/29/88	3/14/89	Approved
21. Econometric Study of Food Aid in Africa	AFR AFR	S. Reutlinger	\$20,000	12/19/88	1/4/89	Approved

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - MAY 12, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
22. Electric Power Utility Efficiency Study (Res. Prep.)	IEN	G. Schramm	\$9,000	12/19/88	12/23/88	Approved for \$6,500
23. Adult Health in the Americas	LA1	J. Briscoe	\$15,000	12/22/88	1/9/89	Approved
24. Trade Policy Stimulation Software	CEC	J. de Melo	\$20,000	12/23/88	2/3/89 3/14/89	Approved up to \$10,000 on cost share basis. Cost-sharing accepted.
25. Poverty, Growth and Adjustment in Pakistan	PHR EM1	J. van der Gaag M. Cohen	\$216,000	1/27/89	4/6/89	Part A and C rejected with possibility of resubmission. Part B approved with 2 provisos.
26. Vetiver Grass and Its Role in Soil & Moisture Conservation (Research Preparation)	AST	R. Grimshaw	\$42,000	01/11/89	2/3/89 3/13/89	Approved at a reduced budget (\$10,000)  Sponsor accepted
27. School Quality and Education Outcomes in Rural Brazil (Supplementary for Dissemination) (RPO 672-93)	EMT	R. Harbison	\$19,910	01/26/89	2/21/89	Approved
28. Mega-Cities Project (Research Preparation)	INU	K. S. Lee	\$10,000	01/31/89	2/21/89	Rejected in principle; because of scepticism about approach to the study; but offer to co-share half of the cost. No response yet from sponsor.
29. Policies for Addressing Regional Unemployment (Research Preparation)	EM4	Y. Sumi	\$10,000	1/27/89	3/6/89	Approved for \$6,000

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - MAY 12, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions	
30. Poverty and the Social Dimensions of Structural Adjustment in Cote d'Ivoire: A Policy Oriented Analysis, 1985-88	AF1	C. Grootaert	\$265,000	9/19/88		Approved at reduced funding (\$75,000 maximum) if resubmitted as research application. Sponsor appealed decision to Fischer. Sponsor submitting supplementary statement with a revised budget requested. Approved for \$100,000	
					2/23/88		
							4/11/89
					5/2/89		
31. Expanded Analysis of Rural Education Policies: Primary School Achievement in Rural Northeast Brazil (Supplement for RPO 672-93)	PHR	R. Harbison	\$62,000	2/23/89		Approved for \$58,000	
32. Poverty in Nepal	AS1	Karcher	\$19,700	2/3/89	2/6/89	Approved	
33. Antidumping: A Problem in International Trade (Research Preparation)	DEC	M. Finger	\$3,800	2/7/89	2/8/89	Approved	
34. Consumption Smoothing with Commodity Bonds and Evolution of Sovereign Debt Contracts	IEC	T. Priovolos	\$20,000	2/8/89	3/6/89	Rejected because of bad quality of proposal	
35. Diamond and Gold in Sierra Leone: The Small-Scale Sector and Its Role in the Economy	AF4	R. Fennell	\$18,000	2/27/89	3/6/89	Approved	
	AF4	L. Squire					

RESEARCH COMMITTEE DECISIONS ON PROPOSALS  
(NOVEMBER 1, 1988 - MAY 12, 1989)

Title Nature of Request	Department Responsible	Supervisors	Amount Requested	Date Received	Date of RC Decisions	Decisions
36. Planning Conference on Centrally Planned Economies	IEC	J. O'Connor	\$41,900	5/04/89	3/28/89	Approved at reduced budget (\$18,000); No response from sponsor yet.
37. Workshop on Research on Socialist Economies	EM4	F. Dhanji	\$16,000	3/6/89	3/8/89	Approved
38. Taxation in Mexico	LA2	I. Nabi	\$17,600	3/6/89	3/10/89	Rejected
39. Political Economy & Management of State Oil & Mining Companies (Research Preparation)	CEC	A. Israel	\$9,000	3/2/89	3/9/89	Approved at a reduced budget (\$5,00)
40. Health Insurance in Developing Countries (Research Preparation)	LAT	J. Andreu	\$6,500	3/6/89	3/10/89	Approved
41. Labor Redundancy in the Transportation Sector (Revised Proposal)	INU	A. Galenson	\$189,010	4/3/89	5/9/89	Approved
42. Taxation in Mexico (Resubmission)	LA2	I. Nabi	\$17,600	4/1/89	4/20/89	Approved

Office of the President

December 6, 1988

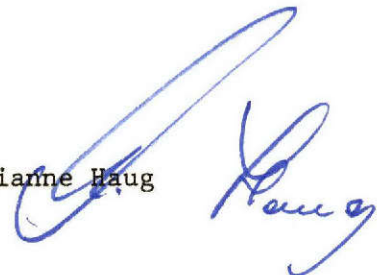
Messrs. V. Rajagopalan and D. de Tray

Mr. Conable will ask you either in the introductory presentation or in the following question and answer period some of the following questions:

- (1) PPR priorities mentioned in pp. 13 and 14 are more focused and appropriately defined. Sector Policy and Research priorities replicate faithfully the current areas of special emphasis. What is the share of research that is done outside of these themes?
- (2) PPR Research Effort. In FY88 PPR spent 83 staff years on research out of a total of about 440 staff years available. The rest of the time was spent on policy work and operational support. Is this proportion right or should more be devoted on research? PPR divisions would like to do more research but the demand for operational support has made it difficult.
- (3) FY88 new research (p. 28) shows only one country specific poverty topic and relatively narrow agenda on human capital development (nothing on health or population and little on employment. Are there research constraints in these areas?
- (4) As several large research projects are being concluded, what is the overall assessment of their relevance to policy formulation? Are there new large research projects under consideration? On which topic?

*30 staff years?  
8 cross-sectional  
in mid year*

Marianne Haug



DRAFT

November 1, 1988

### PRE Research Priorities

PRE's research efforts support the broad areas of special emphasis delineated by the President of the Bank. Research is designed to provide the analytical and methodological underpinnings for policy and operations both in the traditional areas of Bank activity, such as poverty alleviation, human resource development and agriculture, industry and infrastructure, as well as in newer areas such as environment and the role of women in development. Research benefits from cross-sectoral and interdisciplinary interactions made possible by the location of sector policy and research departments in one unit.

A few examples of the way research is designed and undertaken in PRE are provided below. Agricultural research now has a strong element of ecological sustainability as witnessed by a project that examines the raising of agricultural productivity while giving explicit consideration to the use of natural resources. Poverty alleviation is an explicit element of research efforts in a number of sectors. Again in the agriculture sector, strategies are being examined for providing access to productive assets by poorer households and expanding employment opportunities for landless workers. Advancing the role of women in development is seen as being linked to women's access to, and use of public services, and this is an area of research that is being explored, as well as when research is devoted to the determinants of women's access to education and their performance in the labor market. But, PRE research is also concerned with issues of dynamic efficiency. In the industrial sector, particular attention is being given to the design of policies and regulatory changes that foster competition and the development of the private sector. Technology is an element of research efforts across a wide spectrum of sectors -- in the industrial sector, the determinants of technological change are being examined; in the agriculture sector attention is focused on the possibilities for dynamic productivity growth through biotechnology; research in the education sector is examining improvements in technology for education as well as the role of education in a country's technological development.

ROUTING SLIP		DATE: <i>12-6-88</i>
NAME		ROOM NO.
<i>Rajagopalan</i>		<i>5-5055</i>
APPROPRIATE DISPOSITION	NOTE AND RETURN	
APPROVAL	NOTE AND SEND ON	
CLEARANCE	PER OUR CONVERSATION	
COMMENT	PER YOUR REQUEST	
FOR ACTION	PREPARE REPLY	
INFORMATION	RECOMMENDATION	
INITIAL	SIGNATURE	
NOTE AND FILE	URGENT	
REMARKS:		
FROM: <i>Dennis de Tray</i>	ROOM NO.: <i>513-185</i>	EXTENSION: <i>33480</i>



# OFFICE MEMORANDUM

DATE: December 2, 1988

TO: Mrs. Marianne Haug, EXC

FROM: Chukwuma Obidegwu, SPRPA - through Robert Liebenthal, Chief, SPRA

EXTENSION: 34604

SUBJECT: Talking Points for the PC discussion on the FY88 Annual Report on Bank Research

1. Priorities. The Report lists eight "priority" areas for research, but it admits that these areas encompass most of development economics. The PC could discuss what the priorities should be, and perhaps consider human capital development, poverty, and environment as priorities. Unlike the other areas, not much work is going on then and there is an urgent need for knowledge to support Bank operations in these areas.
2. Among new starts in the centrally funded research there is only one poverty project, which is country specific. Are there any problems about generating interest among researchers on poverty issues? Why does VPPRE not research priorities not include human capital development apart from the focus on human capital in women and the poor.
3. Annual Conference on Development Economics. This is one of the new initiatives to make the Bank a center for development economics. The PC ought to discuss the modalities of this conference and how best it can achieve its objectives. Will the conference be focussed on specific issues or will it be about development in general? Who are the likely non-Bank participants?
4. The Visiting Research Fellow Program. This is another initiative to strengthen the role of the Bank as a center for development economics. The PC could discuss the ways to ensure that this program will be mutually beneficial to the Bank and the scholars.
5. Salaries. The Report indicates that Bank salaries are not competitive and the Bank is unable to attract the best researchers. The PC could discuss the implications of this and what can be done to remedy it.
6. PPR Research Effort. In FY88 PPR spent 83 staff years on research out of a total of about 440 Staff years available. The rest of the time was spent on policy work and operational support. Is this proportion right or should more be devoted on research? PPR divisions would like to do more research but the demand for operational support has made it difficult.

the time was spent on policy work and operational support. Is this proportion right or should more be devoted on research? PPR divisions would like to do more research but the demand for operational support has made it difficult.

7. Tone of the Paper. The paper could be seen as too defensive and somewhat passive. It does not appear to offer solutions to the more difficult questions -- building up research capacity in LDCs, attracting the best researchers to the Bank.

C. Obidegwu/mle

## OFFICE MEMORANDUM

*Chiron*

DATE: December 1, 1988

TO: Mr. V. Rajagopalan, VPPRE

FROM: K.D. Jones, Asst. to the VP, PRE

EXTENSION: 33255

SUBJECT: Research Programs in PRE Departments

Attached, for your information, is a copy of the Status Report on the research programs being carried out in PRE Departments. This report will be updated and issued quarterly. Since this is the first comprehensive listing of all the research tasks in PRE, some of the dates, particularly the previous quarter's completion dates, are not available.

Any questions and/or comments on this report should be addressed to Mrs. Lou Hamilton, Ext. 33420.

Attachment

cc: Messrs. Ingram, de Tray, Linn, Woodford  
Colaco, Arrhenius  
PRE Directors and Division Chiefs

/lph

RESEARCH PROGRAMS IN PRE DEPARTMENTS

AS OF NOVEMBER 30, 1988

DEPARTMENT: POPULATION AND HUMAN RESOURCES

No.	Task ID	Task Name	Start Date	Previous Quarter's Completion Date	Revised Completion Date
Office of Director (654/05)					
1.	1WDRF002	Women's Education and Productivity (Special Initiative)	09/88		06/89
Education and Employment Division (654/10)					
1.	1WLDRE452	Education and Informal Sector in Peru	12/83	12/88	06/89
2.	1WLDRE708	School Quality in Brazil	07/87		06/89
3.	1WLDRE709	Financing Vocational Education and Training	07/87	12/88	01/89
4.	1WLDRE809	Multi-Level Models	12/87		08/89
5.	1WLDRE872	Women's Access to Education	07/87		07/89
6.	1WLDRE944	Jamaica Tracer Data	06/88		10/89
7.	1WLDRE945	VET SOA on Agr. Training	06/88		04/89
8.	1WLDRE946	VET Asia Cases	07/88		06/89
9.	1WLDRE947	LAC Regional Vet. Review	07/88		12/89
10.	1WLDRE948	Training for Infor. Sec. Emp.	05/88		02/89
11.	1WLDRE949	Trends in Vocational School	07/88		06/89
12.	1WLDRE950	University and Technological Change	09/88		09/89
13.	1WLDRE951	Financing of Higher Education	11/88		11/89
14.	1WLDRE952	Issues of External Efficiency	09/88		09/89
15.	1WLDRE953	Inter. Efficiency in University	09/88		08/89
16.	1WLDRE954	Effective Schools in Developing Countries	07/88		08/89
17.	1WLDRE955	Management of Change	05/87		09/90
18.	1WLDRE956	Effective Teaching	07/88		08/90
19.	1WLDRE957	Macro-Comparative Study	07/88		03/89
20.	1WLDRE958	Effective Measures and School Quality	07/88		07/89
21.	1WLDRE959	Principal Training*	07/88		02/89
22.	1WLDRE960	Eco. Env. Effect. on VET	10/88		09/89
23.	1WLDRE961	Cognition and Production	06/89		06/90
24.	1WLDRE962	Occupational Path Map	07/88		06/89
25.	1WLDRE996	Science & Technology Education	01/89		06/90
26.	1WLDRE997	Research Dissemination	07/88		06/89
27.	1WDRF003	Manpower Dev. Ec. En.	07/88		06/89
28.	1WDRF004	Supp. to Women's Education	09/88		07/89

No.	Task ID	Task Name	Start Date	Previous Quarter's Completion Date	Revised Completion Date
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Women in Development (654/20)					
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1.	1WLDRE700	Women's Economic Productivity	11/87	10/89	06/90
2.	1WLDRE701	Women, Public Services and Income Generation (Proposal)	11/87	11/88	11/88
Population, Health & Nutrition (654/30)					
-----					
1.	1WLDRE916	Estimates of International Migration	03/88		12/88
2.	1WLDRE917	Trends and Projections of Mortality by Cause	05/88		03/89
3.	1WLDRE918	Household Consequences of High Fertility in EMENA	05/88		08/88
4.	1WLDRE919	Endemic Disease Management (Clark Foundation cofinancing)	08/87		12/89
5.	1WLDRE920	Health Finance: Insurance, Social Security, and HMOs	07/88		06/90
6.	1WLDRE921	Applied Research on Adult Morbidity and Mortality	10/88		02/89
7.	1WLDRE922	Impact of AIDS on the Household (proposal preparation)	06/88		12/89
8.	1WLDRE923	Demographic Impact of AIDS	06/87		06/89
9.	1WLDRE924	Rapid Nutritional Epidemiology Assessment	10/88		06/89
10.	1WLDRE925	Micronutrient Malnutrition	12/88		06/93
11.	1WLDRE926	Research on Maternal Dietary Beliefs and Practices	10/88		06/89
12.	1WLDRE927	Tunbridge Wells Review of Epidemiological Conditions in Africa (Africa Region cofinancing)			06/89
13.	1WLDRE928	Africa Policy Research Studies	07/88		06/89
14.	1WLDRE929	Health Manpower Development	10/88		12/89
15.	1WLDRE930	Differential Program Impact in Differential Demand Environments: Research Proposal Preparation	11/88		04/89

No.	Task ID	Task Name	Start Date	Previous Quarter's Completion Date	Revised Completion Date
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Welfare and Human Resources (654/40)					
1.	1WLDRE723	Employment Changes*	02/87	12/88	12/88
2.	1WLDRE724	Welfare and Human Resources	07/87		06/89
3.	1WLDRE725	Labor Markets: Pakistan	01/88	06/88	09/88
4.	1WLDRE726	Role of Human Resources	07/87	06/88	06/89
5.	1WLDRE727	Labor Supply	07/87	06/88	06/89
6.	1WLDRE728	Impact of Education in Africa*	04/88	12/88	12/90
7.	1WLDRE729	Household Savings	09/87		12/89
8.	1WLDRE887	Cote D'Ivoire: Living Standards	07/87		06/89
9.	1WLDRE888	Public and Private Transfers in Peru*	03/88		07/89
10.	1WLDRE889	Health Care in Peru	07/87		12/88
11.	1WLDRE890	Child Nutrition Status	07/85		12/88
12.	1WLDRE963	Agricultural Production: Cote D'Ivoire	07/88		06/89
13.	1WLDRE964	Transfers & Social Sectors	07/88		06/89
14.	1WLDRE965	Bolivia Living Standards	06/88		06/89
15.	1WLDRE966	Sup. Educ. in Dev. Countries	06/88		06/89
16.	1WLDRE967	PAG on Poverty	05/88		06/89
17.	1WLDRE968	Pakistan: Res. Prop on Poverty	06/88		12/88
18.	1WLDRE969	Quality of Living Standards Data	07/87		06/89
19.	1WLDRE970	LSMS Data Management	07/87		12/89
20.	1WLDRE974	Peru Informal Sector	07/87		12/88
21.	1WLDRF012	Trade Regimes/Cote D'Ivoire	07/88		10/89
22.	1WLDRF050	Jamaica Living Standards	07/88		06/89
23.	1WLDRF051	Morocco Living Standards	07/88		06/89
24.	1WLDRF052	Indonesia Health/Food	07/88		12/88
25.	1WLDRF054	Pakistan Living Standards	11/88		06/89
26.	1WLDRF055	Household Labor Supply	11/88		06/89

\* Partially or fully funded by RPO.

DEPARTMENT: AGRICULTURE AND RURAL DEVELOPMENT

No.	Task ID	Task Name	Start Date	Previous Quarter's Completion Date	Revised Completion Date
Office of Director					
1.	1WLDRE567	Poverty Alleviation	07/86	12/88	06/89
Agricultural Policies (656/10)					
1.	1WLDRE425	Review and Preparation of Research Projects	07/87	06/88	06/89
2.	1WLDRE558	Land Rights Issues	09/86	03/89	08/89
3.	1WLDRE560	Financial Markets in China	03/87	12/89	12/89
4.	1WLDRE562	Growth Linkages	01/87	06/88	03/89
5.	1WLDRE676	Land Security in Thailand	09/87	03/89	03/89
6.	1WLDRE677	Land Taxation	01/88	09/90	09/90
7.	1WLDRE679	Comparative Case Study of Credit Cooperatives	11/87	08/90	08/90
8.	1WLDRE680	Agricultural Pricing Stabilization	01/87	10/88	03/89
9.	1WLDRE681	Macro Link in Agriculture Policy	04/86	12/88	09/89
10.	1WLDRE682	Multimarket Research/Dissemination	07/87	06/88	06/89
11.	1WLDRE683	Food Security and Poverty Alleviation	07/87	06/88	03/91
12.	1WLDRE683	Agricultural Development Policies and the Theory of Rural Organization	02/88	04/90	06/90
Agricultural Production and Services (656/20)					
1.	1WLDRE550	Design Impacts on Performance of Different Irrigation Systems	08/87	06/90	06/90
2.	1WLDRE668	Biotechnology & Livestock	11/87	09/90	09/90
3.	1WLDRE669	Review of Bank Lending in Agriculture	09/88		06/89
4.	1WLDRE670	Sociological Variables	11/87		01/89
5.	1WLDRE914	Irrigation Research	04/88		10/89

DEPARTMENT: ENVIRONMENT

No.	Task ID	Task Name	Start Date	Previous Quarter's Completion Date	Revised Completion Date
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Office of Director (655/05)					
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1.	1WLDRE407	Land Tenure Security	12/88		06/90
Environmental Systems & Technology (655/10)					
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1.	1WLDRE893	Pesticide Management	04/88		06/89
2.	1WLDRE981	Desertification	07/87		06/89
3.	1WLDRE982	Irrigation/Salinity	09/87		12/88
4.	1WLDRE983	Protec. of Biodiver.	09/87		06/90
5.	1WLDRE984	Watershed Rehabilitation	07/87		06/89
6.	1WLDRE985	Climate Change	04/88		12/88
7.	1WLDRE986	Deforestation	04/88		12/89
Environmental Economics and Policy (655/20)					
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1.	1WLDRE684	Poverty & Environment	04/88		06/89
2.	1WLDRE686	Env. Implications of Ag. Pricing Policy	09/87	06/92	06/92
3.	1WLDRE687	Discount Rates (their Use in Evaluating Env. Projects)	10/87	06/88	Completed
4.	1WLDRE688	Research Agenda (Dev. of Economic Research Program in Env. and Natural Resources)	01/88	06/88	06/89
5.	1WLDRE689	Role of Women in Environment	09/87	08/91	Dropped
6.	1WLDRE690	Comparative Air Pollution Analysis	09/87	03/92	03/92
7.	1WLDRE915	Tropical Deforestation	10/87	06/88	06/88
Environmental Operations & Strategy (655/30)					
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1.	1WLDRE698	Institutional Approaches			Dropped
2.	1WLDRE799	Environmental Concerns Proj.	03/88	12/88	12/88



DEPARTMENT: INDUSTRY AND ENERGY

No.	Task ID	Task Name	Start Date	Previous Quarter's Completion Date	Revised Completion Date
Industry Development (657/10)					
1.	1WLDRE711	Technology Development Policies	10/87	03/89	03/89
2.	1WLDRE712	LAC - Technology Policy	07/86	03/89	Dropped
3.	1WLDRE713	Industrial Adjustments in Sub-Saharan Africa	08/87	06/89	Completed
4.	1WLDRE714	Technology Acquisition	05/88	12/88	Dropped
5.	1WLDRE715	High Technology Impact on LDCs	08/87	06/88	10/89
6.	1WLDRE820	Japanese DFI	11/87		12/88
7.	1WLDRE903	Conditionality/SSA Adjustment Lending	07/88		06/89
8.	1WLDRE904	Outward Oriented Development Strategy	07/88		10/89
9.	1WLDRE905	Industrial Restructuring	07/88		12/88
10.	1WLDRE906	Next-in-Line NICS	03/88		12/89
11.	1WLDRE907	Ind. Subsector Dev/Restructuring	07/88		06/89
12.	1WLDRE908	Comparative Study of Labor Markets	07/88		06/89
13.	1WLDRE909	South, South Trade	07/88		06/89
Energy Development (657/20)					
1.	1WLDRE673	Diesel Utility Efficiency	09/20		11/89
2.	1WLDRE674	Resettlement Issues	07/87		Done
3.	1WLDRE675	Debt Implications PS	11/87		Done
4.	1WLDRE717	Natural Gas Dev. Strategy	07/87		12/89
5.	1WLDRE718	Optimal Timing of Investment	10/87	10/88	12/88
6.	1WLDRE719	Energy & Environment	07/87	07/88	01/89
7.	1WLDRE720	Performance Indicators	01/84		Done
8.	1WLDRE721	Petroleum Price Forecast	09/87		Done
9.	1WLDRE722	Marginal Cost Pricing	07/87		04/89
10.	1WLDRE895	Analysis of Implementation	05/88		02/89
11.	1WLDRE896	Review of Power Pricing	05/88		04/89
12.	1WLDRE897	Value of Natural Gas	05/88	06/88	02/89
13.	1WLDRE898	Reg. Structures/Elec	07/88		06/89
14.	1WLDRE899	Financing Needs/PS	02/89		05/89
15.	1WLDRE900	Imp. Record/Large Power			Dropped
16.	1WLDRE901	Marginal Cost Pricing	05/88		04/89
17.	1WLDRE972	Environmental Status Report	03/88		12/88
18.	1WLDRE048	Rev. Power Systems Loss	09/88		12/88

DEPARTMENT: INFRASTRUCTURE AND URBAN DEVELOPMENT


No.	Task ID	Task Name	Start Date	Previous Quarter's Completion Date	Revised Completion Date
Office of Director (658/05)					
1.	1WLDRE671	Analysis of Macro-Economic Linkages of Investments in Infrastructure	07/87	06/88	06/89
2.	1WLDRE973	Urban Research Summary	07/88		Dropped
Transport (656/10)					
1.	1WLDRE617	Labor Redundancy - US/Europe	03/87	04/88	Done
2.	1WLDRE619	Labor Redundancy in LDCs	09/87		11/89
3.	1WLDRE636	Policy Reform	07/87		Done
4.	1WLDRE636	Transport Pricing	07/87		06/89
5.	1WLDRE638	Airline Pricing	04/88		04/89
6.	1WLDRE639	Study of Railway Enterprise Reform	10/87		12/89
7.	1WLDRE640	Transport in Invisible Trade	07/87	10/88	12/88
8.	1WLDRE641	Freight Logistics	07/87		12/90
9.	1WLDRE642	Pricing Practices in Physical Distribution Management	07/87	09/88	02/89
10.	1WLDRE643	Trends in Trade Logistics Management of Trade-related Production Sectors	07/87	09/88	02/89
11.	1WLDRE645	Overview of Labor Redundancy	07/87	10/88	12/88
12.	1WLDRE647	Measures of Rural Mobility	07/87	06/88	12/89
13.	1WLDRE696	Transport Taxation	07/87		09/90
14.	1WLDRE716	Urban Transport Research	07/87	06/88	12/89
15.	1WLDRE823	Transport and Agriculture in Africa	07/87		02/91
16.	1WLDRE868	Shipping Regulations	02/88		08/89
17.	1WLDRE932	Rural Mobility/SSA	07/88		03/91
Urban Development (658/20)					
1.	1WLDRE438	Urban Infrastructure & Production	05/87		06/89
2.	1WLDRE443	Rural Water Supply	10/85		12/89
3.	1WLDRE546	Rent Control - Phase I (RPO 674-01)	04/86	12/88	06/89
4.	1WLDRE547	Land Management	02/87	09/89	Dropped (Guidelines)
5.	1WLDRE672	Rural/Urban Linkages	04/87		06/89

No.	Task ID	Task Name	Start Date	Previous Quarter's Completion Date	Revised Completion Date
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Water Supply (658/30)					
1.	1WLDRE822	Demand for Rural Water Supply	07/88		Dropped
2.	1WLDRE873	Productivity of WS and Sanitation	06/88		09/90
3.	1WLDRE874	Investment Choices in WS & Sanitation Sector	01/88		06/91
4.	1WLDRE875	Reduction of Costs in Env. Damages	01/88		06/92
5.	1WLDRE876	Financing of WS and Sanitation Sector	01/88		06/92

# OFFICE MEMORANDUM

DATE: November 30, 1988

TO: Marianne Haug, EXC

FROM: Visvanathan Rajagopalan, Acting Senior Vice President, PPR 

EXTENSION: 33419

SUBJECT: Draft Fiscal 1988 Annual Report on Bank Research

The attached draft report on World Bank research in fiscal 1988 is scheduled for discussion by the President's Council on December 7th. As in past years, the full report will be in two volumes, the attached volume plus a volume of research abstracts covering research projects under way or completed in fiscal 1988.

The attached volume is, itself, in two parts. The first part covers the philosophy and organization of research in the new Bank and gives an administrative overview of the fiscal 1988 research program. Part II of this first volume contains a discussion of findings from the major research projects completed in fiscal 1988. I would assume that most of our discussion next Wednesday will focus on part I of the first volume.

A revised version of the report reflecting Council members' comments is scheduled for discussion by the Board on January 19th.

- Report Descriptive
- How does Research feed into policy & operation
- Shift in Research emphasis without saying why?
  - Is it supply driven
- Role of Technology in Dwr

How are we aiming at these priorities?

#### ANNUAL REPORT ON BANK RESEARCH

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**PART I. THE ADMINISTRATION OF RESEARCH**

During fiscal 1988, a year in transition, the Bank's staff began building a research portfolio that would serve the postreorganization agenda. Although too early for a definitive assessment, the evidence shows clear progress toward this goal. At the end of the fiscal year under review, a substantial program of research was under way or in the final stages of planning in almost every area of special emphasis, and new starts were launched in most areas of the sectoral research program.

The consolidation of much of the Bank's research work in the Policy, Planning, and Research complex has brought some decided benefits. Research is now easier to manage and coordinate since most Bank research managers report to the same senior vice president. In addition, the structure of PPR departments and divisions reflect Bankwide research priorities and concerns, as do the specific work programs developed for these units. And with single departments responsible for research, policy, and operational guidelines in a given area, management responsibilities more closely reflect the natural development of ideas in a policy research environment. Certainly communications among researchers and especially among research managers have been improved. So, while the Bank is still adjusting to and learning to use its new research and policy structure, the foundation appears to have been laid for an efficient, focused program of policy research.

There is also a potential drawback to the new structure. Although PPR undertakes most research, important research projects are also under way elsewhere in the Bank. PPR's size and integrated policy and research approach may make it easy to overlook these other efforts. But it is essential to coordinate such efforts with the activities of PPR researchers if the Bank's research program is to add up to a sensible whole. The Research Administrator

*Structure is working well to be careful to integrate with others*

*and if duplication was to be avoided*



and others in PPR have worked to maintain and strengthen links with researchers in Operations -- and they will continue to do so.

The new structure for managing Bank research, especially centrally funded research, has already begun to pay off. Most important, the central research management system is being seen as open and responsive -- working to promote the research needs of Operations, Finance, the IFC, and other units in the Bank. The broad base of support for the research program has made it possible to build a balanced central research portfolio that reflects the Bank's new priorities and its strengths in policy research. As this report shows, new starts since fiscal 1987 cover many of the priority areas set by the Bank's senior management and address concerns raised by the Board during its discussion of last year's report.

This year's report begins with a discussion of the general approach to research in the new Bank. It then presents administrative details of the research program in fiscal 1988 and describes the progress with new initiatives. The report concludes with highlights from major research projects -- the fruits of Bank research.

*Research financed  
under loans & credits  
significant - No contact  
when so on*

RESEARCH IN THE NEW BANK

World Bank research has two main aims: improving the Bank's operations and policy advice, and increasing understanding of the process of economic development. In its broadest interpretation, the term "Bank research" encompasses a very large part of Bank activities. Certainly, much economic and sector work would qualify as research outside the Bank. So, too, would many activities supported by project preparation facilities and technical assistance components of loans. And several of the large externally sponsored programs managed by Bank staff also contain significant research components. But by convention and necessity, this report confines itself to but two parts of this larger whole: departmentally funded research not directly related to economic and sector work, and centrally funded research. They are singled out here because they represent that part of Bank research not driven primarily by the immediate needs of Bank operations. They are, in other words, the investment component of Bank research efforts. Both these areas of research are described more fully below. But how do they and the other elements of Bank research fit together in the new Bank?

Research is most usefully defined as the attempt to create new knowledge. In conducting its research, the Bank combines the activities of a consulting firm, a think tank, an academic institution, a government statistical office, and an information service. For instance:

- Most economic and sector work (generally by Operations but also by PPR) falls in the category of consulting. Much of the analytical work done to support Operations is of high quality; it frequently

generates new knowledge about member countries and thus fits a broad definition of research.

- In taking a more overarching view of Bank operations and policy, Bank research divisions act as the organization's think tank. Typical of such research are studies of Bank operations that yield "best practice" advice. Also typical are the development and implementation of specific tools -- such as a new generation of models to analyze adjustment and growth, work that examines the consequences of current global economic trends for developing countries in the next decade, and studies of the Bank's strategic agenda. Most often this think-tank work is part of a PPR division's or Technical Department's core work program and is carried out in response to a clearly voiced need of Bank operations staff. Sometimes, as with the poverty task force, such research is done in other parts of Operations.
- The third part of the Bank's research activities is more academic in that it seeks to expand understanding of the development process without necessarily yielding specific and immediate operational advice or guidance. Work in this area tends to focus on basic issues -- such as improving estimates of agricultural supply responses, understanding more about developing country labor markets, estimating the responses of households and individuals to policy-induced changes in their environment, studying the root causes of poverty, and working on the political economy of adjustment. Bank work in this arena distinguishes itself from some academic research in

being clearly directed toward a recognized policy issue in a way that will eventually yield improved policy advice.

- In addition, in its data gathering and dissemination activities, Bank research serves the role of a statistical bureau.
- The Bank also disseminates knowledge through seminars, conferences, a broad array of publications and programs of the Economic Development Institute (EDI), and by making Bank data available to outside analysts and researchers.

Research in the consulting-firm, think-tank, and academic modes overlaps, both inside and outside the Bank. But Bank convention and administrative reporting separates research from other analytical work: that is, from economic and sector work and the preparation of policy pieces. This narrow usage of the term "research" almost by definition leaves Bank research open to the criticism that it is irrelevant to the operations of the Bank. Nonetheless, for convenience and consistency with past practice, we shall in the body of this report exclude economic, sector, and policy work from the definition of research.

This depiction of Bank research raises a series of issues, among them the reasons for undertaking research at the Bank, the Bank's potential role in building up research capacities in developing countries, and the adequacy of its internal and external dissemination efforts. <sup>1/</sup>

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<sup>1/</sup> The role of research at the Bank has been studied most recently in the Reorganization Task Force Report [April 1987] and earlier in the 1984 Lindbeck Report (Report on the World Bank Research Program -- Part II, Report No. 5325, Office of the Vice President Economics and Research Staff, November 1984) and in the 1979 General Research Advisory Panel (GRAP) report prepared for the World Bank Board of Directors (No. R79-221).

### Organization of Bank Research

PPR conducts or manages most Bank research, but considerable amounts of research are also undertaken in Operations -- for instance, work undertaken through the Special Program of Assistance for Africa, on the Bank's role in the debt crisis, and in economic and sector work. Research is also undertaken in the Finance Complex -- for instance, work on the optimal currency composition of Bank lending. In addition, the Legal Department and the International Finance Corporation have small programs. Research in complexes other than PPR is more likely to be in the consulting-firm mode, but there is no rigid organizational principle allocating specific types of research to different complexes. To a great extent, the locus of research in the Bank depends on the availability of resources and the initiative of research entrepreneurs.

The central research budget finances research managed in PPR, Operations, and Finance, Legal, and IFC. It is intended to support research in the think-tank and, especially, academic modes. Although all centrally funded research has to be relevant to Bank operations, the Research Committee is careful to ensure that central research funds go mainly for longer term research with relatively wide implications for the institution. That leaves consulting-type activities to regular divisional work programs. The central research budget (about \$5 million a year) enables the Bank to draw on outside researchers and to pursue more fundamental research issues. In this way, and through its thorough and impartial review procedures, the administration of the central research budget plays a crucial role in maintaining the quality of Bank research.

A Center for Operationally Oriented Research

The Bank's work as a development agency makes it a prime consumer of economic research. As Bank operations grapple with continuing and new problems of economic development, the demand expands for new ways of dealing with the issues and for the lessons of experience.

Past studies of Bank research, such as the Lindbeck Report, have discussed whether research should be done in the Bank or outside. None of these studies has questioned the need for (or the value of) Bank economic and sector work or related policy formulation activities. Operational issues create the demand for such research, and the institution must be in a position to respond. Moreover, the Bank's operational experience during the more than 40 years of its history provides a stock of knowledge of the development process that is unique in its geographical and sectoral range. This is the basis for its role as a producer of research.

Researchers must be thoroughly familiar with Bank operations and experience -- to respond to and refine research questions coming out of Operations, to initiate and anticipate operationally relevant research issues, to produce operationally relevant research output, and to draw on the Bank's unique cross-country experience. Accordingly, a solid core of research must be done in the Bank by Bank staff. <sup>2/</sup> But this core research group should not be isolated from the mainstream of Bank activities. It should, whenever possible, have direct operational experience -- through mission support or through past service in Operations.

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<sup>2/</sup> Almost all leading economic policymaking agencies, such as central banks, do much in-house research.

The shifts in Bank policy issues make it sensible to satisfy some consulting-firm and think-tank research needs with outside researchers and consultants. But experience has shown time and again that outside consultants cannot operate effectively in or for the Bank without the aid of Bank researchers who understand both the operational issues and research.

Quite naturally, the demand from Operations is primarily for the consulting-firm and think-tank types of research. But more academic in-house research also has important -- if less immediate -- benefits for the Bank's operations. Such research, by increasing understanding of the development process, promises to improve the impact of the Bank on development, through both its policy advice and its lending. In addition, the quality, usefulness, and credibility of the consulting-firm and think-tank types of Bank research depend critically on the Bank's maintaining a capacity to evaluate and understand new approaches, new tools, and new methods. The Bank can do so only by producing high-quality research itself. The Bank should not, however, allow itself to become a closed, self-satisfied world -- in which the research and analytical methods of past decades suffice. By maintaining contacts and working with the best outside researchers, the Bank ensures access to new thinking and methods. Further, by producing internationally respected research, the Bank attracts better entry-level staff: most of the best graduate students want the opportunity to pursue their research interests at least for a few years after graduation.

Research is an investment activity whose payoff is uncertain and mostly in the future. The needs of Operations will always seem more pressing -- whether the pressure is on the individual researcher who puts aside a research project to answer an urgent call from an operational division, or on

the manager who has to meet larger lending targets with fewer staff. As with infrastructure maintenance, the short-run consequences of cutting back on research -- certainly in both the think-tank and academic modes -- are not dramatic. But the long-run losses can be critical.

#### A Center for Development Economics

The Bank, as a development agency, has an obligation to increase general understanding of the development process and to help in building research capacities in developing countries. Accordingly, research management in the Bank has the further goal of making the Bank a center of development economics. The Bank can achieve this in part by providing data and case studies for research, thereby ensuring that it is the first place that development researchers turn for information. But the Bank attempts to go further -- to provide intellectual leadership in the field of development economics. And to succeed in this, Bank research must compete on an even footing with the larger academic community.

The Bank has many advantages in undertaking and supporting longer term (academic-type) research. It is a genuinely international organization. Its staff includes high-level researchers from many countries. It has unrivaled data and experience. Most important, Bank operational staff who struggle daily with the problems of development know the key development issues and are thus well placed to help set the research agenda for the entire field. Getting the question right is a key ingredient of productive research.

In addition, the Bank has the largest single group of development researchers in the world. This staff -- along with an array of programs,



data, publications, and an external education and training effort -- justify the claim that the Bank is a leading center, perhaps the leading center, for development economics. The Bank solidifies this position through EDI's extensive contacts and operations with training and research institutions throughout the developing world.

The Bank's ability to provide intellectual leadership on development issues is nevertheless limited by the fact that few of the very best academic researchers are at the Bank. The Bank's bureaucratic structure and management control are not entirely friendly to academic research; nor is the Bank able to match the salaries that the best academics in North America and Europe earn. <sup>3/</sup> The Bank's insistence that research have some discernible operational impact -- appropriate for such an action-oriented institution -- tends to inhibit more speculative and theoretical thinking.

The Bank can and does draw on academic researchers as consultants. To supplement this primary source of interaction with the best outside researchers, the Research and Publications Policy Council (RPPC) and the Research Committee are experimenting with a Visiting Research Fellow Program. Described more fully below, this program aims at bringing outstanding researchers to the Bank for periods ranging from a few months to a year to work on problems of their own choosing that are of interest to Bank research and operations. The underlying objective is to improve working relationships between Bank staff and the best academic researchers -- thereby

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<sup>3/</sup> Since outstanding researchers from other countries who were willing to come to the Bank would certainly be courted by U.S. academic institutions, the relationship between Bank and U.S. academic salaries affects the Bank's ability to attract outside researchers from all countries.

building the Bank's capacity to undertake policy relevant research, as well as academics' understanding of the problems and constraints faced by the Bank. The Research Committee is also planning to inaugurate in 1989 an annual Bank conference on development economics that will bring together researchers from within and outside the Bank. The intention is to increase the intellectual traffic on the two-way street between Bank staff and the outside academic community, exposing each to the work and research issues of the other.

As a center for development economics, the Bank also has the obligation to attempt to enhance research capabilities in developing countries. The Bank works to meet this obligation in five ways. First, and most significant in terms of resources spent, is the use of developing country scholars as consultants and participants in Bank-sponsored research projects. The Research Committee actively encourages those seeking funding from the central research budget to collaborate with local researchers to strengthen both their own research designs and the capacity of local research organizations to undertake policy relevant research. <sup>4/</sup>

Second, the McNamara fellowships and, more recently, the World Bank Graduate Scholarship Program support researchers from the developing countries to study in other countries. Third, the Research Administrator has solicited research proposals from development research institutions and individual researchers in developing countries, though with limited success to date. Fourth, the Research Committee will be actively seeking out distinguished scholars from the developing countries to enter the Bank's Visiting Research Fellow Program. And fifth, the Bank occasionally funds activities to build

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<sup>4/</sup> See the accompanying volume of Abstracts of Current Studies for details.

research capacity directly -- the Bank's participation in the African Economic Research Consortium, reported last year, is a case in point.

Despite these efforts, building research capacity in developing countries, especially in the poorer member countries, remains an elusive goal. Experience shows that there is no easy way, and certainly no cheap way, of achieving this goal. The Bank's research program does not have the resources to mount a major effort on this front. The Research Administrator's Office is, however, working closely with other Bank initiatives in this area: for example, with the Africa Region's program to strengthen managerial and policy analysis capabilities in Sub-Saharan Africa. This effort will mobilize resources from a number of donors to provide the basis for an innovative and broadly based attack on the problem.

#### Research Priorities

The basic goals of Bank research are to enhance knowledge in areas where the Bank's needs and the development community's are greatest and where there is hope of making progress. In this context, the Bank's research priorities can be described at several levels. The broad priorities change only slowly over time -- for instance, the increased emphasis on macroeconomics and trade as the Bank has moved into adjustment lending. More specifically, the Research Committee has indicated eight general priority research areas, described more fully in appendix 3. The headings for these research areas are:

1. Human capital and development
2. Institution and capacity building for the private and public sectors
3. Poverty

4. Environment
5. Macroeconomic policies
6. International and domestic trade policies
7. International and domestic finance
8. Agriculture and industrialization

These categories, which encompass most of development economics, are intentionally nonexclusive, reflecting our desire to allow room for individual researchers to innovate by working on new questions of their own choosing. They also include the Bank's areas of special emphasis which receive special attention from the Research Committee. Examples include women in development and demography in category 1, private sector development in category 2, poverty and environment in categories 3 and 4, adjustment and trade in categories 5 and 6, and so on. Research on Sub-Saharan Africa, undertaken both in Operations and in PPR, appears under almost every heading. Research managers -- in their own work programs and in their joint work with outside consultants -- are encouraged to be innovative in the choice of research topic and area.

Managers in PPR set more narrowly defined research priorities. In the Development Economics Vice Presidency, the priorities are:

- Macroeconomic adjustment and sustainable growth. The policies and conditions needed to produce sustainable growth are the fundamental issue facing the Bank and therefore the fundamental emphasis of the macroeconomic research program.
- Institutional capacity and economic growth. The Bank has long emphasized the need for an institutional base to support development

and economic growth; it is necessary now to add intellectual substance to that emphasis.

- International trade and the Uruguay Round.
- The debt problem, future financial flows, and growth.
- Improvement and broadened dissemination of the Bank's data base.

For the Sector Policy and Research Vice Presidency the following areas have been identified as priorities for future research:

- Ecological sustainability in agricultural policy and project development.
- Poverty reduction. Improving access by the poor to productive assets, including human capital, and expanding employment opportunities for landless workers.
- Advancing the role of women in development by improving their access to public services, especially education, and to labor market activities outside the home.
- Policies and regulations that foster competition and private sector development.
- Technology and its role in development.

The organizational structure of the research departments and divisions in PPR reflects detailed research priorities (see appendix 4 for a list of those divisions). Divisional work programs are the fundamental practical expression of the Bank's research priorities. Details of the research components of these programs can be found in the accompanying volume of Abstracts of Current Studies.

### Research Personnel

Top-quality researchers are critical to a successful research program. The Bank, with its emphasis on operations, does not encourage specialization in research. So, the typical career pattern is for an individual to enter the Bank through a research division but move on to Operations.

This pattern, sometimes decried in the Bank, has a major advantage. Research is for the most part a young person's game. It is difficult to keep up with new knowledge and new techniques outside a university, where the pressures to publish and to teach keep most researchers close to the frontiers. A freshly minted Ph.D. is far more likely to be more up to date in his or her research methods, and less constrained by Bank presuppositions, than a veteran staff member. The typical career pattern in which individuals enter research when young and then move off to Operations ensures the quality and vitality of the core of the research staff -- but it places a special burden on research management to set clear priorities and to manage these less-experienced researchers.

As noted above, the Bank typically does not attract the best academic researchers. With few exceptions, the best graduate students want to pursue an academic career. Some of those exceptions are at the Bank, attracted here by their interest in policy-related and applied research. Further, the Bank continues to maintain a high average quality of research and analytical work. Whether it can maintain this quality depends on the salaries it pays and on its reputation as a creative and open environment for its staff. Bank salaries have been falling steadily relative to U.S. academic salaries. In

some fields, such as finance, the Bank simply does not compete, even at the entry level.

Whether the Bank succeeds in maintaining a reputation as a creative and interesting place to do research depends very much on management, at both the divisional and top levels. The success of research depends on the creation of a sense of continuity and community. Continuity in research, and the sense that knowledge is being built up rather than created afresh every few years, requires stability in research management and direction. This need for stability does not preclude the typical career pattern of Bank researchers: individuals who leave research for operations can return later; and a limited number may obtain much operational experience from within PPR. But it does mean that research management has to be recognized as a valuable activity, best undertaken by managers who have recognized research experience and ability. It means further that the Bank's culture has to recognize that research, in all three modes, is a legitimate, indeed essential input into the Bank's production process. It means, too, that Bank research is a contribution to economic development, not a luxury.

#### Dissemination of Data and Research Results

The Bank disseminates its research results widely, within the Bank as well as outside. University press books remain a major dissemination avenue for Bank's research output. The past 12 months have witnessed a rapid increase in submissions to the Bank's Editorial Committee as a number of major research projects (including three of the comparative studies -- see below) begin to wind down. In fact, the supply of potential book publications threatens to overwhelm resources available for their publication.

The best known of the Bank's research publications is the annual World Development Report, which has a remarkably wide readership for so serious a publication. Although not a direct product of the Bank's research program, the WDR draws its credibility from the research background papers on which the conclusions of each volume rest.

The Bank's journals, The World Bank Economic Review and The World Bank Research Observer, as well as the widely circulated Finance and Development published jointly by Bank and Fund, spread the results of Bank research throughout the world, as does the quarterly newsletter Research News. Free distribution of both journals in developing countries aims at getting research results -- and in particular results of work funded by the Bank -- to libraries, researchers, students, and policymakers with limited access to other professional journals. Three issues of The World Bank Economic Review and two of The World Bank Research Observer were produced during the year.

Both journals fill publication gaps in applied, policy-oriented development economics, each aimed at different audiences. The Research Observer intended for lay readers and policymakers, the Economic Review more for professionally trained economists. The Economic Review thus is intended to serve the same purposes as the Fund's Staff Papers. It provides a focus and outlet for professional-level Bank research output, which helps ensure both that such research is at a high level and is made available to the wider development research community. Each journal appears to be building up its own clientele, affirming the decision to publish two separate journals.

Bank publications also disseminate data. The World Bank Atlas is well known and has a large circulation. PPR is improving the quality and



timeliness of World Tables, which will eventually be published every six months. It is also upgrading the quality of the Debt Tables, seeking to lengthen basic data series and to improve the presentation of the data. PPR intends, in addition, to begin publishing World Bank Country Briefs, abridging the Country Economic Briefs now provided to the Board.

PPR is making an especially strong effort to disseminate the results of research quickly and in ways that economize on readers' time, particularly in the Bank. To this end, half-page summaries of papers in the PPR Working Paper Series are being widely distributed, with the papers available on request, and a new Policy and Research Series is being launched this fiscal year. A steady stream of seminars, conferences, and courses also spreads research findings within the Bank.

#### THE RESEARCH PROGRAM IN FISCAL 1988

The Bank devoted \$23.5 million to economic and social research during fiscal 1988, or about 14 percent of its spending on analytical work (see figure 1 for an overview and the appendix tables for details). <sup>5/</sup> Of this amount, \$18.4 million was for 89 staffyears of research. The remainder, \$5.1 million, was for allocations from the Central Research Budget to consultants, travel, computer time, and research assistance.

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5/ The Bank's research program explicitly excludes research financed under loans and credits and research of a technical nature, such as that funded by Bank participation in the Consultative Group on International Agricultural Research (CGIAR).

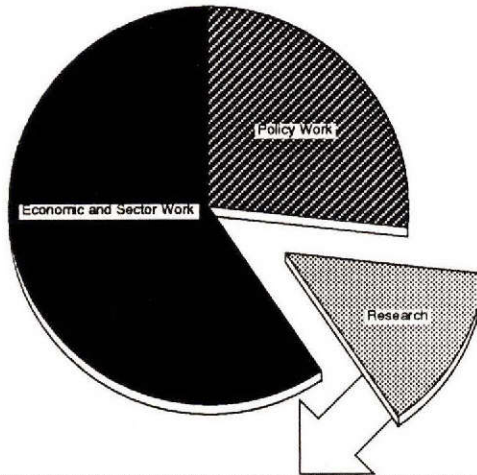
The balance between centrally approved (49 percent) and departmentally approved (51 percent) research changed little in fiscal 1988 from the year before. Centrally approved projects accounted for \$6.3 million in staff time (30 years) and \$5.1 million in funding from the Central Research Budget. Departmental projects amounted to \$12.1 million for staff and consultants, for an equivalent of 59 staffyears. (Centrally approved projects are reviewed by the Research Committee and, when approved, funded from the Central Research Budget. Projects that departments undertake with their own resources are classified as "departmentally funded projects" and are not subject to central review.)

More than four-fifths of Bank research is conducted in departmental and divisional work programs in PPR, where about a third of the resources are earmarked for research. In fiscal 1988 this proportion was actually less than a fifth, with PPR devoting 83 of 440 staffyears to research. Part of this shortfall reflects the transitional nature of fiscal 1988, but it also underscores the pressures that the day-to-day needs of Bank operations put on research resources, especially those held by departments and divisions.

Last year's report noted several trends that had been developing in research over the preceding several years: the growing emphasis on macroeconomic and international research, the growing emphasis on very large and very small projects, and the continuing decline in research conducted by the Bank's Regions. Each of these trends was reversed in fiscal 1988 in response to the Bank's postreorganization agenda (see figure 2). The share of sectoral research rose from 41 percent in fiscal 1987 to 50 percent in fiscal 1988. The share of research on macroeconomic and international issues fell from 58 percent in 1987 to 30 percent in fiscal 1988. Of the \$11.7 million

**Bank Analytical Work**

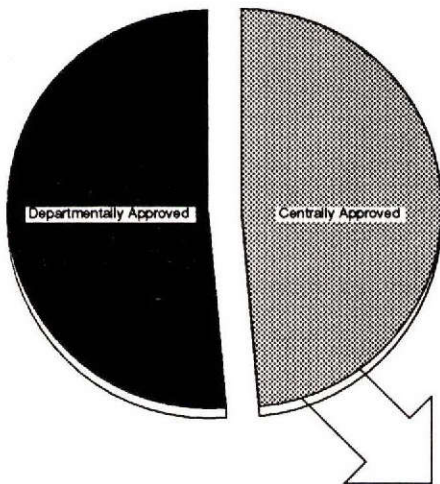
\$170.3 million in 1988



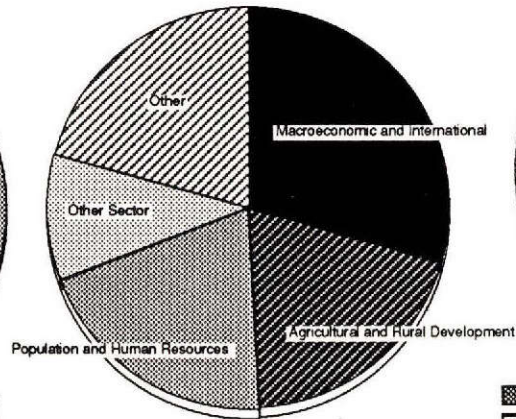
**Bank-funded Research**

FY88 \$23.6 million

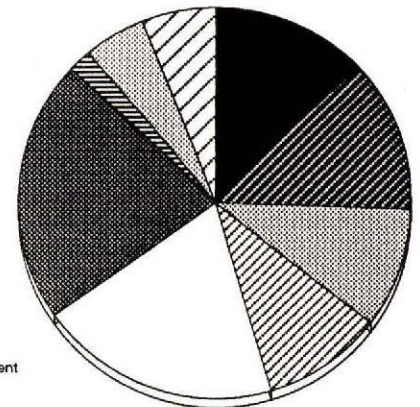
By funding source



By traditional categories



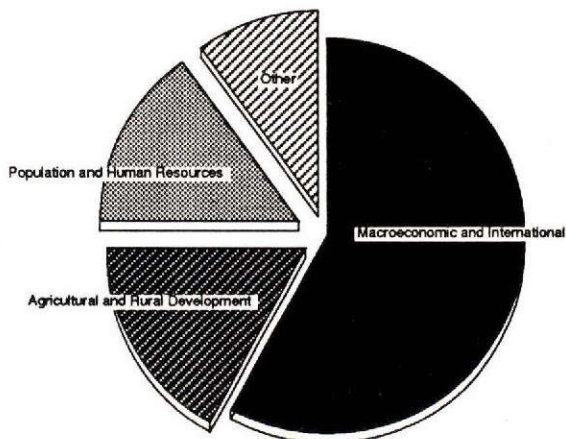
By PPR themes



- Human Resources
- Public and Private Sector
- Technology
- Adjustment
- Dissemination
- Debt Management
- Other
- Financing Development
- Natural Resources, including Agriculture

**Centrally Approved Research**

FY87 \$11.4 million



FY88 \$11.4 million

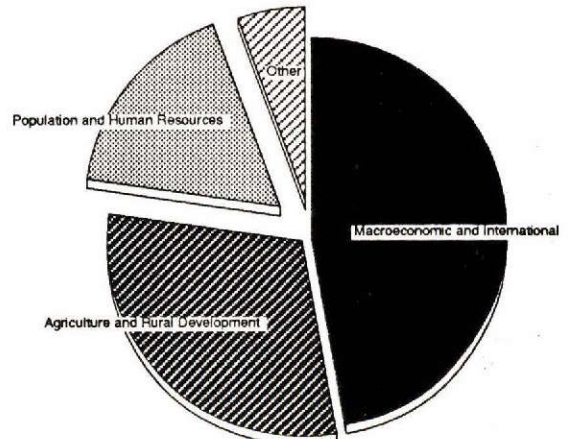
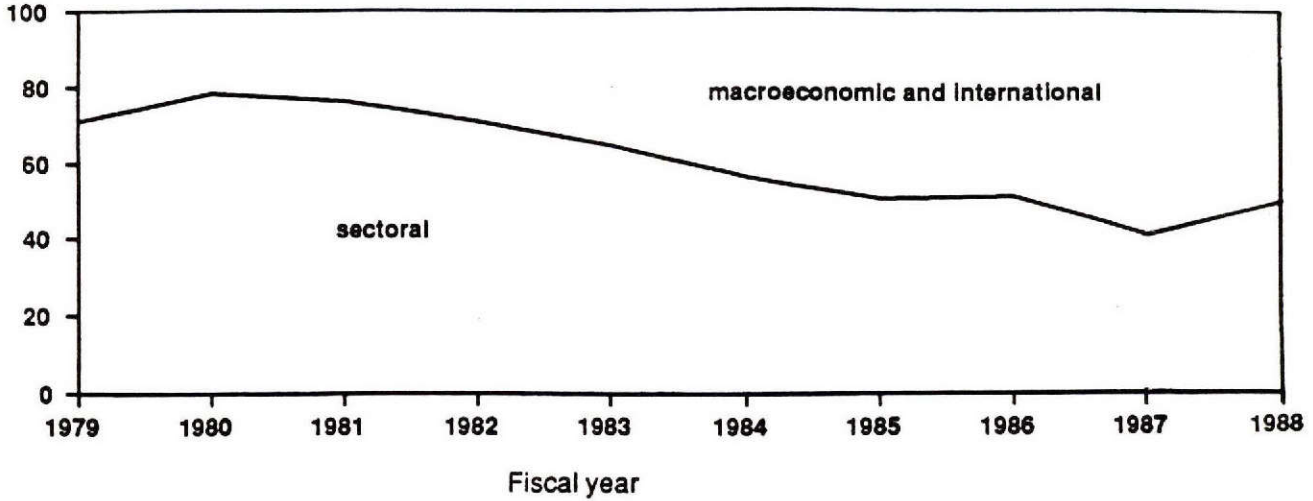


Figure 2

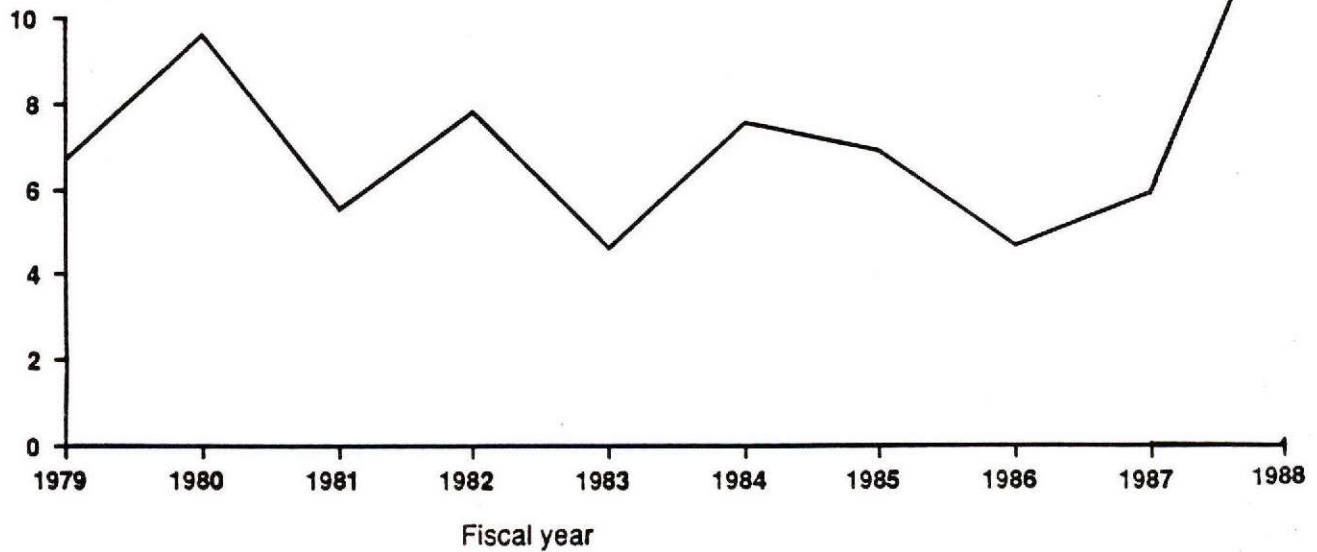
### Sectoral research v. macroeconomic and international

Percentage of total research



### Regionally sponsored projects

Percentage of total research



devoted to sectoral research, the greater shares continued to go to agricultural and rural development (20 percent) and to population and human resources (20 percent). Regionally sponsored research also showed a sizable increase over fiscal 1987. Applications rose by 75 percent, with dollar amounts requested increasing fourfold. Central research funds approved for use by the regions increased threefold from \$234,000 to \$712,000, fully 25 percent of all funds approved during the year (up from 17 percent of a much lower base in fiscal 1987).

This year we are introducing a new system of classification which will replace the traditional one for reporting Bank research activities. The new categorization is intended to reflect the broad themes PPR uses to describe the thrust of its work program. A breakdown of Bank research expenditures by PPR themes is summarized in figure 1 and detailed in appendix table 5. It shows that the major share of resources went to research on human resource development (22 percent) and natural resource development (20 percent), while the other four main categories (public sector and private sector policies, adjustment programs, external sector and debt management and financing development) each absorbed about 10 to 13 percent of the total expenditure.

#### Centrally Funded Research

By the end of fiscal 1988, 69 projects remained in the centrally funded portfolio, up from 55 projects in the preceding year and 64 in fiscal 1986. During the year, the Research Committee reviewed 53 funding requests, up from the previous total of 46 requests. Thirty proposals were for new project starts, nineteen were for seed money to finance proposal preparation,

and four were for supplementary funds for ongoing projects. Requests ranged from less than \$20,000 (24) to over \$100,000 (14); fifteen requests were between \$20,000 and \$100,000. Forty-four of the proposals were approved: 23 for full funding, 4 for phased funding, and 17 for funding at reduced budgets. The total funding approved amounted to \$2.9 million, compared with requests of \$4.9 million. Table 1 and appendix table 3 show the distribution of the proposals by Bank Vice Presidencies.

Twenty-three projects were completed or closed this year. Part II of this report presents summaries of the findings of the major projects completed in fiscal 1988. Forty-two other projects continued into the new fiscal year (for details, see the accompanying volume, Abstracts of Current Studies).

At the end of fiscal 1988, the Internal Auditing Department completed an audit of centrally funded research projects. The objectives of the audit were to assess adherence to policies and procedures governing the centrally funded research program and to recommend improvements. But the review covered the period 1984-87 and thus mostly discussed procedures in effect before the reorganization of the central research management. It showed that these procedures had been generally adequate, but it also pointed out some areas where improvements should be considered. The changes that the new research management introduced during fiscal 1988 have already dealt with most of the weaknesses in the systems, procedures, and management controls pointed out in the audit report.

#### Comparative Studies

**The Timing and Sequencing of a Trade Liberalization Policy (673-31).** Launched in 1984, this study examines trade liberalization in 18

Table 1. Distribution of Project Proposals, by Bank Vice Presidency

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**Policy, Planning, and Research**

Office of the Senior Vice President	1
Sector Policy and Research	19 (3 projects in cosponsorship with the Regions)
Development Economics	17 (3 projects in cosponsorship with the Regions)

**Regions**

Africa	2 (1 project in cosponsorship with PPR)
Asia	2
Europe, Middle East and North Africa	4
Latin America and the Caribbean	6 (1 project in cosponsorship with PPR)

**Other**

Legal	1
International Finance Corporation, Economics Department	1

countries. Lessons on how to move from a restricted trade regime to an open one are being drawn from the country studies. Three volumes, containing eight country studies, are in press and will be on the bookshelves by late spring 1989. Three other volumes of country studies and a synthesis volume are to be published by the end of 1989. (The study's main findings are presented in Part II of this report.)

**The Political Economy of Agricultural Pricing Policies (673-64).**

This study, begun in 1985, examines the evolution of agricultural pricing policies in 18 countries and the effect of the policies on trade, output, consumption, income distribution, and resources and the budget. The country studies are being published in the World Bank Comparative Studies on the Political Economy of Agricultural Pricing Policy. The study on Portugal has been published, the one on Zambia has gone to press, and others are being edited. The country chapters will also appear in three volumes, two of which will go to press by late 1988, and the third in early 1989.

From the findings for the individual countries, the comparative analysis of the synthesis volume, now in draft form, aims to draw guidelines for policymakers within the Bank, in the countries concerned, and in the developing world in general. A complete draft will be available by spring 1989. (The study's main findings are presented in Part II of this report.)

**The Political Economy of Poverty, Equity, and Growth (673-73).**

Conventional economic variables alone cannot explain economic growth and income distribution. This study explores 21 countries for the interactions among conventional economic variables and public policy goals, the instruments for pursuing these goals, and the broader social and political context. The individual country studies, begun in 1985, and the comparisons of "twinning"



countries with similar or contrasting experiences, were completed in mid-1988. A report that synthesizes the findings will be completed by late 1989.

#### **Macroeconomic Policies, Crises, and Long-term Growth (673-99).**

Launched in 1986 and to be completed in 1990, this study focuses on three central questions: Why have some countries succumbed to crisis, and others not? How do crises and the way they are resolved affect long-term growth? And how can countries best make the transition to stable and rapid growth? Phase I of the project consisted of studies on 17 countries and a workshop to discuss the drafts of those studies, held in June 1987. Phase II analyzed critical episodes in each country's study and drafts were presented at a workshop in May 1988. In Phase III, now under way, the relationship between macroeconomic policies and sustainable growth are examined, and a workshop to present the resulting drafts will be held in March 1989. A synthesis volume will encompass the country studies and the subsequent analysis.

#### New Starts

New starts in fiscal 1988 fell into three categories: research-agenda-building grants, research-proposal-preparation grants, and new projects. The two research-agenda-building grants went to support development of menus of priority research issues in the special emphasis areas of environment and women in development. These grants were based on the recognition that the Bank was building its own capacity in these two areas during this period, and that demands for operational support in them made thinking about research issues especially difficult. The central research budget also supported preparation of 17 research proposals, nine of them

sponsored or cosponsored by the Regions. Table 2 lists fiscal 1988's new starts, classified by principal area of concern.

Excluding research preparation studies, 25 new projects were added to the centrally funded research portfolio in fiscal 1988. Almost all the new research projects support the Bank's research priorities. For more details of these studies, see Volume II of this report, Abstracts of Current Studies. This volume also provides the narratives of departmentally funded studies, many of which also started in fiscal 1988.

### New Programs

The Research and Publications Policy Council and the Research Committee have instituted several new programs to encourage policy oriented development research both within and outside the institution. For research in the Bank, the Research Administrator's Office has undertaken an extensive "outreach" effort designed to lower the costs of operational staff involvement in the Bank's research work. This has entailed setting up several small workshops to determine the current state of knowledge in a particular area of interest -- and to find out what research is needed to extend that knowledge in directions that would be useful, either now or in the future, as the Bank advises its member countries.

A continuing challenge of the Bank's research management is the improvement of information flows among researchers, and between researchers and operational staff. As last year's report indicated, the Research Administrator's Office is developing a research information system that will allow Bank managers and researchers access to up-to-date inventories of all Bank research activities. As expected, this is proving both time-consuming

Table 2  
Fiscal 1988 New Starts

*Priority  
& Trade Summit  
Africa / PPR collaboration  
not shown here - UNDP  
etc.  
only external Research  
Dept. work is left over*

**Human Capital Development**

What is the impact of education on employment and household behavior in Sub-Saharan Africa? RPO 674-57

What specific policies and school inputs most efficiently raise student achievement? RPO 674-43

**Institution-Building in the Private and Public Sectors**

What methods have been used in the past, and what options are available to governments who have decided to proceed with the privatization of their state-owned enterprises? RPO 674-33

**Poverty**

Does the Peruvian government's public income redistribution program crowd out private income transfers? RPO 674-49

**Environment**

How can indigenous peoples and their knowledge be better incorporated into conservation efforts? RPO 674-38

What are the incentives and constraints that influence investments in forestry by small farmers? RPO 674-47

**International Finance**

How effective are the investment-promoting programs of developing countries at attracting foreign investors? RPO 674-31

What is the potential of debt swaps in reducing Latin America's debt burden? What are the benefits and costs of schemes to the debtor countries? RPO 674-36

How do debt-equity swap mechanisms affect foreign investment behavior? RPO 674-40

Will active management of the currency composition of external debt reduce exchange risk exposure? RPO 674-64

**Domestic Finance**

What are the revenue implications of transport tax instruments, policies, and other issues in Sub-Saharan Africa? RPO 674-37

What can the experience of 11 countries that have undergone tax reforms teach us about how to improve other developing countries' tax systems? RPO 674-52

**Agriculture and Industrialization**

What are the links between farm investment, productivity, operations of rural markets, and access and use of land in Sub-Saharan Africa? RPO 674-32

What are the technical, economic, and institutional factors affecting agricultural diversification in South-east Asia? RPO 674-66

As rural households become entrepreneurial units in China's new economic system, what are the factors affecting credit demand by and supply to households in the agricultural sector? RPO 674-34

What are the effects of Mexico's domestic agricultural and macroeconomic policies, and of foreign agricultural and macroeconomic policies, on Mexico's agricultural sector? RPO 674-42

How does industrial efficiency and competitiveness change in relation to changes in trade regimes? RPO 674-46

**Other New Starts**

How do changes in price, quality, and location of water affect the water consumption of different types of families, and what are they willing to pay for such services? RPO 674-35

How can satellite technology be used in urban planning in developing countries? RPO 674-66

and difficult, especially for departmentally and externally funded research. Progress is nevertheless being made, and we hope to have an operational system in place soon.

The research management has also instituted two programs to improve the visibility of Bank research and problems to the outside world -- and to strengthen ties between Bank researchers and researchers outside the Bank. The first of these is the Visiting Research Fellow Program. This pilot program is designed to attract the best development scholars to the Bank for periods of three months to a year, usually during their academic sabbaticals. The notion is that these scholars will bring to the Bank an up-to-date knowledge of methodological and theoretical advances in their areas of expertise. They will take away with them a much clearer understanding of the problems Bank staff and member countries face -- including institutional barriers to solving those problems that constrain theoretical solutions -- and a number of contacts with Bank researchers and operational staff that may be called on later to strengthen operational analytical work or to expand research capacity.

The second program -- to increase the world's perception of the Bank as a pace-setter in development economics -- is the Bank conference on development economics. This conference, planned as an annual event, will bring together researchers from around the world and from the Bank to discuss a variety of topics that bear on problems and concerns faced by the Bank and its member countries. Those preparing papers will be asked to pay particular attention to the messages contained in past research for policy, to the remaining gaps in our knowledge, and to proposed research directions that might fill these gaps. These conferences will take place at the Bank with

broad participation by Bank staff. The first conference will be held in spring 1989. The conference will be funded from the central research budget, and the Rockefeller Foundation has made an additional grant to promote the participation of economists from developing countries.

#### Evaluation of Research Projects

Last year's Report on Research promised a new system for evaluating Bank research. This system, to be developed in conjunction with the Operations Evaluation Department (OED), will streamline research evaluation procedures and to enhance the value of evaluation efforts to research managers. The new system will also be more forward looking, one that will identify gaps in our knowledge. Staffing constraints in the Research Administrator's Office have slowed progress in the development of a new evaluation system, but it remains a priority area for fiscal 1989.

PART II. HIGHLIGHTS FROM RESEARCH IN 1988

As the discussion in part I makes clear, centrally funded research is reviewed by the Research Committee and funded from the Central Research Support Budget. Departments undertake a roughly equal volume of research, funded with their own (mainly staff) resources. Presented in this part of the report are some of the main findings and policy messages from centrally funded and departmental research completed in fiscal 1988. Volume II of the report, Abstracts of Current Studies, contains detailed information on all research projects under way in fiscal 1988.

#### CENTRALLY FUNDED RESEARCH

##### The Timing and Sequencing of a Trade Liberalization Policy (RPO 673-31)

This study fills a gap in applied research by addressing not whether but how to move successfully from a highly restricted to a more open trade regime. The researchers have analyzed the paths of policy change in 19 countries -- in essence, all the developing countries that have made significant attempts to liberalize trade since World War II. The analyses show that the path of change to a durable trade liberalization depends on many shifting political and economic circumstances and attributes. Even so, the characteristics of a successful policy are common to enough countries, over long stages of development, for some general principles to be derived.

- The countries that have persevered with their attempts to liberalize tend to be smaller and poorer in natural resources, but with a higher

per capita income than the nonliberalizers. They had comparatively stable political regimes, stable real exchange rates, a lower budget deficit, and considerably higher export growth than those whose attempts to liberalize foundered.

- If a liberalization lasted six years, it stayed put (with one exception).
- Momentum is important to success. Strong, rapid liberalizations, brought in with a bold first step, tend to stick. A gradual, restrained movement towards change has less staying power, especially in countries with a long history of tight protection, or with a previously aborted liberalization.
- Liberalizations initiated at times of economic hardship tended to be sustained. Of those launched when the economy was comfortable, more survived than failed. Those in between -- that is, those introduced when the economy was under some stress but not at crisis point -- tended to fall by the wayside.
- Outside influences -- such as multinational agreements -- played only a minor supporting role in sustaining the policy.
- Transition costs attributable to unemployment have been small. The structure of employment was affected in some instances, but no net unemployment could be ascribed to the policy. This held both for strong, rapid liberalizations and for the gradual, moderate ones. Conversely, the fate of a liberalization has rarely been affected by unemployment.
- Liberalization attempts do not seem to have damaged production, even in the short run.



- Radical relaxation of quantitative restrictions is a vital first ingredient of durable liberalizations. Remarkably, such a loosening of QRs seems to have boosted economic growth markedly in the years immediately following initiation of the policy.
- There is a visible relationship between the balance of payments and the course followed by a liberalization. But the nature and intensity of the association changes according to the stage reached. The position of foreign reserves on the eve of the liberalization apparently has no influence at all on its eventual fate, but declining reserves toward the end of an episode seem crucial. Disintegration of a liberalization has almost universally been preceded by a balance-of-payments crisis. The deciding agent, in either direction, appears to be export performance -- not a surge or decline in imports.
- No systematic connection seems to exist between the adoption of export promotion measures, as part of the trade liberalization package, and the durability of the policy.
- At all stages in a liberalization episode, a depreciation in the real exchange rate promotes survival, and vice versa. Since a nominal devaluation, together with tight fiscal and monetary policies, appears to have been almost a precondition of depreciation in the exchange rate, it follows that they may also be necessary conditions for the success of a liberalization.

The findings of this research serve the Bank's operational needs in furnishing guidelines for designing and implementing sustainable trade liberalization policies. Requests within the Bank for the preliminary output

of this research have been numerous and widespread. In addition, there have been requests from the Bank's Executive Directors, the U.S. Council of Economic Advisors, the U.S. Treasury, the State Department, major research institutions, and academics. The findings have been reported in the Financial Times, Journal of Commerce, and The Economist, and were an important input for the 1987 World Development Report. They have been presented in academic fora, such as the annual meetings of the American Economic Association (1986) and of the Latin American Econometrics Society (1986), and they have been the basis for conferences in Sri Lanka and Brazil.

For most of the country studies, at least one of the authors has been from the country concerned. Often, the study has been carried out in a research center in that country. As well as contributing to research experience, this participation has established research partnerships between the Bank and its client countries that already have led to further research collaboration.

#### The Political Economy of Agricultural Pricing Policies (RPO 673-64)

Most developing countries have tried to foster industrial growth through policies of import substitution and protection and have maintained overvalued real exchange rates. These economywide policies have implied an indirect tax on agriculture. Meanwhile, the political imperative of keeping food prices down and the need for revenue have generated measures to control producer prices of agricultural commodities. These sector-specific (direct) policies have generally implied an additional tax on agriculture. Some governments have tried to offset the penalty to farmers through such direct incentives as subsidized inputs or investment in irrigation.

Individual studies have examined the direct impact of sector-specific policies on agricultural incentives. What has been lacking is a systematic analysis of the interactions between the economywide and agricultural policies and an assessment of the total discrimination against agriculture caused by both sets of policies.

This project has developed a consistent method for studying these policies and their effects in eighteen countries. This method enabled the researchers to quantify the intervention and to analyze the reasons for the policies, and their effects over time on output, consumption, trade, budget, intersectoral transfers, and income distribution on a comparable basis.

- For the 18 countries in the study, direct policies, on average, gave producers lower prices for their agricultural exports during 1960-84 and higher prices for food products that competed with imports (notable exceptions are wheat in Egypt and Pakistan). Interestingly, some countries have switched from subsidies to taxes after achieving self-sufficiency in a food product.
- The impact of direct policies, through industrial protection and overvalued real exchange rates, has entailed a significant tax on agriculture and has overwhelmed the impact of direct policies.
- Comparative results on the effects, the causes, and the evolution of policies are emerging and will appear in the synthesis.

The focus on the impact of trade and macroeconomic policies as well as sectoral policies fits well with the Bank's increased emphasis on structural adjustment and the influences of macroeconomic issues on sectoral reform. Bank regions have requested project results and methods for use in their policy analysis and dialogue. For instance, results on equilibrium

exchange rate calculations were used in discussions with the government of Zambia.

Papers were presented at the American Economic Association December 1987 meetings, at the Latin American Econometric Society meetings of July 1986 and 1988, at the ASEAN Agricultural Economic Association meetings of March 1988, at an August 1988 conference on agricultural policy in Santiago, and at other meetings. Papers by the project directors and various country authors were presented at the August 1988 Buenos Aires meeting of the International Association of Agricultural Economists. Several of the main topics at that meeting (macroeconomic policy, agriculture, and political economy) are a major focus of this project. The project's method was also the topic of a panel discussion in connection with GATT negotiations, and its results are to be drawn on in a report for U.S. AID professionals for use in their policy dialogue with developing country officials.

The project's results and methods have formed the basis for seminars for developing country government economists at the University of Minnesota in the past few years. The methods have also been used for a study commissioned by the government of Ecuador to a private consulting firm. Requests for methodological papers and results have been made by Ph.D. candidates working on developing countries, by academics in Europe, the U.S., and New Zealand. Interest in Latin America has led to an offer by the ICEG (a private research foundation) to finance the translation of the Latin American studies into Spanish.

Results of the project have been discussed with government economists or policymakers in several countries (Brazil and Argentina). A country author (Philippines) was simultaneously a member of an ad hoc commission on

agricultural reform. And in Pakistan, project results have been included in a "Report of the National Commission on Agriculture" by the Ministry of Food and Agriculture of the Government of Pakistan, and results on indirect taxation have been incorporated in the debate at the highest policymaking level.

Managing Agricultural Development in Africa (MADIA) (RPO 673-04)

Agricultural development is critical to economic growth in Africa because it generates output, exports, employment, government revenues, domestic food supplies, and raw materials for processing industries -- and it provides a market for other domestic sectors' products. Yet little is known about African agriculture in terms of the detailed, data-intensive, and cross-country analysis needed to ascertain future growth prospects and formulate policy. To address these concerns, the "MADIA" project -- supported by the Bank together with seven other donors (USAID, UKODA, DANIDA, SIDA, the EEC, and the French and German governments) -- set out to examine the record on African agriculture in three critical areas: (1) the role of country policies toward agriculture and their outcomes for growth, equity, and sustainability, (2) the consequences of donors' contributions, and (3) the political determinants of agricultural policy in Africa.

The study has focused on six countries -- Kenya, Malawi, Tanzania, Cameroon, Nigeria, Senegal -- which have 40 percent of Sub-Saharan Africa's population, 50 percent of its GNP, and a variety of agricultural circumstances. For four years, detailed analysis has been under way, with the participation of policy analysts and researchers from Africa and the participating donor countries.

- Agricultural production has generally grown as a result of expansions of cropped area and (to a lesser degree) of changes in cropping patterns, both due to rapid population growth. There has been very little productivity growth.
- Countries that have maintained their comparative advantage in an export activity have done better than those attempting quick diversification, even in circumstances of global oversupply. Tea and coffee in Kenya exemplify this conclusion, while Senegal's and Tanzania's costly and complex diversification demonstrates its negative side.
- Donors have sought universal explanations for Africa's poor performance -- such as poor macroeconomic policies, neglect of price incentives, and a lack of support for individual initiative. In reality, there is no simple explanation, since there is not a single Africa-wide crisis but a range of national, regional, or subregional crises, each with its blend of causal factors, including climatic, soil, ethnic, politico-historical, and human-physical capital endowments. A comprehensive and location-specific diagnosis of constraints is urgently needed to develop tailor-made, long-run solutions.
- With some exceptions, donors have had a surprisingly small positive effect on African agriculture. Countries receiving the most aid have performed the least well, as external finance has substituted for sound diagnosis of development problems. Even in countries that have done well, donor interventions explain a small part of the success. The most success has been achieved by former "colonial" donors

(showing the importance of detailed knowledge based on grassroots experience as a source of well-planned and executed development efforts), and there have been a few excellent examples of U.S. bilateral efforts in human capital development.

- Institutional and policy stability during severe external shocks are necessary for success. The Bank's assistance to Nigeria is an example of a donor helping stabilize agricultural policies in the smallholder sector, but there are few such examples of donors providing a long-term stable policy environment.
- A lack of institutional memory and historical perspective has resulted in "bandwagon" effects -- leading to emphasis on food self-sufficiency, poverty alleviation, and integrated rural development in the 1970s, and macroeconomic reforms, correction of price incentives, and privatization in the 1980s. More recently, this has come full circle to a renewed emphasis on poverty alleviation and food security. A coherent, consistent policy framework built on a consensus among donors and African governments is important because most African countries suffer severe shortages of human capital resources. At present, despite assistance from a large number of donors, there is little consensus on the substance of long-term development issues.
- The shortage of indigenous expertise has left many African governments with little capacity to frame development plans or deal with the proliferation of external actors. Donors urgently need to develop institutional and human capacity in Africa. An institutionalized, continuous process of acquiring knowledge is also

required, involving active participation of donors and African nationals. This process would enable development and refinement of long-term strategies in support of a coordinated external assistance effort.

The findings from the MADIA project are having a direct operational payoff on such issues as food security, structural adjustment strategies in individual countries, fertilizer pricing and subsidy policies, and the design for building agricultural research capacity. In addition, the collaborative research process and policy dialogue of the MADIA project have been important to building a consensus on possibilities and priorities.

#### Key Institutions and the Expansion of Manufactured Exports (RPO 671-68)

Long the fastest growing segment of world exports, manufactured goods have become the developing world's largest exports, ahead of both fuels and nonfuel primary products. Marketing and institutional arrangements, the area in which least was known and practical advice seemed most needed, served as the primary focus of study.

The project was intended to throw light on marketing, institutional, and practical links between production of finished goods by locally owned firms and demand by ultimate consumers, and thus marketing strategies for emerging exporters. (More than half the manufactured exports from developing countries are finished consumer goods from locally owned firms.) A further purpose was to improve understanding of the effects and implications of textile quotas against developing countries under the Multi-Fiber Arrangement (MFA). The MFA limits and shapes these countries' opportunities for exporting



garments and other textile products, usually their most important early manufactured exports.

- Developing country firms usually go through learning sequences in initially attracting buyers, learning how to set up production and management of exports "made-to-order" with assistance from buyers, and acquiring skills and know-how not only in production-to-order but also in marketing their growing capabilities to potential buyers.
- These learning sequences transform what the firms are able to do by themselves, as well as their knowledge of markets, product design, and much else.
- From the start, exporters are required to get together the entire package required, including packaging, labels, documents, packing and shipping; thus policies allowing easy duty-free access to imported inputs (and competitive locally made inputs) are crucial.
- Fledgling exporters need much help and receive low prices; experienced ones move up market and get better prices while doing much more for themselves.
- In the more standardized products, firms often soon set up their own distribution and eventually produce to inventory, though hardly any advertise their own brands to final consumers in large developed markets.

These findings are now being used in small follow-on studies of how to achieve cost-effective support to export marketing in developing countries undergoing a policy transition, and in policy work looking at lessons of experience in export policy and administration. Another output of the

project, a study on textile quotas, has been widely hailed as the best source on the subject and much used as background for MFA negotiations since then.

Economic Consequences of the Coffee Boom in Kenya and Tanzania (RPO 672-65C)

Temporary trade windfalls are frequent, and their effects are powerful. They open the way to large investment, and provide an opportunity for policy reform. They are also complex economic events, with scope for serious policy error.

The period 1976-78 witnessed a massive but temporary increase in the world price of coffee, a major smallholder cash crop in Kenya and Tanzania. The two countries handled the coffee boom in very different ways. In Tanzania, some 60 percent of the incremental coffee income was taxed away by government, whereas in Kenya 95 percent went to the smallholder coffee growers. This large, abrupt change in an important price, handled so differently in two countries with comparable economic structures, gave a rare opportunity for quantitative analysis of some micro and macro questions fundamental to the development process, especially in the low-income, resource-poor countries of Sub-Saharan Africa.

Using the "experiment" of the coffee boom, and detailed modeling of the two economies, the research addressed these questions:

- What were the consequences for growth and distribution of large but temporary trade shocks?
- Were these consequences intrinsic to such shocks or were they the result of the policy stances?
- What different policy stances would have been superior?

- Did the rural population benefit from such extra public expenditure as occurred as a result of the windfall?
- How did the peasant farmers react to the windfall? Were their reactions so mistaken as to warrant corrective or preemptive policy intervention?

The four methods deployed by the study -- a computable general equilibrium model, large-scale sample surveys, extension of the "Dutch Disease" theory to incorporate temporary windfalls, and development of a theory of peasant supply response in rationed consumer goods markets -- furnished some answers to these questions:

- In both countries, public policies in place at the outset, and those devised in response to the boom, proved seriously mistaken, though in different ways.
- The effects of the boom on distribution and growth consequently brought far fewer benefits than they might otherwise have done.
- Much of the extra public expenditure failed to benefit the rural population. In Kenya, even though the government passed on the benefit to the growers (who saved it), the final outcome was unexpectedly poor for them: controls on imports and asset choices meant that four-fifths of the income of growers was ultimately transferred to the urban sector through a bidding up of prices of nontradeables and import substitutes. In Tanzania improvements in services (notably the health service) financed by the boom could not be sustained afterwards.
- In contrast, far from being so mistaken as to warrant intervention, the reactions of peasant farmers were entirely appropriate: although

constrained by government policy, they were still able to invest a substantial part of their windfall income in higher return activities.

Economic Policy Analysis of Household Data (RPO 674-19) and  
The Costs and Benefits of Food Subsidies in Morocco (RPO 674-16)

Knowledge of household responses to policy initiatives is central for policy formulation, but hard data on elasticities of supply and demand are often lacking. In developing countries it is particularly difficult to obtain good estimates of price elasticities using standard time-series analysis. But many countries collect household survey data on both expenditures and physical amounts of purchases, so that "unit values" (expenditures divided by quantities) can be derived.

The project on the analysis of household data used recent advances in theory and data collection to develop and test a method that shows how these household data can be used to obtain reliable estimates of key price elasticities. Once developed, the method proved to be highly useful for policy analysis. It was applied in research on costs and benefits of food subsidies in Morocco, using the information from two cross-sectional surveys on household expenditures.

The Moroccan study was launched because of the increasing perception in the development community that general nontargeted food subsidy policies are financially unsustainable. Food shortages and population increases have meant that more food must be imported, draining foreign reserves and increasing budget deficits. To cut costs, some countries have embarked on policies to decrease subsidies by increasing food retail prices.

The research set out to evaluate the effect of increases in food prices on various socioeconomic groups, with the goal of finding ways to compensate poor groups hurt by the elimination of foods subsidies. Moroccan authorities are interested in such information because Morocco's budget pressures are making food subsidy program a likely candidate for reform.

The findings confirm the crucial dilemma inherent in nontargeted food subsidy programs:

- Extensive benefits of the programs leak to high-income households.
- But since poorer households spend more of their income on food than richer households, they nevertheless benefit substantially from the subsidies (and suffer from increases in food prices).
- Consequently, across-the-board cuts in food subsidies will reduce budget deficits, but at the cost of poor households' welfare.

A general conclusion from the study is that policymakers should concentrate on targeting their subsidy programs. The study shows the budgetary, welfare, and nutritional consequences of alternative food price policies. A specific finding is that subsidies on barley (in the rural sector) and hard wheat (in the urban sector) could reduce the hardship that low-income households in Morocco suffered when the general food subsidy program is being eliminated.

Health Care Demand and Resource Mobilization: Côte d'Ivoire and Peru  
(RPO 673-39)

This project examined the impact of user fees on the demand for health services in rural areas of two developing countries. How would the use of health services be affected by new fee policies? Would users shift from

some types of health care providers to others? Would some user groups fare better or worse than others? Would there be differences by type of health service? How much in additional resources would be mobilized?

Some researchers have hypothesized that factors other than price, particularly perceived quality of care, dominate in household health care choices and that existing fees for public health services could be raised substantially without appreciably affecting use. To test this hypothesis, it is necessary to know how price sensitive the demand for medical care is, and how this price sensitivity differs by socioeconomic group. A major part of this research project was therefore devoted to generating reliable estimates of price elasticities of demand.

- The demand for medical care is price-sensitive, but much more so for the poor than the rich.
  - The revenue potential of user fees is low in poor areas, high in wealthier areas.
  - User fees approaching the marginal cost of care will effectively price the poor out of the market, but do not substantially deter residents of wealthier villages from using medical care.
  - Both from the point of view of cost recovery and of equity, therefore, some sort of price discrimination is necessary.
  - Since targeting the poor for price discounts may be administratively difficult, geographic discrimination (charging lower prices for facilities that primarily serve lower-income groups) may be an answer.
  - Fees should be introduced gradually, guided by evaluation of resulting impacts on patterns of use of medical care.

- Child care is more price-elastic than adult care.
  - Imposing or raising user fees will harm children's health and welfare more than adults' health.
  - It would make good economic and humanitarian sense (as well as being logistically simple) to exempt child care from increases in the fee structure for medical care, or at least to differentiate between fees for child and adult health care.
- Alternative health care providers are closer substitutes than self-care.
  - Charging fees for higher levels of care (for instance, hospitals) generally causes individuals to move to other types of care rather than to drop out of the medical care market.
  - This result suggests that it would be worth experimenting with higher charges for higher levels of care, carefully monitoring the effect on demand for medical care overall, and adjusting accordingly.

The general message to policymakers is thus one of gradation and differentiation. User fees could significantly increase resources needed to improve the health system. If they are introduced selectively, and special measures are being taken to protect the poor, the policy can at the same time improve the equity of the system. But if no special measures are taken, a user fee will perpetuate the inequitable distribution of health care in the developing world.

Macroeconomic Implications of Reductions in Government Spending: Methodology and Applications to Mexico (RPO 674-08)

Cuts in public spending have important macroeconomic implications. Central issues are the effects of reductions in government spending on the exchange rate and the balance of payments. Moreover, when the government cuts spending to reduce the budget deficit, a side effect may be reduction in the domestic interest rate. If the public requires a high premium to hold assets, the result may be capital flight, which will cancel the advantage of the initial interest rate reduction and hamper fiscal stabilization. This issue is especially relevant in Mexico, many of whose problems are related to capital flight.

- A reduction in spending on infrastructure can be inflationary, because of the resultant decrease in efficiency of private output.
- Several sectors in the Mexican economy do not have positive output elasticities with respect to public infrastructure.
- Given the high elasticity of substitution between domestic and foreign assets, it is difficult to change the domestic real interest rate significantly.
- When a government's exchange rate policy is reserve-based, the devaluation of the exchange rate that ensues if reserves fall below some critical level can affect welfare, at least in the short run.

The project's findings underline the importance of thoroughly understanding what spending is for before initiating cuts, and of coordinating them with exchange rate policy. For Bank work, the need to coordinate projects with macroeconomic policy is particularly relevant today, given the austerity programs that many developing countries have been forced to undertake.



Education and Informal Sector Employment (RPO 673-26)

Earlier studies on the economic role of education have been based mostly on samples of urban wage employees working in large firms and government service. But in most developing countries, including Peru, such workers represent only a fraction of the labor force. Further, institutional factors -- such as minimum wage legislation, unionization, and legal barriers to entry -- may push formal sector wages above market-clearing levels. Informal sector wages, since they are not subject to these influences, should more accurately reflect the relative economic value of different types of labor.

Two of the project's studies examined the contribution of education to productivity and earnings in farming and other family enterprises. Several other studies examined the determinants of earnings of urban male workers, focusing on the contributions of formal schooling and postschool vocational training, comparing the returns to different levels of education, or exploring differences in the earnings of those in private and public employment. Two studies focused on the returns to education and out-of-school vocational training for women, exploring also the factors that affect employment and earnings.

- School expansion policies pursued by the government in the 1950s and 1960s succeeded in raising education levels and in narrowing the gap between rural and urban residents and between men and women.
- As the supply of schools expanded, the effect of parents' years of schooling and occupations on the educational levels of their children lessened, indicating that the link between socioeconomic background and access to schools had weakened.

- Even rural areas enjoyed rapid expansion of primary schools. For males this meant that rural residence was no longer a disadvantage for their primary education. But for females rural residence mattered greatly, suggesting that rural parents had less interest in investing in the schooling of their daughters.
- Secondary schools remained less available in rural than urban areas; urban residence at the age of 13 thus remained an advantage to educational attainment.
- As elsewhere, individuals emerging from general educational streams in Peru earn much the same, and have essentially the same occupational profiles, as those who have trained in vocational institutions. Such institutions, despite declared differences in emphasis and goals, apparently differ little from other educational institutions: funded at the same level as nonvocational institutions in Peru, they cannot afford the inputs and "hands-on" experience that would make them genuinely technical.
- Public sector wages are well below private sector wages in metropolitan Lima, while in other urban areas there is no significant wage difference. Prospects for reducing budget deficits by cutting the government wage bill may therefore be dim.
- For urban men, the probability of receiving postschool vocational training increases with educational attainment, revealing a strong complementarity between formal schooling and training.
- Whereas education may decrease rather than increase the number of Peruvian women in the labor force, it alters the occupational

distribution by increasing the proportion of women in paid employment.

- Among employed females, education is positively related to hourly earnings: the relationship is nonlinear, with primary education showing higher returns than secondary. The return to postsecondary education, except for a small fraction of women who have earned a diploma, appears low and negative, a result partly of the recent poor performance of the Peruvian economy.
- Most women who attend training programs prepare for predominately clerical jobs. As with men, the probability of receiving training increases with school attainment, revealing a strong complementarity between schooling and training.

#### DEPARTMENTALLY FUNDED RESEARCH

Many divisional research programs focused on rebuilding during the year. Some projects have nevertheless produced some important findings and policy messages, which have been disseminated to Operations staff and more broadly.

#### Trade Policy

- Adjustment lending. A review of the Bank's experience with structural adjustment loans led to four major conclusions. First, sectoral adjustment lending in questionable macroeconomic

environments is not appropriate. To provide an appropriate basis for sector loans, the Bank and government need to reach greater commonality of understanding about the medium-term adjustment path for the economy and the policy initiatives to support that path. Second, the qualifications for adjustment lending are threefold: an agreed medium-term adjustment program; commitment from the government to carry out a specified set of actions; and a need for external financing because of a present or anticipated deterioration in the balance of payments or because of costs arising from the adjustment program. Once these prerequisites are met, there should be considerable flexibility concerning what the proceeds of any adjustment loan would finance. Third, appropriate levels of external financing are essential to adjustment programs, and recent initiatives to obtain greater financing for highly indebted countries and Sub-Saharan countries deserve support. Fourth, although the level of adjustment lending to any individual country should be based primarily upon country-specific considerations, it is desirable to set some limits on the continuation of adjustment lending to an individual country and on the share of adjustment lending in total Bank commitments. These limits should not be rigid ceilings, but triggers for reevaluating adjustment lending's effectiveness.

- The effects of VERs. Countries facing voluntary export restraints (VERs) often adopt a two-tier allocation system for export licenses to the restricted market. The system consists of (1) a "basic" allocation based on export shares to the restricted market and (2) an "open" allocation based on export shares to the nonrestricted

market. This allocation system -- which increases exports to the nonrestricted market beyond levels with a single quota allocation system -- has an efficiency cost as it results in extra sales at below marginal cost. Analytically, the two-tier quota allocation scheme is identical to a linking scheme where subsidies to sales in one market are financed from sales in another market.

- The costs of quantitative restrictions on trade. Nontariff barriers prevent a transition to the realities of international competition, and their welfare costs are huge. Estimates of the costs of quantitative restrictions in textiles, steel, and autos in the U.S. economy suggest that the United States loses an estimated \$14 billion a year in revenues through rents lost to exporting countries. Add another \$7 billion for distortionary costs. Removing the remaining tariffs (an average 3.5 percent in 1984) would produce a welfare gain of about \$0.9 billion. The welfare gains of removing all these restrictions add up to a net benefit of \$105 billion, measured in terms of the discounted value of displaced workers' lost earnings over a lifetime.
- Export revenue effects from increased external demand. To capture the full effects of external economic activity on export revenues, both volume and price effects need to be included. Because of the lagged adjustment of export supply, the response of export volumes to an increase in world income is likely to be smaller in the short run but to increase in the long run. Export prices, however, would be expected to change quickly, but to level off soon thereafter as resources are shifted to increase production. The total long-run

effect of a one percent change in external economic activity on export revenues is estimated at 1.5 percent -- a result which is remarkably robust to the alternative specifications adopted, and is generally smaller than the estimates in previous studies (which range from 1.3 to 4.7 percent). This result implies that domestic economic policies -- particularly those encouraging investment in export oriented activities, and exchange rate policies -- will need to play a key role in the strategy of developing countries to increase their foreign exchange earnings.

#### Macroeconomic Adjustment and Growth

Stabilization programs. One of the more ambitious ongoing research studies in this area analyzes the characteristics of the inflationary process in various countries and compares the effectiveness of alternative strategies for stopping inflation. High inflation leads to high variability in relative prices and distortions in the allocation of resources. The main goal is to improve understanding in the design of stabilization programs -- by delineating the advantages and disadvantages of the orthodox and heterodox approaches undertaken in some developing countries. This will provide valuable support to the World Bank's operational work.

- Orthodox stabilization policies -- those based on a tight fiscal stance -- have been shown to be very effective in stopping hyperinflation, as in Bolivia in 1985. The hyperinflation eliminates wage and price inertia, and because it cannot go on for long, it makes a serious stabilization program credible. Orthodox policies have been less successful in countries suffering chronic inflation.

Three types of orthodox programs can be distinguished: (1) tight fiscal stance with no nominal anchor for prices; (2) tight fiscal stance with money supply as the anchor; and (3) tight fiscal stance with the exchange rate as the anchor.

- What about efforts that add money or the exchange rate as a basis for determining other nominal prices? Disinflation with the money supply as the anchor (as in Chile and Argentina in the mid 1970s) or with the exchange rate as the anchor (the tablitas [preannounced devaluation schedules] in Chile, Uruguay, and Argentina) is at best slow. In some cases inflation picks up, and many such programs have to be abandoned because they lack credibility.
- In the long run, however, persistence and discipline can make the orthodox approach successful. In Chile more than a decade of fiscal restraint and the consistent use of various nominal anchors eventually brought inflation under control. There nevertheless were the drawbacks of periodic crises and low average growth along the way.
- Heterodox programs of stabilization -- those using wage and price controls -- might be a better alternative. This approach is currently being studied.

Labor markets. Research on exchange rate policy and the structure of the labor market has investigated the effectiveness of nominal exchange rate policy in the presence of segmented labor markets. Draft papers have been completed for Argentina, Chile, Colombia, the Philippines, and Uruguay, and have provided useful labor market and macroeconomic data to support operational work. Regulations on hiring, firing, and compensation have been

shown to retard the transfer of workers across sectors. Thus, even if devaluation succeeds in changing the relative price of tradables and nontradables, resources may not flow as expected toward tradable-producing activities.

This research is establishing whether the structure of the labor market (its segmentation) matters in terms of the effectiveness of conventional macroeconomic policies (aggregate expenditures or exchange rate policies). If it is significant, there would be a need for implementing some microeconomic policies to complement macroeconomic strategies. For instance, some type of labor market deregulation or special programs to strengthen labor mobility would need to be pursued.

Thus far, this research has indicated that to deal with the unemployment problem it is very important to differentiate among components of total open unemployment (structural and transitional unemployment rates).

Other research on labor markets includes an international comparison of labor costs and the effect of wages and nonwage costs of labor on manufacturing exports. This research addresses the question: Are there important labor market distortions preventing growth of nontraditional exports? Labor costs have been shown to be a very important variable in explaining the performance of manufactured exports of developing countries. This supports the view that the role of the labor market is central to any structural adjustment program. Empirical information on nonwage costs and labor cost levels is now available for use in operational work.

Public sector revenue, expenditure, and deficit financing. To relate public sector revenue, expenditure, and deficit financing to broad macroeconomic aggregates, the experience of Malaysia was studied. The



research showed how the net fiscal stimulus determines the basic movement of the government budgetary deficits.

- In many developing countries, the net fiscal impulse tends to emanate from relative contractions or expansions of public expenditures rather than from the tax side. During periods of activist development policy, the net fiscal stimulus is therefore expansionary. This explains the pervasive presence of fiscal deficits in developing countries.
- A large net fiscal impulse is sometimes cast in terms of short-term countercyclical objectives, to offset unfavorable movements in domestic aggregate demand. But the fiscal expenditures implied by the initial net fiscal stimulus can be made to support budgetary programs perceived to have a more or less permanent claim on the budget. This has implications for World Bank operational work: a government committed to use countercyclical policies designed to offset downturns in domestic incomes (because of a fall in the terms of trade and of export incomes, as in Malaysia) would be tempted to initiate or expand (relatively permanent) government expenditure programs in order to offset (temporary) cyclical economic problems.
- Thus, carried over time, the fiscal deficits implied by the expansionary net fiscal impulse are unsustainable. This explains the large fiscal deficits in Malaysia in the late 1970s and the domestic income instability that the deficits led to once the government realized that effective fiscal adjustment involved the reduction and control of the fiscal deficits in relation to overall macroeconomic balance.

Capital flows. As part of a background paper for the Adjustment Lending Policy Paper, statistical evidence on the magnitude of lending and repayment was analyzed. The paper responded to the question of whether repayment reduced the resources available in the 1980s for development. The evidence largely confirms commonly held beliefs.

- Net resource flows have turned negative since 1982, especially when one includes short-term and nonguaranteed loans. The official resource flows to highly indebted countries, on the other hand, increased since 1982, while official resource flows to other debtor groups declined. In other words: heavy lending to the highly indebted countries from official creditors was passed back to commercial lenders.
- Terms of trade shocks since 1978 helped some countries and hurt others. But not all of the countries hurt by terms of trade changes became problem debtors, while some countries that benefited from terms of trade changes became problem debtors anyway. Imprudent borrowing rather than terms of trade shocks seems to better explain why countries have debt problems.
- In terms of its relevance to Bank operational work, this research has shown that countries experiencing debt problems should not generally be given special priority for World Bank lending.

Social impact of structural adjustment programs. Many questions have been raised in recent years concerning the impact of structural adjustment measures on the poor and other vulnerable groups of society. Answers are hard to find, due to severe data limitations as well as to conceptual problems.

Papers have been written for the Poverty Task Force, for the symposium on Poverty and Adjustment, and for the Adjustment Lending Policy Paper.

- The major policy message from this research is that not enough is known about the impact of adjustment on the poor. But what little evidence exists indicates that adjustment makes the poor poorer, and that the failure to adjust makes them even poorer. Nonetheless, there is no case for excluding measures to analyze and offset the impact of adjustment on the poor in adjustment programs. Measures to estimate the impact of adjustment on income groups, while rarely applied (due to the recent timeframe), are available (well-designed household surveys).
- Policies to mitigate the social costs of adjustment, while rare in practice, are feasible. Such policies include targeting public expenditures to achieve equity and efficiency, cost recovery or private sector services for those able to pay, and social service administrative reforms, compensatory programs, and longer term human and physical capital development. These will enable the poor to contribute to growth and obviate the need for the aforementioned public expenditures. Political and administrative constraints are obstacles but not necessarily insuperable ones. Assisting the poor may make adjustment programs more sustainable.

#### International Trade

- The overwhelming policy message that has evolved in fiscal 1988 is that protectionism in developed countries seems to be on a secular expansionary trend, at least for protection by nontariff barriers

(NTBs). The amount of trade affected by NTBs has probably doubled since 1966. Moreover, it is highly concentrated by sector (textiles and clothing, steel, cars) and growing in acceptance.

- Voluntary export restraints (VERs) have become popular among some exporting countries. Procedures that use countervailing and antidumping duties, while extremely restrictive whenever applied, have grown in respectability since they are both "GATT consistent" and "fair." Nevertheless, the newly industrialized economies that are the direct targets of this protection seem to be agile enough to have avoided the impact. Other exporters of manufactured goods may have been hit, but the second conclusion -- after surveying the literature for the Development Committee -- is that very little is known about why trade continues to grow despite efforts to retard it.
- A determined effort must be made to keep world trade open. And a determined effort must be made as well to keep the developing countries from going down the GATT-approved route of nontariff barriers.

#### International Finance

During fiscal 1988 IFC's Foreign Investment Advisory Service (FIAS) engaged in two research projects, both of which received support from the World Bank Research Program. These were on Debt-Equity Swaps and Foreign Direct Investment in Latin America (674-40) and the Effectiveness of Government-Sponsored Investment Promotion (674-31).

Debt-equity swaps. Completed in September 1988, the research studied how swap programs affect the behavior of investors, and drew conclusions for

ways that governments of indebted countries can design swap programs to maximize achievement of their own objectives.

Effectiveness of promotion. This work studied the activities used to promote foreign investment in a large number of developing countries, and analyzed what kinds of programs work in what circumstances.

Both projects were designed to be of direct use in the advisory work of FIAS. They generated information that staff need to advise governments on the design of swap or promotional programs. Using the results of this research, FIAS has already advised or is about to advise the governments of Argentina, Brazil, Chile, Mexico, the Philippines, and Yugoslavia on the design of swap programs. It is also contemplating similar work in several other countries including Costa Rica, Ecuador, Egypt, Jamaica and Nigeria. The usefulness of the research on promotion is even more widespread: almost every country in which FIAS works wants help on this topic.

### Public Economics

Fiscal stabilization and exchange rate instability. A general equilibrium model can be used to analyze the fiscal impact of reductions in public spending, permitting consistent analysis of government spending, deficit financing, and exchange rate behavior. The model incorporates features important to analyzing public policy in Mexico, including the cost of producing government infrastructure, a tax system and government exchange rate policy similar to those in Mexico, and the estimated savings behavior of domestic consumers.

- Mexican public spending increased from 26 percent of GDP in 1973 to 47 percent in 1982. This rise was accompanied by dramatic increases in inflation, the government deficit, and external debt.
- Policymakers look at such a situation and automatically conclude that stabilization depends on reduced public spending. But when applied to Mexican data for 1983-85, the model shows that public spending cuts alone may be inflationary if they cause a reduction in the productivity of private capital.
- The model does not estimate the elasticity of private output to public infrastructure. But even if low elasticity is assumed, spending cuts may produce a reduction in private productivity that will have an undesirable effect.
- A decline in productivity may outweigh the impact of falling monetary growth rates and reduced budget deficits. If it does, the benefit of spending on infrastructure outweighs its costs. If, however, government spending produces no useful infrastructure, a reduction in spending will have the desired result of reducing inflation.
- Various simulations with the model indicate that dogmatic recommendations for spending cuts can at times be counterproductive.

Mineral taxation. Given the dual role played by the government as resource owner and tax collector in many Sub-Saharan economies, it is important to separate "resource factor payments" from taxes through the use of different instruments. The instruments to be considered are:

- A factor payment system that includes "ad rem" or "ad valorem" royalties. Production sharing, resource rent schemes, and fixed fees could also be used, but some form of unit payment is necessary and

justified, because natural resources in the ground are inputs into the production process. Determined in a reasonable manner, such a royalty would signal the opportunity cost of extraction and development, capture the "natural resource rent," and offer an acceptable level of risk to the country.

- A cash-flow and withholding-tax system initially for the mineral sectors and eventually for other sectors of the economy. The cash-flow tax would capture a share of the "economic rent" from each sector and be neutral across sectors. The withholding system would enable application of an income (as opposed to a consumption) tax base at the individual level.
- A depletion account to preserve the economy's capital stock. Natural resources are part of an economy's capital stock, which will fall unless "replacement investment" is made as the resource is depleted. To ensure adequate saving for this "replacement investment", the account can be funded by the value of depletion each year, equal to the minimum amount necessary to keep the aggregate capital stock constant.

Tax administration. For an efficient tax administration agency, the main idea is to present the process of income assessment as a decision tree. A decision to continue the process should be taken whenever the taxpayer comes with new information. If the administration is an efficient one, the expected return per time invested in the process should be equal across taxpayers and across decisions. The model can be used by the tax administration for allocation of resources in the agency.

- The tax administration could collect more tax revenue without an increase in its budget. This can be done by increasing the number of self-employed tax returns using double-entry bookkeeping, decreasing the number of self-employed tax returns using single-sided bookkeeping, and decreasing the number of tax returns filed by corporations.

Public sector pricing. What are the principles that should underlie the setting of public sector prices in developing countries, paying particular attention to the use of public sector prices as instruments of revenue-generation? The analysis is based on the Bank's two-step approach to public sector pricing: first calculating marginal cost, and then adjusting it to take account of other factors. The aim, therefore, is to show how adjustments should be made to take account of fiscal concerns. Such an analysis is needed because these adjustments are not widely used at present.

- The choice of marginal cost concept depends on the costs of price uncertainty and the importance of excess capacity. A weighted average of the two measures might be better than either on its own.
- The imposition of financial constraints can be an inefficient method of achieving fiscal objectives. It is better to decide prices on the basis of their economywide effects without regard to financial targets and then, if necessary, impose financial targets that are consistent with those prices. It is better to raise prices above marginal cost by the use of trades, rather than by raising the price received by the enterprise.

Taxation and exchange rates. The analysis shows the effects of tax policies on the real exchange rate and sectoral prices and, through these



relative prices, the impact of taxes on consumption, production and trade. One particular question highlighted by the study is the relationship between tariffs and the exchange rate. An increase in tariffs leads to real exchange-rate appreciation, irrespective of whether the exchange rate regime is fixed or variable.

- Under fixed exchange rates, a tariff increase lowers import demands and leads to a temporary trade surplus, which raises the money stock. Service prices rise as factors move to the protected sector and the real exchange rate thus appreciates.
- Under variable exchange rates, both the real and nominal exchange rates are affected by tariff changes. The real exchange rate adjustments are the same as under fixed exchange rates. The nominal exchange rate, however, depends on monetary policy. In particular, nominal appreciation is reduced by an increase in money stock.

Taxation and financial institutions. The removal of constraints (interest rate ceilings, credit targets) has a very powerful impact on the level of financial assets in the domestic sector.

- Reforms were successful in Thailand and Indonesia because all interest and credit constraints were removed. A similar reform failed in the Philippines because taxes were monitored on the financial sector and interacted with the inflation rates.
- The efficiency gains of the successful reforms were small when compared to GDP, but very large when compared with the transfers (explicit or implicit) induced by the policies of regulation.
- The lesson is that a reallocation of resources through the manipulation of the financial system may be very inefficient relative

to other fiscal policies. This hypothesis that was verified for Thailand and Indonesia, most certainly applies to the Philippines, and remains to be tested in further work that will concentrate on other countries.

Taxation and growth. Can tax policies be designed to encourage economic growth in developing countries? One view holds that by providing the government with a stable source of funding and reducing the current account deficit, tax revenues encourage long-term growth. In this view, the economic distortions aggravated by tax rates are slight in comparison to such institutional constraints as price controls, foreign exchange allocations, and trade quotas. The other view is that high marginal tax rates constrain long-term economic development by discouraging business expansion, investment, and foreign trade. The contention is that the benefits of a carefully designed, moderate tax structure exceeds the costs of budget deficits or spending cuts.

- This research tests these views by measuring the effect of government spending and taxation on output growth. In theory, higher tax rates shift investment and employment to sectors with low -- or even negative -- tax rates, such as import-substitution or underground sectors. The lower returns to investment and labor in these sectors mean that the economy will generally record lower growth rates. Data from 31 African countries show the medium- and long-term effects of fiscal policies on growth during 1965-73 and 1974-82. Government investments for the earlier period were sufficiently productive to justify the distortions imposed by the relatively high tax rates necessary to finance them. By 1974-82, however, the return on government investments had fallen to almost zero, suggesting that the

burden of personal and corporate taxes led to a contraction in growth.

- Although taxes on imports did not affect output directly, such taxes reduce investment and thereby indirectly curtail growth. On balance, sales and excise taxes, or a shift from personal and corporate taxes to consumption taxes, can increase growth rates in developing countries.

Welfare dominance and excise taxation. There is a compelling fiscal rationale for encouraging greater reliance on taxing the consumption of electricity and telephone (E&T) services. E&T taxes are easy to administer. Enforcement and collection of the tax is relatively inexpensive, since the tax can be added to commercial charges, and the services quickly turned off for nonpayment. It is not difficult to distinguish, in most cases, between business and personal use of these services. E&T taxes avoid the problems of smuggling and evasion commonly associated with taxing the production or use of commodities that can be imported.

- On equity grounds, in Côte d'Ivoire at least, E&T taxes are clearly the most desirable excise taxes. Ranking alternative commodity taxes with high income elasticity, telephone services clearly dominated -- and electricity consumption, nearly dominated -- the taxation of alcoholic beverages and public transportation.
- The conclusions on the distributive impact of alternative indirect tax measures are reached through the application of the relatively new concept of marginal conditional welfare dominance. A commodity tax dominates others on social welfare grounds when a marginal shift

in the balance of commodity taxation toward that particular commodity enhances social welfare.

- Using household budget data, such dominance can be established statistically and shown graphically without resort to normative considerations. This approach suggests that E&T services can be an underexploited tax base in many developing countries.
- E&T taxes may also meet the test of relatively high efficiency if they can be implemented through a two-part pricing schedule that charges a flat fee for access to service and an additional escalating fee for marginal use.

### Financial Policy

Research on financial policy moved during the year toward large, comparative studies in the four areas: financial liberalization and structural adjustment, the reform of banking institutions, the restructuring insolvent banks, and systems of prudential supervision and regulation.

- The need for financial restructuring -- and for some comparative insight on how these exercises are to be carried out -- is more pervasive than originally thought.
- The complexity of financial sector reform is great, requiring careful phasing with reforms in other sectors.
- Financial markets affect such real variables as investment. The degree of leverage of firms (and thus the potential fragility of the financial system) tends to be high in developing countries and responds to financial sector policies and institutional arrangements.

- Contractual savings systems in developing countries are typically tightly restricted in their use of resources and could play a far larger role in long-term finance of productive investments than they do at present.
- Given the absence of hedging facilities, it may be unrealistic to expect final borrowers of Bank funds to assume the foreign exchange risk.

### Infrastructure and Urban Development

Municipal finance. The means by which urban services are financed is of critical importance to the economic viability of cities. Taxes, charges, and intergovernmental transfers must together support the recurrent costs of municipal operations, maintenance, and debt service, and must do so in a way that does not introduce major economic distortions or inequities. The system of financing must be capable of mobilizing savings for infrastructure investment, allocating those resources efficiently, and recovering their costs.

- To increase the yield and improve the fairness of the property tax, both policy and administrative problems are addressed.
- Tax policy must ensure that rates are set high enough to make the tax worth collecting, that exemptions must be limited, and that regular adjustments in rates or valuations are essential to counteract the effects of inflation.
- Administrative reforms should support the use of simple procedures for property discovery and valuation, suited to the characteristics of the local tax base and the skills of the taxing authority.

Land management. Insecure tenure, cloudy title to land, and lack of current information about land contribute significantly to the poor functioning of cities in less developed countries. Collectively, they contribute to difficulties in the provision of shelter (especially low cost housing), they inhibit resource mobilization in the formal sector, clog up the functioning of land markets, and make investment planning and cost recovery for the provision and operation of infrastructure difficult.

- More efficient land market operations can be achieved by (1) government support for land registration and administration of land tenure, (2) land management information systems as part of overall urban policy and planning, and (3) a land management policy that defines institutional roles for the private sector and government agencies involved.

Infrastructure investment policies. Manufacturing firms in Nigeria have developed private provision responses to the failure of water supply, transport, telecommunications, and waste disposal. Private and social costs of infrastructural deficiencies are high and affect the productivity in general. Between the two extreme cases of inefficiencies -- the nonperforming public sector and the costly substitution by private individual manufacturers -- there must be better policy options and investment strategies.

- The policy conclusion is to focus on alternative methods to encourage new modes of cooperative private provision among manufacturers on the basis of competitive access to the markets with appropriate changes in regulations and infrastructure pricing.

Rent control. Costs and benefits of rent control vary with type of law, its enforcement, and market conditions. Benefits of rent control are not

usually "progressively" distributed, but are at best poorly targeted.

Further, these benefits to tenants diminish over time, as markets find ways around controls.

- There are at least seven ways to relax or eliminate controls. In markets which have additional supply side constraints, such as poorly functioning land or financial markets, decontrol should be considered as part of a wider package of housing policy reforms. It is important to ensure an adequate supply response in order to avoid pressures for recontrol.

Water supply and sanitation. The ongoing research on water supply and sanitation revealed important areas of underachievements in Bank projects.

- The revenue equivalent of unaccounted-for-water for Bank-supported water supply projects amounted to an average of 40 percent of total sales revenue; while less than one in ten projects met or exceeded expectations for cost coverage from sales revenue. Sales volume forecasts in supported projects met or exceeded expectations in only 16 percent of completed projects.
- These shortfalls result in greater financial difficulties than anticipated or in the necessity to seek dramatic price increases on the water sold. These price increases serve to limit the pace of demand growth further.
- Realistic and comprehensive risk analysis of assumptions and forecast results in water and sanitation projects is essential for success of investments in the sector.

### Energy Development

Focusing on four areas -- electric power, petroleum pricing, natural gas, and energy-related environment issues -- research on energy development is being conducted with a view toward refining and improving Bank policies in these areas.

- Research on the Bank's power lending and the performance of utilities highlights the problem of the serious financial condition of the electric utilities in these countries and the fact that institution-building has not been uniformly successful. The research points to the need for policies that increase the effectiveness of the management, operation, and performance of utilities. It is clear that closer coordination on multi-agency programs related to small-system power development (diesel utilities) is needed.
- Serious policy questions are associated with insufficient Bank support for the development of indigenous natural gas resources in the developing countries. There are multifaceted constraints hindering gas development, further complicated by the decline in oil prices. Yet natural gas is a viable, environmentally acceptable alternative to imported or less environmentally desirable fuels. To increase understanding and to develop policies in this subsector, a number of studies are under way, covering incentives to stimulate investment in gas-prone countries, downstream contracts, and training for gas utilities.
- The projected price of petroleum is a factor in evaluating the investment outlook for energy projects and Bank participation in these projects, including those in the natural gas, electric power,



and energy conservation/alternatives subsectors. The price factor also underpins policies and planning decisions in the energy sector. Departmental research has highlighted nontraditional methods of forecasting the movements of petroleum prices in the future.

- Research in the energy-related environmental areas has pointed to the urgent need for policies that would optimize the development and use of high cost, scarce woodfuel and biomass resources, especially for Sub-Saharan Africa.

### Environment

Deforestation. Priority tasks have been identified for research to contain tropical deforestation.

Biodiversity. The message that the loss of biodiversity is an important issue has been disseminated and is being taken much more seriously in Bank operational work.

Desertification. The extent of desertification is unclear as evidence is sketchy; technologies are somewhat scarce; and policies are clearly important. The Sudan Forestry Resource Conservation Project has benefited from policy work on mechanized areas and fuelwood revenue collection.

Watershed management. Watershed management research has shown that on-site costs of soil erosion for Java are about \$300 million annually compared with off-site cost of an estimated \$65 million annually. Research work has helped the region in developing a monitoring and evaluation system for a project in the Philippines (CVRP) that will generate information on the costs of various technologies for reducing soil erosion.

Salinity. A better job can and should be done to measure salinity and develop an early warning system. And a better way must be developed to evaluate when it is most economic to introduce drainage into irrigation systems.

Pesticides. More emphasis needs to be placed on integrated pest management.

Environmental accounting. When GDP and other aggregate income measures are used in economic analyses, their shortcomings should be better highlighted and case study work should be undertaken to compute a better measure for "sustainable income."

Social forestry. Research has provided practical results on the choice of species for social forestry projects.

#### Women in Development

Since the Women in Development Division was not formed and fully staffed until well into fiscal 1988, work on the research program has concentrated on identifying the key issues for major research efforts. Preliminary work indicates that the major emerging policy hypotheses and messages are:

- Women's economic contribution is significant, though often not accounted for in official labor force and national income statistics.
- Women face gender-based barriers in their access to productive resources, support services, and markets which lower their productivity.
- Overall economic productivity could be raised by removing or lowering the barriers that women face.

- Greater equity could be achieved if access to human capital investments (education, health) and to economic opportunity were opened up to women, who tend to be underprivileged.

Research that documents the above would make the case for focusing on gender as an important factor in designing more effective policies and projects. For example, where women produce a significant proportion of agricultural output (as in Africa), extension and credit projects need to be specially designed to overcome cultural or legal barriers (such as those that inhibit extension workers from meeting women farmers or those that prevent women from getting access to credit because they do not own enough collateral). Research into the determinants of women's access to productive inputs, services, and human capital investments would provide the analytical foundations for designing better projects. It would show, for example, what factors are important in increasing female school enrollment or how to design credit projects so that women can borrow for productive purposes.

Appendix 1. RESEARCH AND PUBLICATIONS POLICY COUNCIL

The Research and Publications Policy Council (RPPC) is the Bank's policy-setting body for both research and publications. It is chaired by the Senior Vice President for Policy, Planning, and Research, with members drawn from senior managers throughout the Bank and the IFC. The RPPC establishes the broad agenda and makes recommendations for Bank research and publication activities. It meets twice a year, more often if necessary.

Research and Publications Policy Council Members

David Hopper	Chairman, Senior Vice President Policy, Planning, and Research
Visvanathan Rajagopalan	Vice President Sector Policy and Research
Stanley Fischer	Vice President, Development Economics and Chief Economist
Attila Karaosmanoglu	Vice President Asia Regional Office
Joseph Wood	Vice President Financial Policy and Risk Management
Guy Pfeffermann	Director, Economics Department and Economic Advisor (IFC)
Alexander Shakow	Director, Strategic Planning and Review Department (ex officio)
Dennis de Tray	Research Administrator Policy, Planning, and Research (Research Secretariat)
James Feather	Director, Publications External Affairs (Publications Secretariat)
Francisco Aguirre-Sacasa	Director, External Affairs

Appendix 2. RESEARCH COMMITTEE

The Research Committee (RC) translates the RPPC's guidelines into a specific agenda for future Bank research, evaluates past research efforts, and oversees applications for funding from the Research Support Budget. The RC meets every month to advise its Chairman, the Bank's Chief Economist, on the disposition of research proposals submitted to it. The Committee judges on the technical merits of these proposals and determine whether they are within the guidelines set by the RPPC. The Chairman of the RC, on the advice of its members, will rule on proposals of \$100,000 or more. A subcommittee of the Research Committee, chaired by the Research Administrator, decides on proposals between \$20,000 and \$100,000, with the Research Administrator alone acting on smaller requests. All proposals are subject to review by external experts and internal Bank staff, with the extent of review depending on the size and complexity of the proposal. The Research Committee also has responsibility for evaluating broad areas of Bank research and for establishing specific research priorities based on guidelines set forth by the RPPC.

Details of structure and procedures of proposal reviews are spelled out in the Operational Manual Statement (OMS 9.70) in Appendix 5.

Research Committee Members

Stanley Fischer	Vice President, Development Economics and Chief Economist
Dennis de Tray	Research Administrator Policy, Planning, and Research
Nancy Birdsall	Chief, Population and Human Resources Division Latin America and the Caribbean, Country Department I (Brazil)
Anthony Churchill	Director, Industry and Energy Department
Vittorio Corbo	Chief, Macroeconomics and Growth Division Country Economics Department
Vinod Dubey	Director, Economic Advisory Staff
Amnon Golan	Director, Asia Technical Department
John Holsen	Director, Country Economics Department
Inderjit Singh	Senior Economist, Industry and Finance Operations Division Asia Country Department III (China)

Lyn Squire	Lead Economist, Country Operations Division Western Africa Department
Andrew Steer	Chief Officer, Country Risk, Risk Management and Financial Policy Department
Ardy Stoutjesdijk	Director, Europe, Middle East, and North Africa Country Department III
Jerry Warford	Senior Adviser, Environment Department
Oktay Yenil	Chief Economist, Office of the Regional Vice President Asia Regional Office

### Appendix 3. RESEARCH PRIORITIES

World Bank research has two fundamental principal objectives:

- To extend knowledge of the determinants of development and economic growth
- To assess the intended and unintended effects of policies aimed at promoting development.

The Research Committee actively encourages any and all research proposals that further these objectives.

The basic objectives of Bank research are intentionally broad to reflect the fact that the Bank is open to any promising research proposal that will contribute to development. However, the Research Committee also hopes to encourage research on priority issues as identified by senior management and the Research and Publications Policy Council. The following issues have been singled out as being of special concern to the institution and its member countries:

1. Human capital and development: education; industrial training; managerial capacity and decision making; the role of women in development.
2. Institution and capacity building for the private and public sectors: the effects of the structure and efficiency of government on economic policy and performance; adequacy of institutional structure of the economy for the efficiency of the private sector, including property rights and land tenure systems.
3. Poverty: identification and quantification of the consequences of structural and sectoral adjustment policies on the poor; policies conducive to the creation of productive employment opportunities; the role of access to assets; policies to reduce poverty in the short and long runs.
4. Environment: identification and quantification of the effects of alternative policies on the quality of the environment; the relationship between growth and the long-term sustainability of the environment.
5. Macroeconomic policies: adjustment with growth; the determinants of supply response; the role of incentives; fiscal and monetary policies.
6. International and domestic trade policies: export orientation and growth; exchange rate policies; protectionism; the effects of industrialized country and LDC trade barriers on trade flows and growth; the potential for expanding free trade; trade in services; the potential role of regional trading arrangements.

7. International and domestic finance: optimal domestic and international financing of development; new forms of international capital flows; the debt crisis and its impact on development.
8. Agriculture and industrialization: the relative roles of agriculture and industrialization in the growth process; agricultural supply response; food security; industrial policies and reforms; regional and urban development.



Appendix 4. RESEARCH DIVISIONS IN PPR

Sector Policy and Research

Population and Human Resources Department

Education and Employment  
Women in Development  
Population, Health and Nutrition  
Welfare and Human Resources

Environment Department

Economics and Policy

Agriculture and Rural Development Department

Agricultural Policies

Industry and Energy Department

Industry Development  
Energy Development  
Energy Strategy, Management and Assessment

Infrastructure and Urban Development Department

Transport  
Urban Development  
Water and Sanitation

Development Economics

International Economics Department

International Trade  
Debt  
Commodity Markets  
International Economic Analysis and Prospects

Country Economics Department

Trade Policy  
Macroeconomics and Growth  
Public Economics  
Financial Policy and Systems  
Special Studies (MADIA)  
Public Sector Management and Private Sector Development

# Operational Manual Statement

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## PROCEDURES FOR REVIEW OF RESEARCH PROPOSALS

### Introduction

1. This OMS outlines the rules, procedures and responsibilities for the review of research proposals by the Research Committee (hereafter referred to as the Committee). The Committee was established by the Research and Publications Policy Council (RPPC) in January 1988. The functions, responsibilities and membership of the RPPC and the Committee are set out in Annexes A and B respectively. The Committee establishes overall research priorities (set out in the Bank's annual Reports on the World Bank's Research Program), and evaluates and makes recommendations on individual research proposals submitted for funding from the Research Support Budget. The Vice President, Development Economics and Chief Economist and the Research Administrator are ex-officio Committee Chairman and Deputy Chairman, respectively. The other members are appointed by the Chairman of RPPC on the advice of RPPC members.

2. The main objectives of the research proposal review process are:

- (a) to ensure that proposals conform to the research priorities laid down by the Committee under the guidance of the RPPC, and to place responsibility with line managers for the substance and operational relevance of the proposals;
- (b) to ensure the technical quality of research proposals; and
- (c) to expedite the research proposal review process.

### Institutional Relevance of Proposals

3. Line managers should consult widely within the Bank to ensure that research proposals have institutional relevance and conform to the research priorities laid down by the Committee. Department directors whose staff are planning to submit major research proposals are strongly encouraged to organize a workshop to inform interested staff around the Bank of these plans early in the process. The workshop should be scheduled when the basic approach, data sources, focus (global, institutional, sector or country) and methodology have been thought through, but before researchers are fully committed to a particular design.

### Regional Coordination and Support

4. Sponsoring departments should coordinate studies involving specific countries or Regions with the appropriate Regional units in Operations. After the studies have been formally submitted to the Committee, the Secretary will arrange for their review by the appropriate Chief Economist(s) to assess the extent of Regional support and commitment.

### Submission of Research Proposals

5. Proposals may be submitted at any time to the Secretary of the Committee: (a) for proposals below \$20,000, 5 copies should be submitted; (b) for those between \$20,000 - \$100,000, 15 copies; and (c) for those above \$100,000, 30 copies. Form 1699 (Request for Research Support Budget Funding) should be attached to every proposal. The form is available upon request from the Committee's Secretary.

### Duration of Research Projects

6. The Committee will normally consider research projects which are planned to be completed within three years. It will report exceptions to the RPPC.

### Research Preparation Funds

7. The Committee will fund preparatory work on research proposals where necessary, but such funding will not guarantee favorable consideration of the research proposal that follows. Acceptance of research preparation funds constitutes an agreement on the part of the sponsoring department to submit a research proposal to the Committee within six months. Decisions on requests for research preparation funds are made by the Deputy Chairman who may consult other Committee members before reaching a decision.

### Review and Decision Procedures

8. Requests for funding from the Research Support Budget are subject to the following procedures:

- (a) for requests below \$20,000, the Deputy Chairman will decide;
- (b) for requests between \$20,000 and \$100,000, the

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- Deputy Chairman will decide, in consultation with an ad hoc subcommittee which he appoints, and with at least one reviewer external to the Bank. He may also seek other internal reviews from staff with relevant expertise; and
- (c) for requests above \$100,000, the proposal will be reviewed by at least two external reviewers and, if necessary, other Bank staff with relevant expertise, and then by an ad hoc subcommittee appointed by the Deputy Chairman. The subcommittee will report on the proposal to the full Committee, which will discuss it and make a recommendation to the Chairman, who will take the final decision.

9. All reviewers, internal and external, will be anonymous. External reviewers will be chosen from an international roster maintained by the Committee. Prior to the formal consideration of research proposals by the Committee or its subcommittees, the sponsors shall receive copies of all reviewers' reports, and may send written responses to the Secretary for submission to the Committee, within seven days of receipt of the reviews.

10. When a decision is made on a proposal, a Committee memorandum outlining the basis for it will be sent to the sponsors. A synopsis of decisions made on all requests shall be circulated at regular intervals to the Committee and the RPPC.

## Appeal and Resubmission Procedures

11. Decisions on requests for under \$20,000 are final. Adverse decisions on requests for \$20,000-\$100,000 may be appealed, with documented justification, to the full Committee, whose decision will be final. For funding requests above \$100,000, appeals may be made to the Chairman of the RPPC. An appeal must be made within one month of receipt of the Committee's decision memorandum. A final decision on the appeal will normally be communicated to the sponsor within a month (two months for complex proposals).

12. Unless the Committee explicitly states otherwise in its decision memorandum, any rejected proposal may be revised and resubmitted as a new proposal.

## Supplementary Funding

13. Only under exceptional circumstances will the Committee consider requests for supplementary funding of work previously authorized in an ongoing research project. Requests for supplementary funds to finance research additional to that in the original proposal will be subject to the same review and decision processes as new research proposals.

## Closure of Projects and Completion Reports

14. The Committee will close a project six months after the authorized completion date (as shown in the original proposal), unless the Committee agrees in writing to a request for an extension for a specified period. Sponsors are required to file completion reports on their projects no later than the date of their closure. Completion report forms are available upon request from the Committee's Secretary.

## Quorum

15. The Committee will have a quorum of at least seven members.

## Chairmanship

16. In the Chairman's absence, the Deputy Chairman will act on his behalf. When the Deputy Chairman is absent, the Chairman will designate in writing another Committee member to act as Deputy Chairman. When both are likely to be absent, the Chairman will in advance, designate in writing, another Committee member to act as Chairman or Deputy Chairman as circumstances require.

## Conflict of Interest

17. No Committee member with direct involvement or with a substantive interest in a proposal under review shall be involved in any way in any review or decision process. Members of an ad hoc subcommittee set up to review a research proposal should not include staff from the Department(s) of the proposal's sponsor(s), nor the Chief Economist(s) if the sponsor is from the Chief Economist's office. No person having any substantive

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interest or direct involvement in a proposal will be appointed as an internal or external reviewer.

18. Questions on this OMS should be addressed to the Secretary of the Research Committee, Research Administration, in the Office of the Senior Vice President, Policy, Planning and Research.

**Appendix Table 1. RELATIONSHIP OF RESEARCH TO OTHER BANK ANALYTICAL WORK AND ADMINISTRATIVE BUDGET  
(Current US\$ Million)**

	FY85		FY86		FY87		FY88	
	\$	%	\$	%	\$	%	\$	%
Research	23.3	15.6%	23.4	15.3%	23.3	14.4%	23.5	13.8%
Economic & Sector Work	82.0	55.0%	85.8	55.9%	91.9	56.6%	101.3	59.5%
Policy Work	43.7	29.3%	44.2	28.8%	47.1	29.0%	45.5	26.7%
<b>Total Analytical Work</b>	<b>149.0</b>	<b>100.0%</b>	<b>153.4</b>	<b>100.0%</b>	<b>162.3</b>	<b>100.0%</b>	<b>170.3</b>	<b>100.0%</b>
Memo Item: Research as a % of Bank Administrative Expenses	3.2%		3.1%		3.1%		3.1%	
Memo Item: Research Expenditure in constant 1988 dollars	25.5		24.8		23.8		23.5	

Appendix Table 2. RESOURCES DEVOTED TO RESEARCH BY COMPONENT, FY84-88 a/

(Current US\$ Million)

	FY84		FY85		FY86		FY87		FY88	
	\$	%	\$	%	\$	%	\$	%	\$	%
<b>Centrally Approved Research b/</b>	12.2	56.7%	13.0	55.8%	11.4	48.7%	11.4	48.9%	11.4	48.5
of which										
- Research Support Budget	(3.7)		(4.8)		(4.5)		(4.0)		(5.1)	
- Staff Costs	(8.6)		(8.1)		(6.9)		(7.4)		(6.3)	
<b>Departmentally Funded Research Studies c/ (Staff Time Costs)</b>	9.3	43.3%	10.3	44.2%	12.0	51.3%	11.9	51.1%	12.1	51.5
<b>TOTAL RESEARCH</b>	<b>21.5</b>	<b>100.0%</b>	<b>23.3</b>	<b>100.0%</b>	<b>23.4</b>	<b>100.0%</b>	<b>23.3</b>	<b>100.0%</b>	<b>23.5</b>	<b>100.0</b>

a/ Includes all administrative costs.

b/ Includes the full costs of all research activities which were reviewed and approved by the Research Projects Approval Committee, and the comparative studies program which was reviewed and approved by the Research Policy Council.

c/ Research activities conducted using departmental resources only and not subject to review and approval by the Research Projects Approval Committee. These studies were carried out by the departments listed in Table 3.

Appendix Table 3. RESOURCES DEVOTED TO RESEARCH BY DEPARTMENT a/, FY88  
(CURRENT US \$ '000; STAFFYEARS)

Organization	Centrally Approved Projects				Research Preparation/ Departmental Studies		Total Research			
	Research Support Budget Expenditure	Staff		Total Costs	Staff		Staff		Total Research	
		Time b/	Costs c/		Time b/	Costs c/	TIME b/	COSTS c/	COSTS d/	%
<b>POLICY, PLANNING AND RESEARCH</b>										
<b>DEVELOPMENT ECONOMICS</b>										
International Economics	134.7	1.39	\$285.1	\$419.8	15.47	\$3,164.2	16.87	\$3,449.4	\$3,584.1	15.2%
Country Economics	1,072.3	11.54	\$2,360.0	\$3,432.3	10.71	\$2,189.3	22.25	\$4,549.3	\$5,621.6	23.9%
Research Administration	240.1	1.84	\$376.7	\$616.8	0.36	\$73.6	2.20	\$450.3	\$690.4	2.9%
<b>Total</b>	<b>1,447.1</b>	<b>14.77</b>	<b>\$3,021.8</b>	<b>\$4,468.9</b>	<b>26.54</b>	<b>\$5,427.2</b>	<b>41.31</b>	<b>\$8,449.0</b>	<b>\$9,896.1</b>	<b>42.1%</b>
<b>SECTOR POLICY AND RESEARCH</b>										
Agriculture and Rural Development	173.8	3.29	\$673.3	\$847.1	8.58	\$1,754.8	11.87	\$2,428.0	\$2,601.8	11.1%
Environment	15.6	0.00	\$0.0	\$15.6	1.58	\$322.1	1.58	\$322.1	\$337.7	1.4%
Infrastructure and Urban Development	39.9	1.45	\$296.5	\$336.4	4.16	\$851.0	5.61	\$1,147.6	\$1,187.5	5.1%
Industry and Energy	0.0	0.00	\$0.0	\$0.0	3.94	\$805.4	3.94	\$805.4	\$805.4	3.4%
Population and Human Resources	348.1	6.68	\$1,367.0	\$1,715.1	12.36	\$2,527.9	19.05	\$3,894.9	\$4,243.0	18.0%
<b>Total</b>	<b>577.4</b>	<b>11.43</b>	<b>\$2,336.8</b>	<b>\$2,914.2</b>	<b>30.62</b>	<b>\$6,261.2</b>	<b>42.04</b>	<b>\$8,598.0</b>	<b>\$9,175.4</b>	<b>39.0%</b>
<b>REGIONAL OFFICES</b>										
Economic Advisory Staff	451.9	0.43	\$109.6	\$561.5	0.01	\$2.0	0.44	\$111.6	\$563.5	2.4%
Africa	72.5	0.27	\$68.0	\$140.5	0.46	\$117.5	0.73	\$185.5	\$258.0	1.1%
Asia	66.8	0.05	\$13.2	\$80.0	0.30	\$75.9	0.35	\$89.1	\$155.9	0.7%
Europe, Middle East and North Africa	55.0	0.64	\$162.0	\$217.0	0.25	\$63.1	0.88	\$225.1	\$280.1	1.2%
Latin America and the Caribbean	1,100.0	2.02	\$513.9	\$1,613.9	0.80	\$204.6	2.82	\$718.5	\$1,818.5	7.7%
<b>Total</b>	<b>1,746.2</b>	<b>3.41</b>	<b>\$866.8</b>	<b>\$2,613.0</b>	<b>1.82</b>	<b>\$463.0</b>	<b>5.23</b>	<b>\$1,329.8</b>	<b>\$3,076.0</b>	<b>13.1%</b>
Other	59.1	0.00	\$0.0	\$59.1	0.00	\$0.0	0.00	\$0.0	\$59.1	0.3%
Accruals Adjustment	1,305.9	0.00	\$0.0	\$1,305.9	0.00	\$0.0	0.00	\$0.0	\$1,305.9	5.6%
<b>GRAND TOTAL</b>	<b>5,135.7</b>	<b>29.61</b>	<b>\$6,225.4</b>	<b>\$11,361.1</b>	<b>58.98</b>	<b>\$12,151.4</b>	<b>88.58</b>	<b>\$18,376.8</b>	<b>\$23,512.5</b>	<b>100.0%</b>

NOTE: Details may not add due to rounding.

a/ Include all administrative costs.

b/ Data on staff time are taken from the Bank's time reporting system. They include regular professional and departmental consultants staffyears only.

c/ Cost factors are all-inclusive average unit costs by vice-presidency.

d/ Includes research support budget expenditure and total staff time costs. Excludes discretionary funds spent by departments on research activities.

Appendix Table 4

Subject Category	Centrally Approved Projects					Research Preparation Departmental Studies	
	Research Support Budget Expenditure	Staff		Total Costs	%	Staff	
		Time	Costs			Time	Costs
I. Development Policy and Planning							
I.A. Income Distribution	873.9	1.9	398.1	1,272.0	11.1	1.6	321.7
I.B. Planning, Growth, Country Economic Analysis	678.2	3.1	657.7	1,335.9	11.7	4.5	931.8
II. International Trade and Finance	290.4	2.9	602.6	893.0	7.8	10.6	2,191.7
III. Agriculture & Rural Development	1,254.3	10.4	2,187.8	3,442.1	30.1	5.8	1,189.4
IV. Industry	66.8	1.0	210.2	277.0	2.4	2.6	530.1
V. Transportation, Water & Telecommunications	0.0	0.6	117.0	117.0	1.0	3.7	769.8
VI. Energy	0.0	0.0	0.0	0.0	0.0	0.9	175.9
VII. Urbanization & Regional Development	52.0	0.6	123.5	175.5	1.5	1.5	315.0
VIII. Population and Human Resources							
VIII.A. Education	237.7	3.3	692.6	930.3	8.1	4.9	1,004.3
VIII.B. Labor & Employment	87.3	3.5	736.7	824.0	7.2	1.7	352.6
VIII.C. Population & Health	39.1	0.8	171.3	210.4	1.8	6.7	1,373.2
IX. Other	250.1	1.8	388.0	638.1	5.6	14.3	2,942.1
Accruals Adjustment	1,305.9	0.0	0.0	1,305.9	11.4	0.0	0.0
<b>Grand Total</b>	<b>5,135.7</b>	<b>29.8</b>	<b>6,285.6</b>	<b>11,421.3</b>	<b>100.0</b>	<b>58.7</b>	<b>12,097.7</b>



Appendix Table 5 RESOURCES DEVOTED TO RESEARCH BY SUBJECT CATEGORY, a/, FY88  
(CURRENT US \$ '000; STAFFYEARS)

By Subject Category	Centrally Approved Projects				Research Preparation/ Departmental Studies		Total Research			
	Research Support Budget Expenditure	Staff		Total Costs	Staff		Staff		Total Research	
		Time b/	Costs c/		Time b/	Costs c/	TIME b/	COSTS c/	COSTS d/	%
I. Public and Private Sector Policies	1,014.9	3.69	\$777.2	\$1,792.1	5.93	\$1,222.3	9.62	\$1,999.4	\$3,014.3	13%
II. Adjustment Programs	807.1	5.47	\$1,152.2	\$1,959.3	5.22	\$1,075.3	10.69	\$2,227.5	\$3,034.6	13%
III. External Sector and Debt Management	131.1	1.32	\$277.4	\$408.5	9.40	\$1,935.8	10.71	\$2,213.2	\$2,344.3	10%
IV. Financing Development	173.6	2.40	\$504.6	\$678.2	8.38	\$1,727.4	10.78	\$2,232.0	\$2,405.6	10%
V. Natural Resource Development	1,028.9	7.10	\$1,494.9	\$2,523.8	10.64	\$2,192.1	17.74	\$3,687.0	\$4,715.9	20%
VI. Human Resource Development	421.7	7.74	\$1,630.9	\$2,052.6	14.74	\$3,036.8	22.48	\$4,667.7	\$5,089.4	22%
VII. Technology and Development	0.0	0.00	\$0.0	\$0.0	2.26	\$465.9	2.26	\$465.9	\$465.9	2%
VIIIb. Coordination, Publication & Dissemination	252.5	1.84	\$388.0	\$640.5	2.03	\$418.8	3.88	\$806.8	\$1,059.3	5%
Other	0.0	0.05	\$10.9	\$10.9	0.38	\$77.3	0.43	\$88.2	\$88.2	0%
Accruals Adjustment	1,305.9	0.00	\$0.0	\$1,305.9	0.00	\$0.0	0.00	\$0.0	\$1,305.9	6%
<b>Grand Total</b>	<b>5,135.7</b>	<b>29.61</b>	<b>6,225.5</b>	<b>\$11,361.2</b>	<b>58.98</b>	<b>\$12,151.3</b>	<b>88.59</b>	<b>\$18,387.8</b>	<b>\$23,512.5</b>	<b>100%</b>

NOTE: Details may not add due to rounding.

a/ Include all administrative costs.

b/ Data on staff time are taken from the Bank's time reporting system. They include regular professional and departmental consultants staffyears only.

c/ Cost factors are all-inclusive average unit costs by vice-presidency.

d/ Includes research support budget expenditure and total staff time costs. Excludes discretionary funds spent by departments on research activities.

# OFFICE MEMORANDUM

VR 01/2  
~~LRM~~  
SL  
10/30

DATE: June 25, 1992  
TO: Distribution  
FROM: Ernest Stern *ES*  
SUBJECT: Technical Capacity for Resettlement and Environment

RECEIVED  
016  
92 JUN 26 PM 2:09  
OFFICE OF THE VICE PRESIDENT  
SECTOR POLICY & RESEARCH

1. As you know, in the response to the Report of the Independent Commission on Narmada, we have committed ourselves to a review of all projects in the portfolio which involve resettlement. The Environment Department is responsible for this review which is to be available, in draft, early in 1993. The review will depend on the full cooperation of your staff.
2. We have also committed to a review by each Country Department of the adequacy of their technical staff to handle the current and prospective portfolio of projects with resettlement and environment impact. Please arrange for that appraisal expeditiously and forward your conclusions and recommendation to Mr. Rajagopalan, with a copy to Mr. El-Ashry, by August 30, 1992. Portfolios are diverse and there is no presumption that current units are inadequate as to size and composition. However, we would like to be sure that our evolving understanding of the complexity of such operations is reflected appropriately in our staffing patterns.

Distribution: Messrs. Husain, Kaji, Koch-Weser, Jaycox, Thalwitz

cc: Messrs. Alisbah, Wood, Rajagopalan, Wyss, El-Ashry

THE WORLD BANK/IFC/MIGA

**OFFICE MEMORANDUM**cc: Jg  
LKA

RECEIVED

014  
92 SEP -9 PM 4:22OFFICE OF THE OSPVP  
SECTOR & OPERATION POL.

DATE: September 4, 1992

TO: Mr. Visvanathan Rajagopalan, Vice President, OSP

FROM: Wilfried Thalwitz, Vice President, ECA

EXTENSION: 36860

SUBJECT: EUROPE AND CENTRAL ASIA REGION: Review of Technical Capacity for Environmental Assessment and Resettlement Issues

1. As per Mr. Stern's memorandum of June 25, 1992, please find attached ECA's comments.
2. The review determined that:
  - In EC1 - Southeast Europe, excepting Turkey, and EC2 - Central Europe, few projects now require preparation of environmental assessments and/or present major resettlement issues. In future however, EC2 may have more "A" projects, as new investments replace rehabilitation projects;
  - In contrast, EC3 - former Soviet Union, counts 15 large scale projects, concentrated in the Russian Federation and Ukraine, which may require environmental assessments and involve resettlement. The restructuring of the agricultural sector creates special requirements for analysis of potential environmental and social impacts in 12 proposed projects in 10 republics; and
  - Resettlement issues in the ECA region will result from both policies and projects, due to the privatization and restructuring processes. Addressing these issues will require adoption of a broad approach to the analysis of social issues. Support will also be needed for local government training in the process of public participation and preparation of environmental assessments and resettlement plans.
3. It is recommended that a program for training Bank and Borrower personnel be implemented and that a full-time social scientist be added to ECA/MENA to address resettlement and social impact issues. A preliminary estimate of the additional resources needed for these recommendations totals about US\$500,000 per year.

Attachments

cc: Messrs./Mmes:

El-Ashry (ENVDR); Bianchi o/r, Hasan, Lari, (ECAVP);  
Fox (ECACA); Wiehen, Zaidan (EC1DR); Dervis, Loos (EC2DR);  
Cheetham, Blejer, Michalopoulos (EC3DR); Kohli (EMTDR);  
Seth (EMTEN)

ECA, Div., Chron. files

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## EUROPE AND CENTRAL ASIA REGION

### REVIEW OF TECHNICAL CAPACITY FOR ENVIRONMENTAL ASSESSMENT AND RESETTLEMENT ISSUES

1. **Overview.** The Europe and Central Asia Region (ECA) has prepared a brief review of its technical capacity for addressing environmental assessment and resettlement issues, based on: (a) experience to date with the implementation of Operational Directives 4.01, "Environmental Assessment" and 4.30, "Involuntary Resettlement"; (b) a review of the lending portfolio for FY 1993-1995 (Attachment A and Table 1); and (c) an assessment of the requirements and capacity of Borrowers in the region.
2. It is concluded that:
  - (a) In both the EC1 Department (Southeast Europe), with the exception of Turkey, and the EC2 Department (Central Europe), few projects will require preparation of environmental assessments and/or present major resettlement issues, given the focus of country programs on rehabilitation of energy and infrastructure, restructuring of agriculture and industry, and the development of market oriented financial systems and services. However, in Turkey, new investments in major energy and infrastructure will continue to require environmental assessments and evaluation of resettlement issues. In future years, the EC2 portfolio may include more "A" projects, when new investments replace rehabilitation projects as the focus of lending operations;
  - (b) In distinct contrast, a review of the proposed project portfolio for the recently established EC3 Department (former Soviet Union) encompasses 15 large scale projects (\$50-500 million each) which, on the basis of their preliminary descriptions, may require extensive environmental assessments and in some cases involve resettlement. These projects are concentrated in the Russian Federation and Ukraine and are predominantly in the energy and infrastructure sectors. In addition, the restructuring of the agricultural sector, especially land use and tenure creates special requirements for the analysis of potential environmental and social impacts in 12 proposed projects in 10 republics; and
  - (c) Resettlement issues in the ECA region will result from both policies and projects, due to the complex process of transferring agricultural, industrial and urban property to private parties. To adequately address these issues will require adoption of a broad approach to the analysis of social issues in Bank operations. It is recommended that a full-time social scientist be added to ECA to address resettlement and social impact issues. Special support is also required to meet the need for training local governments in management of the public participation process and in the preparation of environmental assessments and resettlement plans, especially in the previously centrally planned economies.
3. Support for environmental assessment and resettlement issues to date has been predominantly provided by specialists from the Environmental Division of the

- 2 -

Technical Department (EMTEN), with the support of consultants and, in specialized areas, of the Central Environment Department. Improvement of staff capacity to address these issues should focus on short-term training for SOD staff to ensure an operating knowledge of the requirements of Operational Directives 4.01/4.30 and key environmental issues in their sector. In addition to training on the preparation of environmental assessments, resettlement plans and social impact analysis, special assistance is required on procedures for: (a) effectively structuring and incorporating public participation in Bank operations in newly emerging democracies; (b) integration of the environmental and resettlement/social impact requirements of the Bank and the Borrower in project preparation and supervision; and (c) incorporating environmental factors in the implementation of intermediate lending projects in agriculture, energy conservation, industry and municipal infrastructure. Additional resources will also be needed for the participation of environmental and resettlement specialists in the large number of EC3 projects which may have significant impacts in these areas.

4. While the upgrading of Bank staff skills is important, especially in EC3, it is strongly recommended that the focus of longer-term ECA efforts be directed to the strengthening of the institutional and human resources capacity to address these concerns in Borrower countries (Attachment B). This is especially critical given that: (a) ECA Borrowers, with the exception of Albania and Turkey, all presently require environmental assessments under national legislation; and (b) under the provisions of Operational Directives 4.01 and 4.30, it is the Borrower who is responsible for the preparation of environmental assessments and resettlement plans and the effective implementation of their recommendations. Within the region, there is a need to support cooperating countries in the establishment and implementation of appropriate procedures for environmental assessment and evaluation of resettlement plans. In those countries which have experience with the preparation of environmental assessments, support is needed to train specialists in the implementation of environmental mitigation and monitoring plans. In this regard, priority should be given to support the Russian Federation, Turkey and Ukraine as a larger number of projects with major environmental and resettlement impacts are presently programmed or projected in the long-term. Consideration also should be given by Bank management to providing ECA with special resources for development and conduct of support activities, especially training seminars and professional internships, to meet this objective.

5. Review of Adequacy of Staff Skill Mix. While the technical capacity of the ECA Departments to address environmental assessment and resettlement issues is moderate in these areas, to date there has been little problem in obtaining adequate support within the Bank for EC1, EC2 and EC3 due to: (a) a smaller number of existing and projected projects which have significant environmental impacts or resettlement needs; (b) the existence of adequate specialized staff in EMTEN and (c) the availability of consultant trust funds to support selected environmental activities. Therefore, it has not been necessary as yet to call heavily on the additional resources of the Central Environment Department for these purposes. However, the initiation of the EC3 program, with its large number of projects requiring analysis, their considerable size, and the logistical complexities of working in the former Soviet Union, presents significant new demands for Bank staff resources to address environmental assessment and resettlement requirements. It is anticipated that new regional staff will require training concerning the implementation of the Bank's Operational Directives on Environmental Assessment and Involuntary Resettlement. They will also need to participate in specialized training on environmental assessment issues associated with various lending sectors, with priority given to energy and infrastructure.

- 3 -

6. Personnel in EC1, EC2, EC3 and EMT with experience in these topics include:

- (a) Country Department I (EC1), which is responsible for Bank operations in Bulgaria, Cyprus, Portugal, Romania and Turkey. Task Managers with experience in managing projects with environmental assessments in the energy sector are Messrs. Kocic, Moose, O'Brien-Kumi, Oduolowo, M. Sharma, R. Sharma (EC1IE) and, in infrastructure, Messrs. Blanchet, Coysaud, Ikegami, Pulley (EC1IN). There are no staff with significant experience in resettlement issues<sup>1</sup>. The Infrastructure division (EC1IN) is presently in the process of recruiting an environmental specialist who would be responsible for coordination of environmental issues in EC1. To date, environmental assessment and resettlement work in the Department has been largely supported by EMTEN and consultants;
- (b) Country Department II (EC2), which is responsible for Bank operations in Albania, Czech and Slovak Federal Republic, Hungary, Poland, and the former republics of Yugoslavia. It has eight Task Managers with experience in the management of projects with environmental assessments and/or environmental review procedures for sub-projects: Messrs. Duvivier, Reyes-Vidal (EC2CD); MacEwen, Schumacher (EC2AW); Busz, Cao, Gray, Markus (EC2EE); and Duvigneau (EC2PL). The Energy and Environment Division (EC2EE) includes Mr. Schreiber, an environmental economist, who is responsible for coordination of environmental issues in EC2. Mr. Cao, in EC2EE, has experience in resettlement issues. To date, environmental assessment and resettlement work in the Department has been largely supported by EMTEN and consultants;
- (c) Country Department III (EC3), which is responsible for the recently initiated program of Bank operations in the former Republics of the Soviet Union (Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kirghizstan, Latvia, Lithuania, Moldova, Russian Federation, Tadjikistan, Turkmenistan, Ukraine and Uzbekistan). It has six Task Managers with experience in managing projects with environmental assessments: Messrs. Adamantiades, Batstone, Craig, Lovei, Queiroz and Stuggins (EC3IV). The Infrastructure, Energy and Environment Division is responsible for the coordination of environmental issues; it includes Mr. Batstone, Principal Environmental Engineer. A second environmental specialist who has been externally recruited is expected to join the division in October 1992. Mr. Batstone has experience in resettlement issues. The first environmental assessment prepared by EC3, for the Oil Sector Project in Russia, is under preparation by a team of foreign and local experts;

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<sup>1</sup> Mr. D. Butcher (ASTEN) earlier wrote a definitive study of Turkey's resettlement procedures.

(d) **Technical Department (EMT).**

(i) **Environment Division.** The joint ECA/MENA Technical Department has a large staff with experience in the preparation and implementation of environmental assessments. Five staff members in EMTEN each have over 15 years experience in the preparation of such studies (Baratz, Berset - LTC, Halldin, Lindgren, Lintner) and five staff with three to five years experience (Arif, Glineur, Margetis, Sinha, Whitford). In particular, Messrs. Baratz and Lintner served as members of a Bank committee which prepared the original Operational Directive 4.00, Annex A - Environmental Assessment, and several EMTEN staff actively participated in the drafting of the Environmental Assessment Sourcebook. Technical specialists with experience in resettlement issues include Ms. Kudat, Messrs. Arif, Lintner, Margetis and Whitford. EMTEN also has staff with specialized skills in biodiversity, energy/industrial pollution control, environmental economics, environmental policy and forestry to support review and preparation of environmental assessments; and

(ii) **Other EMT Divisions.** Other EMT staff with significant experience in environmental assessment include: Mr. Fog (EMTIE) on environmental assessment of cement plants, Mr. Gupta (EMTAG), who has experience in the environmental assessment and analysis of resettlement in major dam projects internationally, and Mr. Kindler (EMTWU) who, previous to joining the Bank, served as the Vice President of the National Commission on Environmental Assessment in Poland. In EMTIN, Messrs. Drozd (LTC), Locussol, Stottman, Vernigora and Ms. Elwan have environmental assessment experience for infrastructure projects. EMTAG also includes Messrs. Holloway, van Santen and Wencelius, who have specialized knowledge of forestry, fisheries and natural resources management issues, respectively; and

(e) **Additional Staff for Resettlement Issues.** A full-time social scientist should be added to ECA to address resettlement and social impact issues. This individual would provide direct assistance to Task Managers in the identification and supervision of foreign and local social scientists to participate in ECA activities. The social scientist would also be responsible for resettlement/social impact related training and provide support for public participation activities to Bank staff and Borrowers. A major role for this specialist would be the evaluation of the potential resettlement and social impacts of policies and lending operations associated with changes in ownership and land tenure.

7. Review of Requirements and Capacity of Bank Borrowers. In general, the development of national environmental organizations and the establishment of environmental review procedures has occurred over the last ten years (see Table 2). All ECA countries, with the exception of Albania and Turkey, presently have national requirements for the preparation of environmental assessments on major projects. However, national and local environmental institutions remain weak and poorly staffed, with limited ability to implement effectively environmental policies, laws and regulations, including those requiring environmental assessment. Ministries with responsibility for the design and implementation of projects which

- 5 -

may result in significant environmental and social impacts also have limited development of "in house" capacity in these areas. Resettlement issues are often only dealt with in the context of compensation paid to parties with formal land tenure by government agencies when private land and/or property needs to be acquired for projects. To date, with the exceptions of Cyprus and Turkey where the Bank has been active, the majority of environmental assessments and resettlement studies in the region have been prepared by governments in response to the requirements of their national legislation. In several countries, such as in some former republics of Yugoslavia, the quality of these studies has been acceptable to the Bank.

8. In contrast to the weakness of institutions, most ECA countries with the exception of Albania and some Central Asian Republics, have a wealth of well trained engineers, planners, public health specialists, scientists and social scientists who, with advisory support, proper training, and adequate funding, are quite capable of preparing good quality environmental assessments and resettlement plans. A major problem area is how to approach public participation in these studies due to the historical lack of such procedures in most countries in ECA.

9. Equally important, it should be recognized and understood that Borrower countries at present, with the exception of Cyprus, Turkey and some former republics of Yugoslavia, do not have the financial resources to address in a timely manner the work required for carrying out environmental assessments and resettlement plans. Generally, preparation of these studies calls for hiring of foreign and local specialists, provision of fuel and vehicles, and working space, which are far beyond the budgetary resources of governments involved in political and economic restructuring. Therefore, measures need to be taken by the Bank and the donor community over the short and medium term to mobilize resources for these needs.

10. Other Issues. In order for the Region to effectively implement its environmental and resettlement responsibilities, it is important that the Central Environment Department complete the preparation of the updated version of the Environmental Guidelines for Industry and Energy. The present Bank guidelines, developed in the 1970s with partial updating in the 1980s, are somewhat limited in scope. They should be updated, address a greater number of industries, pollutants (e.g. hazardous materials) and include more recent experiences of North America, Western Europe, Japan and other countries over the last decade.

#### Attachments

Attachment A Review of Present and Projected Project Portfolio

Attachment B Review of Bank and Borrower Training Needs

Table 1 Proposed Projects with Major Environmental and/or Resettlement Impacts - FY 1993-1995

Table 2 National Environmental Assessment Requirements - Status as of August 1992



## EUROPE AND CENTRAL ASIA REGION

Review of Present and Projected Project Portfolio

1. The present and projected ECA portfolio has the following environmental assessment and resettlement needs:

- (a) EC1 has three major borrowers: Bulgaria, Romania and Turkey. Given the development needs of Turkey, it is anticipated that the Bank will continue to support new investments in agriculture, energy and infrastructure, which will require the preparation of environmental assessments/environmental reviews and evaluation of resettlement issues. In Bulgaria and Romania, the portfolio will concentrate on rehabilitation of existing energy facilities and infrastructure, restructuring of agriculture and industry, and the development of market oriented financial systems and services. At present, the portfolio includes three projects which will require environmental assessments - coal development in Romania, gas system expansion in Turkey, and wastewater disposal aspects of the Istanbul Water Supply Project in Turkey. The portfolio also includes 34 projects (15 in the post-IEPS stage, 19 potential) which have already been or are anticipated to be placed in environmental screening category "B", which requires the preparation of environmental reviews. These reviews include mitigation and monitoring programs and/or the establishment of specialized procedures, such as the particularly complex problem of environmental review for intermediate credit operations which require procedures for "on-lending" operations. EC1 has developed a model for environmental review of "on-lending" in the Industrial Restructuring Project in Cyprus;
- (b) EC2's portfolio focuses on rehabilitation of existing energy/district heating facilities and infrastructure, restructuring of agriculture and industry, and the development of market oriented financial systems and services. Therefore, EC2 has a low number of projects in environmental screening category "A" calling for preparation of detailed environmental assessments. Currently, the portfolio includes three projects requiring environmental assessments - Environment I in CSFR which potentially includes funding for two hazardous waste incinerators, Energy II in CSFR, involving construction of a new gas pipeline, and the Energy/Environment Project in Hungary which involves replacement of power and heating facilities with combined cycle technology. The portfolio includes 45 projects (26 in the post-IEPS stage and 19 potential) which are already or will possibly be placed in environmental screening category "B", requiring preparation of environmental reviews including mitigation and monitoring programs. EC2 has gained some experience in addressing environmental review problems associated with intermediate credit projects from the Agro-Processing Project in Hungary and the Agro-Industry Export and Industrial Export Development Projects in Poland. In future years, the EC2 portfolio may include more "A" projects, when new investments rather than rehabilitation projects become the focus of lending operations;

- (c) EC3 has one project under preparation for which an environmental assessment is presently under preparation (Oil Sector Loan - Russian Federation) and 15 projects (Azerbaijan - 1, Belarus - 1, Kazakhstan - 1, Russian Federation - 1, Ukraine - 4, Uzbekistan - 1) at the preliminary phase of development which may require environmental assessments following further definition. These are concentrated in the energy sector (Azerbaijan - 1, Kazakhstan - 1, Russian Federation - 5, Uzbekistan - 1), infrastructure (Russian Federation - 2, Ukraine - 3) and industry (Belarus - 1, Russian Federation - 1, Ukraine - 1). In addition, EC3 has reached an agreement with the Russian Federation, as a condition of the coal element of the Rehabilitation Loan, to prepare a programmatic environmental assessment to support the future restructuring of the coal sector. Review of the present projected portfolio indicates that ten or more "B" projects may provide intermediate credit for agriculture and industry and thus would require the establishment of environmental screening procedures and training of personnel for their implementation. Currently, there are no projects with significant environmental issues under supervision in EC3.

The process of restructuring the agricultural sector and the privatization of lands raises special environmental review issues in the successor states of the former Soviet Union. For example, in the Russian Federation, a proposed Farm Restructuring Project is anticipated to require a programmatic environmental assessment which would assess environment implications of restructuring the agricultural system; this would provide a general analysis of issues for consideration of such activities in other EC3 countries. Environmental reviews are anticipated to be required for Category "B" agricultural sector loans in Azerbaijan, Belarus, Kazakhstan, Latvia, Moldova, Russia, Tadjikistan, Turkmenistan, Ukraine and Uzbekistan. The proposed programmatic assessment and the significant number of reviews will require a special allocation of staff and consultant resources.

- (d) Resettlement Issues in the present ECA portfolio are restricted to two projects: (i) the Berke Hydropower Project in Turkey which requires the relocation of 144 people and a small cemetery, consistent with the project's environmental mitigation and resettlement plan, and (ii) the Kolubara Thermal Power and Tamnava Lignite Mine Project in Yugoslavia (Serbia), which requires resettlement during the course of implementation due to surface mining operations. It should be noted that the latter project is not effective due to the political situation in Yugoslavia. In the proposed portfolio, there is one project in EC1 which involves resettlement in association with surface coal mining operations (Romania) and two in Turkey requiring small scale resettlement; in EC2, one project in CSFR may require limited resettlement at two locations; finally, in EC3, there are 16 projects at the preliminary phase of development which will require screening as they develop further to determine whether detailed investigations of their potential resettlement issues will be necessary.

2. It is anticipated that the majority of projects requiring preparation of environmental assessments in the near future will be concentrated in the programs for the Russian Federation, Turkey and Ukraine, where there are a number of large scale investment programs involving major construction activities in the energy, industry and infrastructure sectors. It is expected that, due to the structure of the projected portfolio in the other country programs, ECA will continue to have a limited number of category "A" projects and a large number of category "B" projects. Preparation and appraisal missions for projects in category "A" and those in category "B" which require significant environmental reviews should include an environmental specialist and, when appropriate, a social scientist. The continued prevalence of intermediate credit projects in all sectors will require the region to devote increased efforts to ensuring that environmental procedures for these projects are properly designed, effectively implemented and regularly reviewed during project supervision. Greater emphasis should be placed on project supervision in the category "A" projects and major category "B" projects. Particular attention needs to be given to monitoring the implementation of provisions for mitigation, institutional strengthening and human resources development plans agreed to at project approval.

3. Currently, there are very few project induced cases of involuntary resettlement in the ECA region portfolio. As the Bank's support in the ECA region shifts from rehabilitation to new construction and as the privatization process gains momentum, both policy and project induced resettlements are likely to become more frequent. The privatization of agricultural cooperatives and collectives, restoration of land and buildings to previous owners, privatization and restructuring of energy and industrial enterprises and their associated housing stock could result in the displacement of large numbers of people. The efficiency measures adopted by enterprises will increase the numbers of unemployed and result in some cases in indirect resettlement. Projected levels of unemployment, especially in EC3 countries, could provoke movement between cities and rural-urban migration, as unemployed individuals and their families seek new economic opportunities.

4. Although project induced settlement has been limited, ongoing ethnic conflicts in the region have created a highly complex social situation resulting in significant levels of involuntary resettlement or externally induced population displacement. At present, the management and provision of short and medium term assistance and eventual resettlement for war induced refugees from conflicts in Azerbaijan, Armenia, Bosnia, Croatia, Georgia, etc. constitutes an important social concern. This situation is further exacerbated by the international movement of refugees within the region.

## EUROPE AND CENTRAL ASIA REGION

Review of Bank and Borrower Training Needs

1. **Training Efforts to Date.** The ECA region, with the support of EMTEN, has had an active program for the training of Bank staff; it conducted seminars for staff at the regional level and for all operational divisions in FY 1990. This has been complemented by the following ECA sponsored training seminars and courses for Borrower personnel: Czech and Slovak Federal Republic (2 seminars), Poland (1 seminar) and a special training seminar held in Geneva for representatives of selected countries from the former Soviet Union. EMTEN will also be participating in an environmental assessment training seminar in September 1992 for personnel from the FAO/Bank Cooperative Programme, which historically has been involved in the preparation of agricultural projects for some ECA countries.
2. **Training of Bank Staff.** The training of Bank staff within the region should continue through participation of personnel in short-term training seminars. Training resources should also be allocated for Task Managers responsible for projects requiring preparation of environmental assessments and/or resettlement plans, which will allow the Task Manager to spend more time directly in their design, preparation, review and implementation, rather than contracting these responsibilities largely to the Technical Department and/or consultants. Priority short-term training needs, based on the projected lending portfolio, would include: training for new regional staff (90 percent of EC3 staff did not participate in the previous series of training sessions); more detailed training for Task Managers of "A" projects; general staff training in resettlement issues; and dissemination of relevant literature. Based on the Environmental Assessment Sourcebook, Task Managers should be provided with practical guidance concerning major environmental and social issues related to specific types of projects in the proposed portfolio.
3. **Training of Personnel from Borrower Countries.** The training of Borrower personnel in the design, preparation, review and implementation of environmental assessments and resettlement plans is critical for long-term success in implementation of Operational Directives 4.01/4.30 and, more important, for the effective incorporation of environmental concerns into the national development planning and management process. Training programs for Borrower personnel should be given priority to support the lending programs for the Russian Federation, Turkey and Ukraine where it is anticipated that a large number of Category "A" projects may occur. Steps should be taken to better familiarize cooperating organizations in Borrower countries with the environmental assessment requirements of the Bank. This could be accomplished through seminars for managers and practical training courses for technical staff. These activities should focus on actions to address the following issues: (a) environmental screening of proposed projects to determine potential environmental and resettlement/social impacts; (b) development of implementable work plans for the preparation of environmental and social impact studies; (c) identification and analysis of alternatives to the proposed project; (d) development of implementable mitigation and monitoring plans; (e) formulation of institutional development and human resources plans as mandated by the Bank's procedures, (f) techniques for the evaluation of resettlement and social impacts, (g) evaluation of potential impacts to archaeological and/or historical sites and biological diversity, and (h) techniques for public participation/local nongovernmental organization involvement in the preparation of environmental and social impact studies.

4. Translation of Bank Guidelines. Funds should be allocated for translation of the following materials: (a) Operational Directives 4.01 and 4.30 into the national languages of all Borrower countries; and (b) translation of the Environmental Assessment Sourcebook (3 volumes) into Russian and Turkish.


**TABLE I - Europe and Central Asia Region**  
**Proposed Projects with Major Environmental and/or Resettlement Impacts**  
**FY 1993-1995**

Department/ Country	Sector	Proposed Project	FY	Env. Class	Resettlement Issues	Major Issues
<b>ECA 1</b>						
Romania	Energy	Power/Coal Rehabilitation	94	A	Yes	Expansion of lignite mining will require review of site restoration and existing resettlement procedures
Turkey	Energy	Expansion of Gas Transmission System	94	A	To be determined	Expansion of gas infrastructure including major pipelines
	Infrastructure	Istanbul Water Supply	94	A	To be determined	Treatment and disposal of sewage effluents at proposed Riva outfall
<b>Project Under Supervision</b>						
Turkey	Energy	Berice Hydropower	93	A	Yes	Environmental monitoring plan, resettlement plan (144 people) and potentially moving a small cemetery
<b>ECA 2</b>						
CSFR	Environment	Environment I	94	A	Under Investigation	EA for two hazardous waste incinerators under preparation, which will review if any resettlement is required for safety reasons
	Energy	Energy II	95	A	Not Anticipated	Gas pipeline
Hungary	Energy/ Environment	Energy/Environment	93S	A	No	Replacement of power/control heating facilities with combined cycle units - air pollution, noise
<b>Project Under Supervision</b>						
Yugoslavia	Energy	Kolubara Thermal Power/Tamnava Lignite Mine	91	A	Yes	Project not effective due to political situation; extensive environmental monitoring included in project design and a resettlement plan will be implemented

# OFFICE MEMORANDUM

DATE: August 31, 1992

TO: Mr. V. Rajagopalan, Vice President, OSPVP

FROM: Daniel Ritchie, Director, ASTDR 

EXTENSION: 81312

SUBJECT: Environment and Social Skills Mix

1. In response to your request, the Asia Regions (East Asia and Pacific, South Asia) have assessed skills required to support the environmental and social aspects of their workprograms. Attachments 1 and 2 summarize the additional requirements for environmental skills and social skills respectively. These needs are based on two papers prepared by ASTEN in consultation with the two Regions: one on environmental skills mix, and the other on building social capacity. These papers are also attached for your reference.

2. First, on environment, the skills mix paper points out that our work program is expanding dramatically. Both lending for the environment and the number of environmental assessments are expected to double in the next three years, with environmental lending in East Asia accounting for about two thirds of environmental work. To support this work program, at least eight environmental specialists are needed in East Asia, four in South Asia, and six in the Technical Department. Although this request for 18 positions is a modest estimate in view of the work program proposed, it is unlikely that the CDs can or will hire these needed technical specialists in the absence of some incremental resources for this purpose.

3. Second, on social skills, the upcoming workprogram indicates need to strengthen regional capacity to deal with resettlement, participation, WID and other social concerns. The Asia Regions have 74 projects (under preparation or implementation) involving resettlement, 55 projects in which consultation is required, 89 projects with WID components, and a growing number of projects involving tribal and isolated peoples. The staff resources currently available (two people working on resettlement and two on WID) is inadequate to meet these demands. To address these issues, ASTEN has proposed that we create a Social Division and provide six additional positions to deal with social issues. Of these, three would be in the CDs and three in the Social Division. The Social Division would also need incremental financial resources to prepare training information which could help borrowers address social issues, particularly those related to resettlement and consultation in the EA process. The proposal is currently under consideration by regional management.

## Attachments

cc: Messrs./Mmes.: Kaji (EAPVP), Wood (SASVP), El-Ashry (ENVDR),  
Christoffersen (AFTEN), Mahar (LATEN), Seth (EMTEN),  
Davis (ASTEN)

RRamankutty:rr

ASIA REGION

ENVIRONMENTAL SKILLS MIX ANALYSIS<sup>1</sup>

Overview and Conclusions

i. The Bank's lending and sector work on environment are expanding rapidly. From 1990-1992 the combined Asia Regions lent about \$2.4 billion for environment. This will double in FY93-95 to about \$5 billion, amounting to about 15% of total lending. The greatest growth will be in East Asia where environmental lending will exceed \$1 billion p.a. over the next three years. The number of environmental assessments to be undertaken is also expected to double. This has important skills mix and resource implications. ASTEN cannot meet current demands for operational support and a major effort is now needed to strengthen CD and TD capacity to carry out environmental work.

ii. An analysis of the regions' work on environmental assessment, GEF/Montreal Protocol, lending and sector work shows that skill needs are clustered in key sectors and Country Departments. All divisions with heavy work programs express concern about the burden on task managers. EA1 and EA2 have the most pressing needs for additional support on environmental assessment and for environmentally oriented technical specialists in the urban/infrastructure and energy divisions. The agriculture divisions in East Asia also indicate a need for additional task managers and ecologists. In SA2, there is need for technical support from environmental specialists, particularly in energy and agriculture. To support most other South Asia Divisions, technical specialists are also needed in the Agriculture, Infrastructure, Industry and Energy Divisions of the Technical Department. ASTEN needs to strengthen its capacity to review and support projects in urban and water supply and in agriculture.

TABLE 1. REQUESTS FOR TECHNICAL SPECIALISTS

Technical Specialty	East Asia			South Asia			Technical Department					
	EA1	EA2	EA3	SA1	SA2	SA3	IF	AG	EG	IN	PH	ENV
Environmental Economist	1				1							1
EA Specialist/GEF & Montreal Protocol	2	1										
Urban Environment (including transport and infrastructure)		1								1		1
Industrial/Energy Environment		1			1		1*		1			1*
Ecologist (Agriculture, forests and biodiversity specialists)		1	1		1	1		1				1
Total (without vacancies)	3	4	1	0	3	1		1	1	1		3

\* Vacancy available, not counted in total

<sup>1/</sup> The case for strengthening social capacity in the Asia Regions is made in a note to be circulated separately.



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iii. These requests, which are modest in relation to the size of the work program, are summarized in Table 1. This shows that East Asia has identified the need for eight specialists, South Asia four, and the TD six, of which three new positions are in ASTEN. This makes a total of 18 environmental specialists, which in the judgement of ASTEN and the CDs is the minimum needed to deliver the work program which has been promised. In view of other needs, it is difficult to calculate how many environmental specialists will actually be hired in the absence of incremental slots. In fact, many Country Departments indicate that their actual needs are understated given the concern that they may be required to reallocate slots for environment when other needs are also pressing. These CDs express the hope that the TD will be able to provide appropriate technical specialists as required.

iv. Several other concerns are touched upon in this paper. First the number of EAs is doubling at a time when EA resources have been decentralized and merged into the general budget. In this situation, task managers are reporting difficulty finding the funds needed to support EA work. Second, Asia Region Departments spent only 3 SY on EAPs last year which is lower than resources allocated to this task in other regions. Finally, ASTEN has fewer environmental staff than any other RED, and with ten environment positions and twelve consultants, ASTEN has a low ratio of staff positions to consultants, a situation which needs to be reviewed.

ASIA REGIONS TECHNICAL DEPARTMENT

BUILDING SOCIAL CAPACITY IN THE EAST AND SOUTH ASIA REGIONS

Overview and Conclusions

i. Work on social issues in projects in Asia is increasing. The two Asia Regions currently have 54 projects under implementation and 20 in the pipeline which involve the resettlement of over 2.2 million people. There are 55 projects of environmental category 'A' which require consultation with affected groups in the EA process, and an increasing number of projects affecting indigenous people. Participation to improve the social soundness of projects and to improve their sustainability is also a matter of growing concern, the recently issued OD 4.15 on Poverty Reduction and the emphasis on participation and WID or gender matters is also placing new demands on the Regions for attention to social issues. The ASTEN social team currently has two anthropologists working most of the time on resettlement, and two staff working on WID. This is inadequate to the task.

ii. In order to meet the demands of the South and East Asia Regions and to build this capacity to take social issues into account in project design and implementation, the attached paper proposes to establish a Division for Social Development within the Technical Department. A similar strategy to that followed by ASTEN would be adopted whereby skills and experience would be built-up initially in the Social Division and progressively devolved to the CDs. The India and China Departments would be encouraged from the start to recruit resettlement experts.

iii. To provide the necessary support, the Social Division requires three additional positions (one each for resettlement, indigenous people, consultation and participation) and two to three resettlement specialists need to be recruited by the India and China Departments. A breakdown of staff needs is shown in Table 1.

TABLE 1 - SOCIAL STAFF REQUIRED		
ASTEN	EXISTING STAFF	NEW STAFF
Resettlement Specialist	2	1
Consultation/Participation		1
Indigenous People/Natural Resources		1
Gender/WID	2	
SA2		
Resettlement Specialist		2
EA2		
Resettlement Specialist		1
TOTALS	4	6

- 2 -

iv. As well as additional staff, the new Social Division needs the time and resources to develop a proactive program to deal with social issues. To this end the Social Team has requested financial resources to develop a resettlement video which explains Bank procedures and could be used with borrowers, NGOs and affected people. It also proposes a series of workshops to be held initially in India and China on resettlement and consultation. This program would be extended to other CDs in subsequent years. Additional financial resources could potentially be mobilized from bi-lateral funders for work on participation and WID.

## ASIA REGION

### ENVIRONMENTAL SKILLS MIX ANALYSIS<sup>1</sup>

#### Environmental Issues in Asia

1. The Asia Region has over half the global population, and urban populations in Asia have doubled over the last three decades. Nearly a third of Asia's population now live in cities and towns, and by 2025 urban residents are expected to account for nearly 60 percent of the total population. The region has 13 megacities (cities with populations over 8 million); by the turn of the century, four more cities in Asia will join this list. In the year 2000, Shanghai, Calcutta and Bombay will each have more than 15 million inhabitants. High population densities and rapid urbanization mean that environmental issues related to municipal pollution, urban infrastructure and transport have high priority for attention.

2. Urbanization has been fueled by rapid industrialization. The industrial sector currently accounts for at least a fifth of the GDP in all countries in the region and China, Indonesia, Korea, and Malaysia have industry sector shares of more than 40 percent. The rapid pace of industrialization is expected to continue as countries in the region liberalize markets and relax trade regimes. Population growth combined with industrialization is also generating an increasing demand for energy. At current growth rates, energy demand in the region is doubling every 12 years (The global energy demand is doubling once every 28 years). In addition, energy intensity (the amount of energy per unit output) in Asia is among the highest in the world. Managing the emissions and toxic wastes generated by the expanding industry and energy sectors is a critical environmental concern.

3. Agriculture, while increasingly productive, is declining as a share of GDP in the region, and this is more pronounced in the East Asia Region than South Asia. While calorific requirements are largely met in countries in East Asia, many countries in South Asia region fall short of their requirements. Agricultural intensification without proper environmental management practices is causing land degradation, and contamination from agrochemicals. Water resources are under pressure from increasing demands in agriculture, domestic and industrial sectors. The pressure on forests, grasslands is increasing and threatening natural habitats.

4. Bank projects and environmental work in Asia closely correspond to these priorities and concerns.

#### The Environmental Work Program in Asia

5. In response to environmental concerns, the environment work program of the Asia Regions is rapidly expanding. Annex 1, Table 1 shows the number of discrete activities within the East Asia and South Asia Regions, which have an environmental focus. When comparing FY 90-92 with FY 93-95, the number of operations involving environmental activities increases from 60 to 124 in East

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<sup>1/</sup> The case for strengthening social capacity in the Asia Regions is made in a note to be circulated separately.

Asia and from 37 to 71 in South Asia. In other words, in both regions the workload on environment will roughly double. This has important implications for regional skills mix.

6. The environmental work program in Asia consists of two types of activities. First, tasks intended to identify and mitigate potential adverse environmental and social impacts of the Bank's lending. This is done primarily through project review and environmental assessment. Second, activities aimed at identifying and addressing the most important environmental concerns in the region. This occurs mainly through lending and sector work. The patterns, trends and resource requirements for these activities is as follows.

7. Environmental Assessment. During FY 90-92, the combined Asia Regions had 25 "A" projects for which EAs were required. In the FY 93-95 pipeline, there are 47 projects classified as "A", a twofold increase. These "A" projects represent about 56 percent of all "A" projects in the Bank. Of these, 32 (38 percent) are in East Asia and 15 (18 percent) are in South Asia. The number of EAs required in East Asia in Urban/Infrastructure (14) and in Energy/Industry (11) equals or exceeds the total number of EAs required in any other region and argues for significantly strengthening EA review capacity in East Asia in these sectors. (See Annex 1, Table 2)

8. ASTEN has calculated specialist (Bank staff and consultant) input for EA review at 8 SW for "A" projects and 3 for "B" projects, although a recent assessment by EA3 indicates that these numbers are considerably understated. This amounts to about 8 SY per annum. Last year, ASTEN staff provided about 2.5 SY, and consultants funded under the Environmental Assessment Account provided another 2.5 SY, about 60 percent of the resources required. Creating environmental assessment review capability in EAL and EA2 would help reduce this gap. ASTEN also needs to enhance its ability to support EA work in urban and infrastructure. At present, two of the three ASTEN staff and consultants with urban expertise work exclusively on the UNDP-financed Metropolitan Environmental Improvement Program (MEIP).

9. Lending Program. During FY 90-92, the Asia Regions processed 208 projects worth \$24 billion. Of these, 11 were environmental projects and more than 56 have environmental components (see Annex 2 for definitions). Total volume of environmental lending amounted to \$2.4 billion over three years or 10 percent of total lending. During FY93-95 environmental lending is expected to double to about \$4.8 billion, or 15 percent of the total lending. The East Asia Region is expected to account for nearly 70 percent of the environmental lending in the two regions combined. Annex 2 contains details of the lending program.

10. During FY 90-92, the East Asia Region appraised 41 projects with environmental components totalling \$1.4 billion in environmental lending. During FY93-95, the Region expects to more than double its environmental lending to \$3.2 billion, or 17 percent of total lending. Environmental lending in the "Brown" sectors (urban/infrastructure/industry/energy) is expected to increase to approx. \$1.8 billion and in the "Green" sectors (agriculture, irrigation, forestry and other natural resources management) to approx. \$1.2 billion. Lending in other sectors is negligible (\$0.2 billion).

11. In the South Asia Region, during FY90-92 environmental lending amounted to \$960 million (10 percent of total lending). During FY93-95, environmental lending is expected to increase to approx \$1.6 billion, or about 12 percent of the total lending program. Environmental lending in the "Brown" sectors shows a modest increase from about \$600 million during FY90-92 to about \$720 million during FY93-95, while lending for environment in the "Green" sectors is expected to more than triple from about \$200 million to about \$760 million.

12. Lending for GEF and MPIF. Global Environmental Facility (GEF) projects address greenhouse gas reduction, biodiversity loss and the pollution of international waters; while projects financed by the Montreal Protocol Interim Fund (MPIF) are intended to protect the ozone layer. Since January 1991, the Asia Regions have added 18 new operations to the pipeline which are or will be financed by GEF and three financed by the MPIF. The GEF pipeline includes investment projects and UNDP Technical Assistance which is executed by the Bank. Of the 18 GEF projects, 13 are in East Asia and five in South Asia. All MP projects are in East Asia (see Annex 2, Table 2).

13. In East Asia, both GEF projects and MPIF projects are clustered in a few divisions. In EAL, EALAG has three biodiversity projects, EALIE has three greenhouse gas projects and three countries with Montreal Protocol operations. In China, EA2IE is supporting three greenhouse gas activities. No other division has more than one GEF or MP operations, although GEF work in India (SA2IE) is expected to increase. Although future plans for GEF are not firm, it is expected that GEF operations and funding will at least double over the next three years with an emphasis for the Asia Regions on greenhouse gas projects. The TD currently has sufficient technical staff to support GEF operations but there is urgent need to expand the number of task managers in most divisions carrying out GEF and MP projects. If the GEF is doubled in size, EALIE, EA2IE and SA2IE would be in particular need of additional support for projects to reduce greenhouse gas emissions.

14. Environmental Sector Work. In the past three years, the combined Asia regions have produced six free-standing environmental reports and twenty additional reports which give some attention to environmental concerns. In the future pipeline, East Asia has proposed nine studies with environment as a major focus. South Asia proposes to cover environmental issues in ongoing sectoral analysis which is heavily concentrated in urban, energy and water resource management. EALIN and SA2 have indicated a need for environmental economists to support this work.

15. Environmental Action Plans are under preparation in eleven countries in East Asia and these should be completed by June 1993. The Bank has provided inputs into two of these, and it proposes to review the reports and assist in filling gaps. Five EAPs or equivalents are underway in South Asia with Bank assistance to three. To date, actual staff input (as indicated in the MIS) has been limited to 44 SW in East Asia and 110 SW in South Asia. This is so far lower than the input provided to EAPs in most other regions.

16. Experience to date suggests that most national EAPs need considerable assistance with policy formulation, specific strategy design and investment prioritization and effective follow-up to country studies is likely to require far more resources in the future. EAL will be particularly pressed as it has work underway in six countries. This Department has recently taken

steps to recruit an environmental specialist, but would require a significant increase in SW resources to follow up on the country studies currently underway.

17. The Technical Department has supported the region's environmental analysis with studies on agrochemical pollution, watershed management, water resources management, forestry, and urban transport. Lending trends suggest that the urban and energy divisions will need to provide increased technical support for environmental sector work. ASTEN has a work program in support of the GEF and regional issues. This covers biodiversity and atmospheric emissions including greenhouse gases and acid rain. ASTEN has three staff to support this work, but all are supported from off-budget resources.

#### Building Environmental Capacity in the Asia Region

18. As the previous analysis indicates, the volume of work on environment is already large and still growing. In most areas, such as environmental assessment and lending, environmental outputs are expected to double in the next three years. ASTEN staff have nearly doubled in number each year over the last three years and ASTEN can no longer expand to meet the demand. Under the circumstances, a strategy to expand environmental capacity in the Regions must start by recruiting appropriate staff into the Country Departments and, to a lesser extent, in the TDs. ASTEN, in turn, needs adequate resources to meet functions which others cannot provide.

19. Staffing needs based on the work program. Table 1, Annex 3 shows the distribution of the environmental workload and the divisions in which environmental expertise is required. This suggests that EA1 needs to strengthen skills significantly in EALIE and to a lesser extent in EALIN and EALAG. EA2 needs to strengthen departmental capacity to handle industrial pollution control and environmental assessment, and it would be desirable to enhance skills in EA2AG, EA2IE, and EA2EH. The environmental work program in EA3 indicates need for additional support to handle urban and possibly industrial pollution, and the program in EA3AG including GEF work will require skills in ecology/biodiversity. In South Asia, SA1 and SA3 are expected to depend on the TD for environmental support. The India Country Department (SA2) has a large environmental work program in Agriculture, and Energy, and skills are needed to support the activities in SA2AG and SA2EG. The Technical Department also needs to strengthen its skills to support the Country Department activities.

20. Staffing needs identified by CDs. As part of the skills mix exercise, Country Departments were asked to identify what skills they have and what skills they need to support environmental work. These responses are summarized in Annex 3, Table 2. Not surprisingly, needs identified by CDs correspond closely to those identified by the work program analysis. In general, the Country Departments report that they have adequate capacity to deal with environmental issues in agriculture, and in population, health and education sectors, and that this can be further enhanced with training. Most Country Operations Divisions indicate that they have adequate economic skills to handle environmental issues even though the extent of environmental inputs into Country Memoranda has been limited to date.

21. The East Asia CDs have expressed need for three professionals with capacity to handle urban/industrial environmental issues (EA2). They also

indicated need for additional support in biodiversity (EA3) and in ecology (EA2). In addition, EA1 and EA2 have each indicated need for an environmental specialist for EA support. EA1 needs two economists, one to deal with urban environmental issues and the other to deal with natural resource management issues. In addition, EA1 and EA2 indicate need for environmental specialists to support GEF/MP projects.

22. The South Asia Region indicates need for more staff to support environmental work in the "Green" sectors. SA3 indicates need for a crop ecologist and a rangeland management specialist (either in the CD or the TD). SA2 has requested a resource economist and an environmental engineer. The South Asia region, especially SA1 and SA3 expect to continue to depend on the TD for environmental assessment support and skills to develop their environmental programs.

23. Areas of convergence between ASTEN's analysis and staffing needs indicated by the Country Departments were the basis for the staffing recommendations made in Table 1. These recommendations do not include a natural resource economist requested by EA1, an environmental specialist (GEF/MP) and a transport environmental specialist requested by EA2, and an environmental health specialist requested by the Technical Department (ASTPH).

TABLE 1. REQUESTS FOR TECHNICAL SPECIALISTS

Technical Specialty	East Asia			South Asia			Technical Department					
	EA1	EA2	EA3	SA1	SA2	SA3	IF	AG	EG	IN	PH	ENV
Environmental Economist	1				1							1
EA Specialist/GEF & Montreal Protocol	2	1										
Urban Environment (including transport and infrastructure)		1								1		1
Industrial/Energy Environment		1			1		1*		1			1*
Ecologist (Agriculture, forests and biodiversity specialists)		1	1		1	1		1				1
Total (without vacancies)	3	4	1	0	3	1		1	1	1		3

\* Vacancy available, not counted in total

24. Strengthening TD Support. ASTEN has already supported the devolution of environmental staff and functions to other Technical Department Divisions. For example, ASTIF (Industry) is responsible for management of the CFC phase out program and ASTEN has provided one position to ASTIF for a specialist on environmental pollution mitigation. ASTEN has supported the creation of an alternative energy unit in ASTEG, and consideration has been given to placing MEIP in the Urban and Infrastructure Division. ASTEN has also encouraged the location of GIS specialists in the Urban and Agriculture divisions and provided one forestry position to ASTAG.

25. In spite of these efforts, additional environmental resources are needed in the TD. In many cases SODs are too small to recruit environmental specialists, but considerably more operational support is required than can be provided by ASTEN staff. In such cases these specialists should be available in the TD. An analysis of the lending pipeline suggests that high priority



should be given to the recruitment of at least one environmentally oriented person in the Infrastructure, Industry and Energy Divisions of the TD. Staff with environmental skills are also needed to support the work program on water resource management and forestry in ASTAG.

#### The Role of ASTEN

26. There are some functions in ASTEN which cannot easily be devolved. These involve project review, EA capacity building, training and provision of specialist skills. There is a particular need for specialists who work across sectors (water pollution, ecology) or support global environmental work (atmospheric emissions, biodiversity). In addition there is a significant monitoring and reporting function which can be more efficiently handled by one unit than by six CDs. Yet while resources are available from the CDs for direct operational support, and from external resources for work which is not driven by Bank lending (e.g. acid rain), very few resources (about 2 SY) are available for the management, review and training functions so critical to CD support, and analytical work on environment is currently financed entirely off budget. No other environment division functions with so few resources for general regional support and this practice should be reviewed.

27. A second problem relates to the ratio between positions and consultants. Although ASTEN has grown significantly over the last few years it still has relatively few positions when compared to other Regional Environment Divisions within the Bank. If the Division Chief and social staff are excluded, ASTEN has 10 environment positions, of which 4 are special positions (GEF and EA). By comparison, EMTEN has 17 positions, LATEN 13, and AFTEN 11 (see Table 2). ASTEN also has a disproportionate number of long term consultants (12) when compared to the other divisions. As a result, a considerable portion of ASTEN work is done by consultants many of whom are new to the Bank. Because of this and of the way resources flow, task managers frequently complain of a failure to appreciate the way the Bank works and lack of continuity.

TABLE 2. STAFFING PROFILE - REGIONAL ENVIRONMENT DIVISIONS<sup>1</sup>

Division	Regular *	GEF	Montreal Protocol	Special	Second	Total
EMTEN	12	2	1	1	1	17
LATEN	10	2	1	0	0	13
AFTEN	8	2	0	0	1	11
ASTEN	6	3	0	1	0	10

<sup>1/</sup> This does not include staff dealing with social issues

\* Does not include Division Chief

28. To address these issues, ASTEN itself needs a highly professional core team which has adequate resources to provide the continuity and support needed on project and EA review, staff training, consultant identification and training, and analytical work. Ideally this would include 2-3 staff in each of the core sectors. Excluding MEIP (with 1 staff position), ASTEN has only one staff member covering infrastructure, transport and water resources, and one covering industry. There are three staff covering ecology and biodiversity and staff positions for EA and GEF coordinators. All other work is done by consultants (see Annex 3, Table 3). ASTEN has two vacancies, one

for a industrial environmental specialist and the other for an environmental specialist under the GEF. As a result of this analysis, we propose to recruit one experienced person in industry (to fill the vacancy), and need additional positions for staff in urban/transport (and/or water resource management) and in agriculture in FY93. If a position is available, an economist would be recruited in FY94.

29. A major effort to be undertaken by ASTEN in FY93 is the completion of an environmental report which describes environmental issues in the region and the measures taken to address them. This report should lend credibility to ongoing work and show how it corresponds to regional needs. It is expected to provide the basis for consideration of a regional initiative focussing on environment and possibly for improved resource mobilization and donor coordination. If the Regions elect to follow-up, additional human resources will need to be committed to this effort.

ROUGH ESTIMATE OF ENVIRONMENTAL ACTIVITIES BY COUNTRY DEPARTMENT								
Pipeline FY93-95	EAST ASIA				SOUTH ASIA			
Lending Operations <u>1</u>	EA1	EA2	EA3	Total	SA1	SA2	SA3	Total
Infrastructure/Urban	6	7	7	20	2	2	3	7
Energy/Industry	4	7	2	13	0	2	4	6
Agriculture & Natural Resources	5	6	8	19	4	6	4	14
Other	1	1	1	3	1	1	0	2
GEF Operations <u>2</u>	5	3	3	11	0	3	1	4
Environmental Assessments <u>3</u>	10	13	9	32	4	9	2	15
National Environmental Action Plans <u>4</u>	6	2	4	12	3	1	2	6
Sector Work	4	4	6	14/ <u>5</u>	7	4	6	17/ <u>6</u>
Subtotal	41	43	40	124	21	28	22	71
<u>FY90-92</u>								
Lending Operations	EA1	EA2	EA3	Total	SA1	SA2	SA3	Total
Infrastructure/Urban	7	7	6	20	1	2	2	5
Energy/Industry	2	4	3	9	3	4	0	7
Agriculture & Natural Resources	0	3	4	7	2	6	4	12
Other	1	1	3	5	0	2	0	2
GEF Operations <u>7</u>	1	2	0	3	2	0	0	2
Environmental Assessments	5	8	3	16	0	7	2	9
Subtotal	16	25	19	60	8	21	8	37

1 Includes both environmental projects and projects with environmental components.

2 Includes those project identified in the GEF Pilot Phase and likely to be implemented in the Operations Phase.

3 "A" projects only.

4 EA3: Pacific Islands counted as one.

5 Five have environmental objective, others cover environmental issues.

6 One has environmental objective, others cover environmental issues.

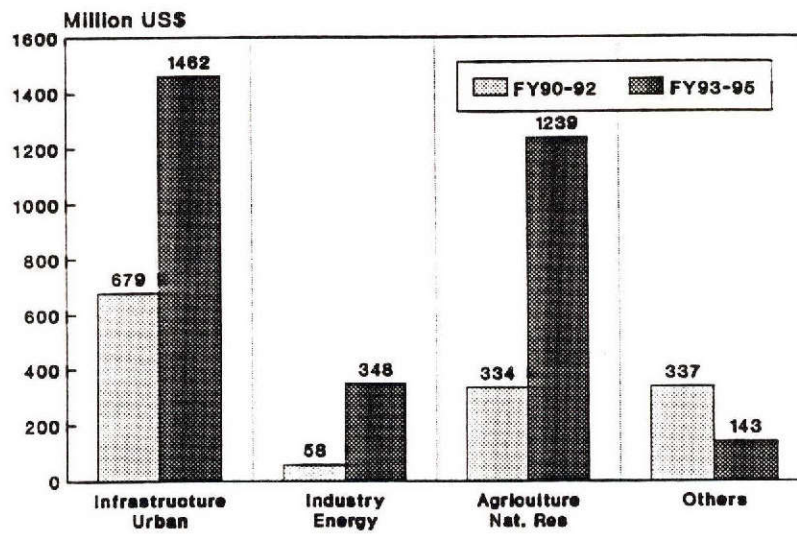
7 Includes investment projects and TA executed by the Bank.

NUMBER OF PROJECTS WITH "A" AND "B" ENVIRONMENT RATINGS FY 93-95		
	A	B
Africa Region	16	94
East Asia	32	56
Europe & Central Asia	5	33
Latin America	13	72
Middle East & North Africa	3	32
South Asia	15	51

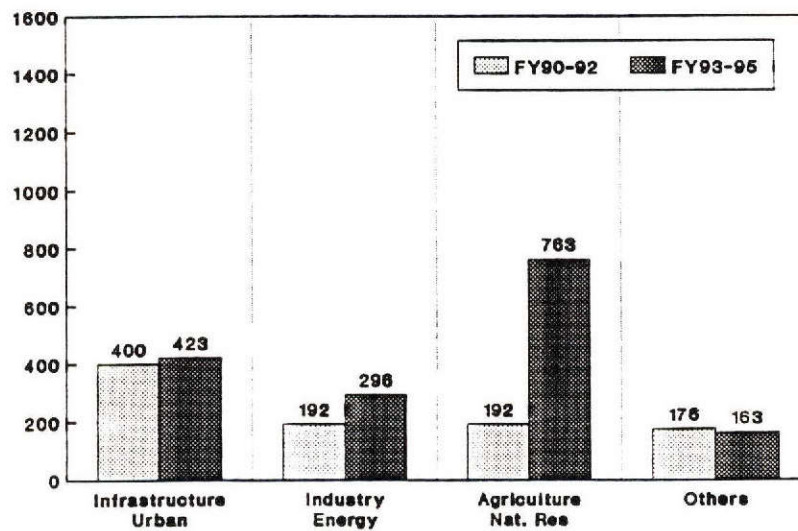
NUMBER OF PROJECTS WITH "A" AND "B" ENVIRONMENT RATINGS FY 93-95		
	A	B
<b>EAST ASIA</b>		
Agriculture	7	16
Energy & Industry	11	22
Infrastructure	14	17
Population/Human Resources	0	1
<b>SOUTH ASIA</b>		
Agriculture	2	20
Energy & Industry	9	17
Infrastructure	4	14
Population/Human Resources	0	0
<b>TOTAL</b>	<b>47</b>	<b>107</b>

Amount of Bank Lending for Environment Projects and Environment Components in the Asian Regions by Sectors and Year <sup>1/</sup>

**East Asia**



**South Asia**



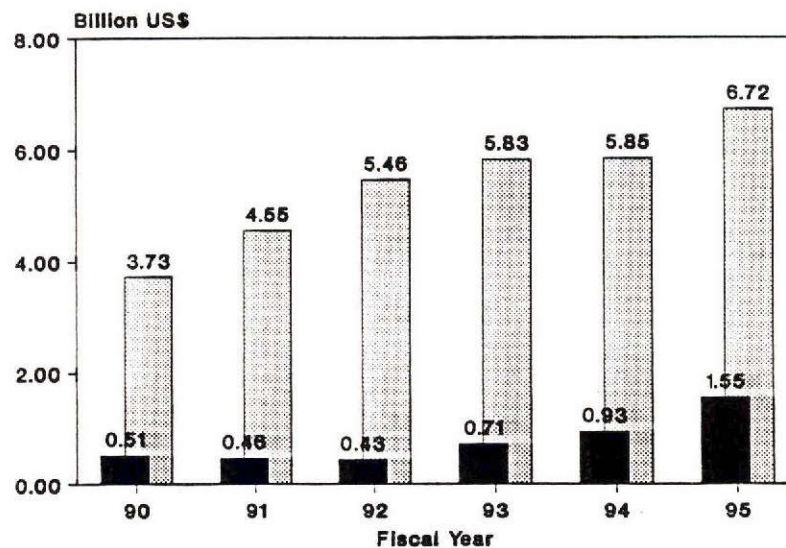
<sup>1/</sup> Bank Finance Only  
FY90-92 Based on actual share  
FY93-95 Estimated

WORLD BANK ENVIRONMENTAL PROJECTS

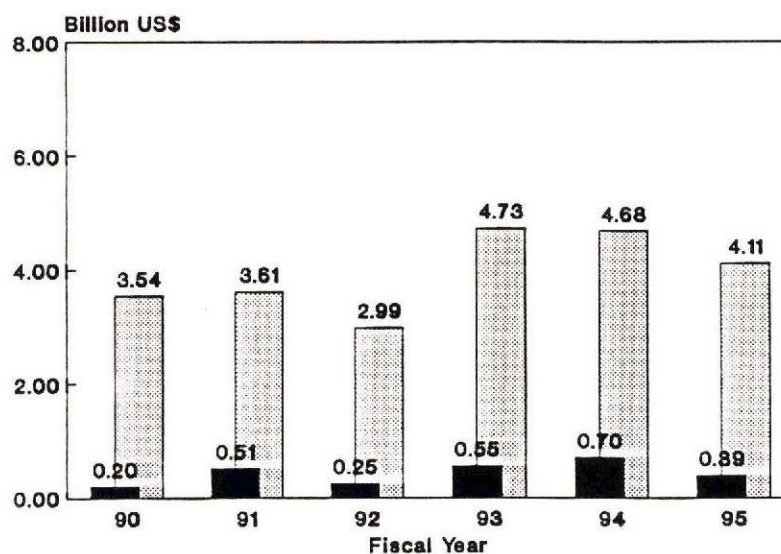
PROJECT SECTORS	TRADITIONAL ENVIRONMENT COMPONENTS	NEWER ENVIRONMENT COMPONENTS
<p>A. Infrastructure</p> <p>1 Urban (Planning, sites and services, housing)</p> <p>2 Transport (Roads, ports, airports, traffic engineering)</p> <p>3 Water Supply &amp; Sanitation</p> <p>4 Disaster Relief/Reconstruction</p>	<ul style="list-style-type: none"> <li>- Sewerage and sanitation; solid waste management.</li> <li>- Traffic management.</li> <li>- Wastewater collection, treatment, disposal.</li> <li>- None.</li> </ul>	<ul style="list-style-type: none"> <li>- Strengthened municipal regulation and enforcement; reduced urban air, water, and noise pollution.</li> <li>- Fuel efficiency; fuel modification; incentives for higher occupancy vehicles; marine pollution.</li> <li>- Ground/surface water quality monitoring; regional/multi-sectoral water quality management; pricing; conservation incentives; regulation and enforcement.</li> <li>- None.</li> </ul>
<p>B. Industry &amp; Energy</p> <p>1 Industry (Industrial development, investment codes)</p> <p>2 Energy (Power generation and distribution)</p> <p>3 Ind. Development Finance</p> <p>4 Telecommunications</p>	<ul style="list-style-type: none"> <li>- End of pipe pollution abatement.</li> <li>- Project-related pollution control.</li> <li>- None.</li> <li>- None.</li> </ul>	<ul style="list-style-type: none"> <li>- Air and water pollution control; reduced ozone depleting substances; standards setting and regulation; hazardous waste disposal.</li> <li>- Supply-side energy efficiency; demand-side conservation; reduced CO2 emissions; renewable energy.</li> <li>- Lending for pollution abatement; components to strengthen screening by the financial intermediaries.</li> <li>- None.</li> </ul>
<p>C. Agriculture/Natural Resource Management</p> <p>1 Agriculture (Research, production, extension, irrigation)</p> <p>2 Forestry</p> <p>3 Watershed Management</p> <p>4 Land Management</p> <p>5 Conservation and Biodiversity</p>	<ul style="list-style-type: none"> <li>- Soil conservation, drainage, and desalination; applied research for reduced water needs.</li> <li>- Forest management and reforestation, primarily for production (commercial and social) forestry.</li> <li>- Watershed management for agricultural purposes or to protect dams and downstream water supplies.</li> <li>- Mapping, titling, transfers.</li> <li>- None.</li> </ul>	<ul style="list-style-type: none"> <li>- Land restoration/reclamation; surface and groundwater control; pesticide control/IPM; multi-sectoral water allocation.</li> <li>- Forest rehabilitation; non-commercial afforestation; conservation management, including biodiversity.</li> <li>- Watershed management in the context of forest protection for biodiversity.</li> <li>- Zoning for environmental purposes.</li> <li>- Rural and coastal conservation/biodiversity projects.</li> </ul>
<p>D. Population and Human Resources</p> <p>1 Population</p> <p>2 Public Health &amp; Nutrition</p> <p>3 Education</p>	<ul style="list-style-type: none"> <li>- Population programs.</li> <li>- None.</li> <li>- None.</li> </ul>	<ul style="list-style-type: none"> <li>- None.</li> <li>- Environmental health components.</li> <li>- Environmental awareness.</li> </ul>
<p>E. SALs (Monetary, fiscal, exchange rate, and trade policies.)</p>	<ul style="list-style-type: none"> <li>- None.</li> </ul>	<ul style="list-style-type: none"> <li>- Environmental sector reform; sustainable development strategies.</li> </ul>
<p>F. Cross-cutting Environmental Activities</p>	<ul style="list-style-type: none"> <li>- None.</li> </ul>	<ul style="list-style-type: none"> <li>- Environmental Assessments.</li> <li>- National Environmental Action Plans.</li> <li>- Institutional development for environmental policy development, regulation, enforcement, and research.</li> <li>- Natural resource accounting.</li> </ul>

## Total Bank Lending and Bank Finance of Environment Components in the Asian Regions

### East Asia



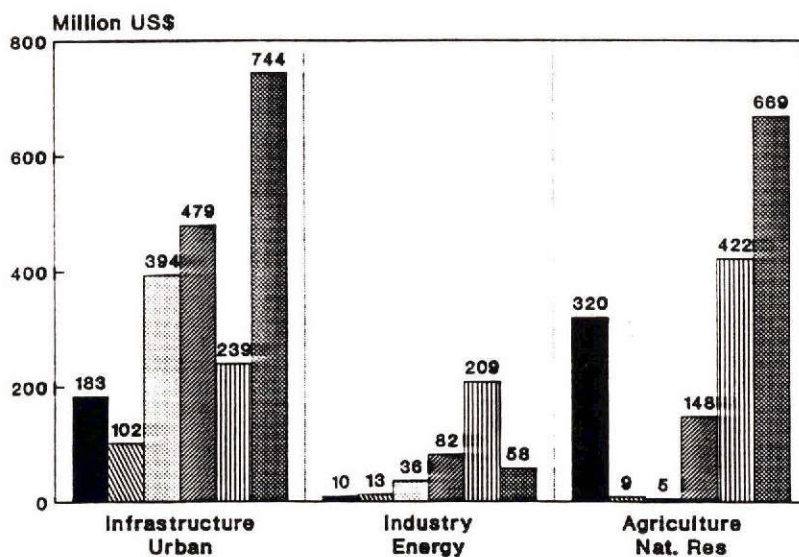
### South Asia



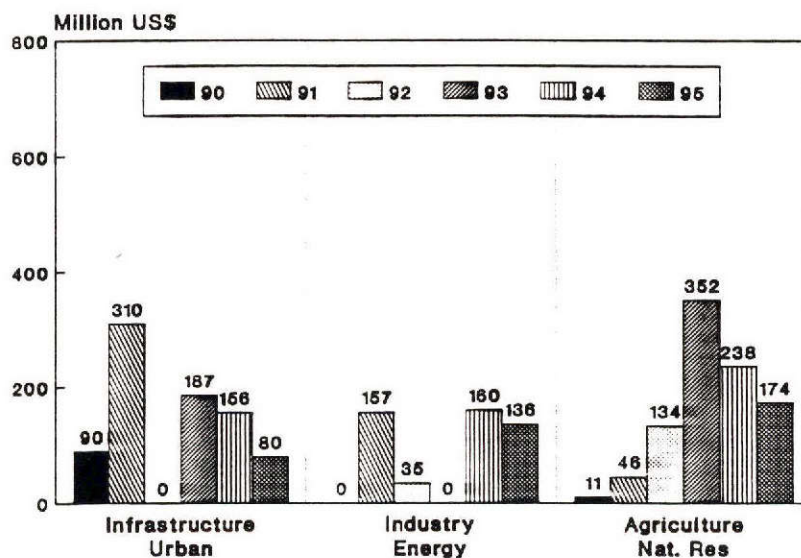
■ Bank Finance of Environment Components    □ Bank Lending

## Amount of Bank Lending for Environment Projects and Environment Components by Sector and Year (FY90 to FY95)

### East Asia



### South Asia





PROJECTS FINANCED UNDER THE GLOBAL ENVIRONMENTAL FACILITY AND EXECUTED BY THE BANK IN THE ASIA REGIONS

Country	Project	Investment/TA	Project Cost US\$m	GEF Funding US\$m	Bank Funding US\$m	Co-financing US\$m	Approval
<b>PROJECTS UNDER IMPLEMENTATION:</b>							
Bhutan	Trust Fund for Conservation	Investment	20	10	0	10	May 92
China	Ship Waste Disposal	Investment	64	30	15	0	April 92
China	Limiting emissions of GHGs	TA & training	2	2	0	0	Jan 92
Nepal	Makalu-Barun Conservation area National Biodiversity Action Plan	TA & training	3.8	3.8	0	0	May 92
<b>PROJECTS IN THE GEF WORK PROGRAM:</b>							
Lao PDR	Integrated Protected Areas	Investment	25.5	5.5	10	Finnida 7-8m	Aug 92
Philippines	Integrated Protected Areas	Investment	301	20	224		Sept 92
Philippines	Leyte Geothermal	Investment	1300	30	365	OECF, GEF for 40 m being sought	Feb 93
India	Non-conventional energy project	Investment		30	120	Dannida, Swiss, Japanese grant being sought	Oct 92
Thailand	Promotion of Electric Energy Efficiency	Investment		15	30	Japanese OECF GEF:15 Australian GEF:6	Dec 92
Indonesia	Biodiversity conservation	Investment		12	22	-	June 93
China	Sichuan gas transmission	Investment		10	300	-	MOD 3/93
Pakistan	Integrated Community waste to energy	Investment		11	130	-	Apprs 10/92
<b>RESERVE PROJECTS (WHICH MAY GO IN CURRENT PHASE OF GEF OR ARE CERTAIN FOR NEXT PHASE):</b>							
Thailand	Forest Reserves	Investment		25			MOD 12/92
China	Biodiversity	Investment		20			
China	GHG Investment	Investment		30			
<b>FUTURE PROJECTS:</b>							
India	Ecodevelopment	Investment		12.5			
Indonesia	Marine	Investment		-			
Indonesia	Renewable Energy	Investment		20.0			

**Montreal Protocol**

During FY92, the following projects were appraised:

Malaysia - MACS recycling and Halon control, and recovery and recycling. Thailand - Controlled Substances Engineering.  
Philippines - Controlled Substances Engineering.

The government of the Philippines has given the consent to begin the project. Agreements are expected to be signed with the other governments soon. In China, a project for Ozone Depleting Substances phase out was pre-appraised, and an agreement is expected to be signed by the government in FY93. In the future, a project to reduce ozone depleting substances is planned for India.

**ECONOMIC AND SECTOR WORK RELATED TO THE ENVIRONMENT**  
(does not include environmental action plans)

East Asia and Pacific Region

	EA1	EA2	EA3
FY89	- Philippines: Farm study - Philippines: Energy Sector Issues (#)		- Indonesia: Environmental Issues
FY90	- Korea: Gas Utilization Study - Thailand: Coal Dev and Util Study.		- Pacific Islands: Agriculture Development Strategy - Pacific Islands: Timber Marketing Strategy - Papua New Guinea: Forestry Sector Review.
FY91	- Malaysia: Gas Utilization Study	- Jiangsu Provincial Development (*) - Coal Utilization Study	- Indonesia: Water Resources Institutions. - Indonesia: Land Resource Management and Planning. - Tonga: Agric Dev Strategy - W.Samoa: Agric Dev Strategy
FY92	- Malaysia: Forestry Subsector Study - Vietnam: Energy Sector Investment	- Environment Strategy Paper - Energy Conservation - Urban Land Management Study (*)	- Indonesia: Agriculture Sector Review - Indonesia: Gas development Plan Study. - PNG: Agriculture Sector Review.
FY93	- Malaysia: Urban Environment - Philippines: Env Assessment - Thailand: CEM (Industry and environment)	- Yellow river Investment Strategy	- Indonesia: Environmental Management Review. - Indonesia: Eastern Island Strategy. - Indonesia: Forestry Research management
FY94	- Vietnam: National Environment Study.	- Urban Environmental Management - Rural Energy - Sichuan Energy and Environment	- Indonesia: Energy Environment Review - PNG: Environmental Management Review.
FY95			- Pacific Island: Regional Agriculture Strategy.
FY96			

Notes:

# Indirect relationship to environment

\* Small environmental focus

South Asia Region

	SA1	SA2	SA3
FY89		- Environment - Rural Water Supply Strategy	
FY90	- Bangladesh: Flood Control Panel		
FY91	- Bangladesh: Minor Irrigation Flood Control. - Bangladesh: Transport Sector Review.		- Sri Lanka: Energy Sector Review - Sri Lanka: Environmental Action Plan
FY92	- Bangladesh: Environmental Strategy paper - Bangladesh: Gas Subsector Review - Nepal: Infrast. Dev Process		
FY93	- Bangladesh: Dev in Population and Family Planning - Nepal: Water Sector Issues. - Nepal: Public Exp in Roads Sector.	- Agricultural Sustainability - Forestry Sector Review - Urban Sector Review	- Pakistan: Private Provision of Infrastructure - Sri Lanka: Energy Sector Review
FY94	- Bangladesh: Petrol Sec Strategy. - Bangladesh: Power Sector Institutions.	- Groundwater Sector Review	- Pakistan: Urban Sector Strategy - Sri Lanka: Infrastructure Dev Strategy - Sri Lanka: Energy Development Strategy
FY95	- Bangladesh: Water Sector Issues. - Bangladesh: Metropolitan Dev Issues		- Pakistan: Energy Sector Strategy.
FY96			

Asia Region

FY89: - Pollution Due to Agrochemicals

FY90: - Forestry Sector Review  
- Uplands Watershed Management

FY91: - Urban Transport Strategy.

FY92: - Forestry Initiative

FY93: - Water Resources Review  
- Forestry/Env Econ Work

ENVIRONMENTAL WORKLOAD & STAFFING REQUESTS FROM COUNTRY DEPARTMENTS

EAST ASIA AND PACIFIC

	Environmental workload				Requests from Country Departments for staff within CDs
	EA	Lending	GEF/MP	SW/EAP	
EA1					
EA1DR					
EA1CO					
EA1AG					Natural Resource Economist
EA1IE	■	■	■	■	Environmental specialist for managing EA, environmental tasks and sector studies, Environmental specialist for GEF/Montreal Protocol projects.
EA1IN		■		■	Environmental economist
EA1PH					Need for training
EA2					Industrial pollution control expert in EA2IE or EA2EH; EA specialist.
EA2DR					
EA2CO					
EA2AG		■	■	■	Ecologist
EA2IE	■		■	■	Environmental Specialist for GEF/Montreal Protocol projects.
EA2TP	■	■	■		Transport Environmental Specialist.
EA2EH	■	■	■	■	Expert in urban environmental management; Research Assistant.
EA3					Technical Department to provide additional support in urban/industrial pollution control.
EA3DR					
EA3EN			■		
EA3CO					
EA3AG	■	■		■	Biodiversity specialist (to be funded by GEF)
EA3IE				■	
EA3IN		■			
EA3PH					

Note: The shaded areas represent divisions and activity areas with heavy environmental workload. For Environmental Assessment (EA), the workload is based on the number of "A" projects.

SOUTH ASIA

	Environmental Workload				Requests from Country Departments
	EA	Lending	GEF/MP	SW/EAP	
SA1					Will look to Technical Department for Environmental Support
SA1DR					
SA1CI					
SA1AG					
SA1EI					
SA1PH					Training.
SA2					Resource economist; Environmental Engineer.
SA2DR					
SA2CI					
SA2AG					
SA2IN					
SA2EG					
SA2PH					
SA3					Will look to Technical Department for environmental support.
SA3DR					
SA3CI					
SA3AG					Expertise in rangeland management; Crop ecologist.
SA3EI					
SA3PH					

Note: The shaded areas represent divisions and activity areas with heavy environmental workload. For Environmental Assessment (EA), the workload is based on the number of "A" projects.

TECHNICAL DEPARTMENT

	Environmental Workload				Skills Requested by Country Departments from the Technical Department
	EA	Lending	GEF/MP	SW/EAP	
ASTDR					Environmental law, environmental management and institutions.
ASTTA					Expertise in social issues
ASTAE					Environmental economists
ASTIF					Technical skills in atmospheric pollution, effluent treatment, ecological aspects of hydropower projects, safety aspects of natural gas systems.
ASTAG					Expertise in environmental issues related to transport.
ASTEG					Expertise in urban and industrial pollution.
ASTIN					Expertise in land use planning/land reclamation.
ASTPH					Waterway cleanup
ASTEN					Support for dealing with environmental issues in agriculture Expertise in biodiversity conservation.

Note: The shaded areas represent divisions and activity areas with heavy environmental workload. For Environmental Assessment (EA), the workload is based on the number of "A" projects.



SKILLS NEEDS INDICATED BY THE COUNTRY DEPARTMENTS

EA1 (Cambodia, Korea, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, Vietnam)

Division	Existing Environmental Skills	Most Urgently Needed Managerial and Technical Skills in Division	Skills needed to be located in the Technical Department	Plans for recruitment
EA1DR				The dept has decided to recruit an environmental specialist for front office.
EA1CO	<ul style="list-style-type: none"> <li>- Environmental Economist</li> <li>- Regional/environmental economist</li> <li>- Resource accounting</li> <li>- Environmental Institutions</li> </ul>	Adequate skills seem to be available for the current program.	Not applicable	None at present time
EA1AG	Some skills available in natural resource economics, involving "green issues". Several staff acquiring task management skills in this area.	Natural resource economist.	<ul style="list-style-type: none"> <li>- Expertise in social issues</li> <li>- Natural resource economists</li> </ul>	No plan to recruit additional staff as we have no vacancies.
EA1IE	Some staff have general knowledge about atmospheric pollution and effluent pollution.	<ul style="list-style-type: none"> <li>- Env specialist for managing EA, environmental tasks and sector studies.</li> <li>- Env. specialist for GEF/MP projects.</li> </ul>	<u>Technical Skills:</u> <ul style="list-style-type: none"> <li>- atmospheric pollution</li> <li>- effluent pollution</li> <li>- ecological aspects of hydropower projects</li> <li>- safety aspects of natural gas systems.</li> </ul>	Do not propose to recruit. Propose to train task managers for managerial skills listed above.
EA1IN	<ul style="list-style-type: none"> <li>- Expertise in sewage and sanitation</li> <li>- Rapidly increasing skill levels in solid waste management</li> <li>- Vehicular emission and noise pollution</li> <li>- Environmental impacts of highway construction and resettlement.</li> </ul>	<ul style="list-style-type: none"> <li>- An environmental economist</li> <li>- Sociologist (to be in EA1DR)</li> </ul>	None	Plan to recruit an economist with appropriate public economics background (when an opening occurs) to support the growing urban environmental portfolio.
EA1PH	<ul style="list-style-type: none"> <li>- Tropical health specialist</li> <li>- Population specialist</li> <li>- Architect</li> <li>- Educators (2)</li> <li>- Operations officer (2)</li> </ul>	Need for training for all task managers in division to increase their understanding of general environmental issues	Narrowly focussed skills required to tackle specific aspects of environmental issues in education and health projects.	No plans at present to recruit additional environmental staff.

## EA2 (China, Mongolia)

Division	Existing Environmental Skills	Most Urgently Needed Managerial and Technical Skills in Division	Skills needed to be located in the Technical Department	Plans for recruitment
EA2		-An industrial pollution control expert to be located in EA2IE or EA2EH. -An EA specialist.		No plans for recruitment in any division in EA2
EA2DR				No plans for recruitment
EA2CO				"
EA2AG	None specifically trained in environmental issues. But staff are experienced through project work in handling env issues.	- An ecologist (or some environmental training for EA2AG staff)		"
EA2IE	- Energy/environmental economist	- Env. specialist for GEF/MP projects.		"
EA2TP	None	- Transport environmental specialist	Additional support from ASTEN and consultants	"
EA2EH	- An environmental coordinator - 2 env engineers (water supply and waste water treatment) - Env economist (position vacant)	- Research assistant - Expertise in urban environmental management		"

EA3 (Fiji, Indonesia, Kiribati, Maldives, Papua New Guinea, Solomon Islands, Tonga, Vanuatu, Western Samoa)

Division	Existing Environmental Skills	Most Urgently Needed Managerial and Technical Skills in Division	Skills needed to be located in the Technical Department	Plans for recruitment
EA3	<ul style="list-style-type: none"> <li>- specialists in forestry, agriculture and watershed management</li> <li>- power engineer conversant with environmental issues</li> <li>- municipal engineer knowledgeable about water supply, sewerage and sanitation</li> </ul>		<ul style="list-style-type: none"> <li>- Expertise in urban and industrial pollution control</li> <li>- sociologist/anthropologist</li> </ul>	No immediate plans to recruit any of the three skills listed. Depending on reassignments in EA3EN, there may be scope to recruit a sociologist/anthropologist during the next 12-18 months.
EA3DR				
EA3EN				
EA3CO				
EA3AG	No specific environmental skills are currently available	Biodiversity specialist (to be funded under the GEF)	specialized technical assistance in ASTEN	No plans for recruitment
EA3IE				
EA3IN				
EA3PH				

Note: EA3 requirements override any indicated by divisions

SA1 (Bangladesh, Bhutan, Nepal)

Division	Existing Environmental Skills	Most Urgently Needed Managerial and Technical Skills in Division	Skills needed to be located in the Technical Department	Plans for recruitment
SA1DR				
SA1CI	Three staff members have experience in preparing/managing EAPs and ESPs. One task manager has been the task manager for an Industrial project which includes TA for strengthening pollution control guidelines and monitoring (with MEIP guidance in Sri Lanka)	Current staff complement will meet needs of pipeline.	Division will look for assistance from ASTEN and/or Consultants.	No plans for recruitment.
SA1AG	Staff do not have any special environmental skills beyond the common sense level		Environmental skills to be located in TD	No plans to recruit environmental staff
SA1IE	Staff have been monitoring EA process with support from ASTEN and outside consultants, and have developed reasonable experience in drafting TORs, reviewing and supervising EAs.		Environmental assistance from TD or from LT/ST consultants	No plans to recruit environmental staff
SA1PH	Staff deal with environmental issues through health, education and population projects.	Some training for staff in environment as it applies to education.	--	No plans to recruit environmental staff.

## SA2 (India)

Division	Existing Environmental Skills	Most Urgently Needed Managerial and Technical Skills in Division	Skills needed to be located in the Technical Department	Plans for recruitment
SA2	<p>7 individuals are currently assigned to work either full time or part time on a wide range of environmental and resettlement issues. Their skills mainly embrace financial, economic and social science disciplines.</p> <p>The dept regularly hires anthropologists, sociologists and env specialists as consultants to help with environment and resettlement work.</p>	<ul style="list-style-type: none"> <li>- Resource economist</li> <li>- 2/3 anthropologists/sociologists</li> <li>- environmental engineer</li> </ul>	--	<p>Planning to establish a new resettlement unit in New Delhi. Also considering a senior environmental officer in New Delhi office. If bilateral funding can be obtained, would like to add 2 environmental specialists -</p> <ul style="list-style-type: none"> <li>- a resource economist, and</li> <li>- an EA specialist -- in Washington.</li> </ul>
SA2DR				
SA2CI				
SA2AG				
SA2IN				
SA2EG				
SA2PH				

SA3 (Afghanistan, Pakistan, Sri Lanka)

Division	Existing Environmental Skills	Most Urgently Needed Managerial and Technical Skills in Division	Skills needed to be located in the Technical Department	Plans for recruitment
SA3DR				
SA3CI				
SA3AG	Has staff with experience in soil conservation, drainage, desalination, land restoration and reclamation, water conservation, multi-sectoral water allocation and water quality issues	Experts in rangeland management and crop ecology (could also be located in ASTAG if it is cost-effective)	Expertise in environmental law, environmental economics, biodiversity, environmental management and institutions (ASTEN).	No plans to recruit additional environmental staff
SA3EI	None of the staff are specifically trained in environmental issues. However, since many of the projects include environmental components, the staff have gained experience with the assistance of environmental specialists		<ul style="list-style-type: none"> <li>-Solid and hazardous waste disposal</li> <li>-waste water recycling</li> <li>-effluent treatment</li> <li>-air quality improvement/pollution control</li> <li>-land use planning/land reclamation</li> <li>-waterway cleanup</li> </ul>	No plans for the immediate future. An urban environmental specialist may be considered in the future should an expanded environmental program develop.
SA3PH				

SKILLS THAT SHOULD BE RESIDENT IN TECHNICAL DEPARTMENT

- Environmental law, environmental management and institutions.
- Expertise in social issues
- Environmental economists
- Technical skills in atmospheric pollution, effluent treatment, ecological aspects of hydropower projects, safety aspects of natural gas systems.
- Expertise in environmental issues related to transport.
- Expertise in urban and industrial pollution.
- Expertise in land use planning/land reclamation.
- Waterway cleanup
- Support for dealing with environmental issues in agriculture
- Expertise in biodiversity conservation.

ENVIRONMENT TEAM

FUNDED PRIMARILY FROM REGULAR BUDGET

Management and Administration

- \* Division Chief - Gloria Davis
- \* EA and Training Coordination - Jean Aden
- \* GEF Coordinator - Under Recruitment (Energy Economist)

Urban/Infrastructure/Water Resources

- \* Team Leader - Art Bruestle
- Bill Lane
- CH Zhang (1/2)

Industry/Energy

- \* Team Leader - Yaacov Ziv
- \* - Vacant
- Jack Fritz

Ecology/Biodiversity

- \* Team Leader - Colin Rees
- \* - Susan Shen

ASTEN ACTIVITIES FUNDED OFF BUDGET (Funding Source)

Metropolitan Environment Improvement Program (MEIP)

- \* Team Leader - David Williams
- Tom Walton (UNDP)
- CH Zhang (1/2 UNDP)

Regional and Global

- \* Biodiversity - Malcolm Jansen (GEF)
- Hemanta Mishra (Norway)
- Atmospheric Emissions - Todd Johnson (GEF)
- Jitu Shah (Norway)
- Katsunori Suzuki (GEF/Japan)

Regional Environment Initiative

- Carter Brandon (Norway)
- Ramesh Ramankutty (Norway)
- Salenna Wong (Norway)

\* Staff Positions



	FY 90-92		FY 93-95		Change	
	A	B	A	B	A	B
East Asia	16	60	32	56	16	-4
South Asia	9	36	15	51	6	15
TOTAL	25	96	47	107	22	11

ASIA REGIONS TECHNICAL DEPARTMENT

BUILDING SOCIAL CAPACITY IN THE EAST AND SOUTH ASIA REGIO

Goals and Objectives

1. To enable the Bank lending program to achieve its development objective by improving the social soundness and sustainability of projects.

Current Obligations and Resources Available

2. Operational Support. In the past two years, requests for support from the social team in ASTEN have expanded significantly, even though there have been only a limited number of social scientists available. Requests for operational support from the ASTEN social team and resources provided are shown in Table 2.

TABLE 2 - RESOURCES REQUESTED AND PROVIDED ON SOCIAL CONCERNS (SW)				
FISCAL YEAR	PLANNED (CAM)	ACTUAL (CAM)	EXTERNALLY FINANCED	TOTAL
FY91	126.9	112.8	0	113.8 ACTUAL
FY92	120	187.4	54.2 <sup>1</sup>	241.6 ACTUAL
FY93	169.6	NA	79.0 <sup>1</sup>	248.6 PLANNED

1/ These resources are primarily for WID and participation.

3. Requests to ASTEN for technical advice have expanded beyond support on resettlement to GEF Biodiversity projects, consultation with affected groups in the EA process, indigenous people's issues, gender and poverty issues, and social factors in natural resources management. The planned (CAMed) figure of 169.6 staff weeks (4 SY) for FY93 includes all social sectors covered by ASTEN: 47% is for resettlement, 35% for gender work, and 18% for participation and natural resource management.

4. ASTEN currently has four positions for social scientists: two for resettlement and two for WID. The CAM requests for operational support during FY93 require the full time services of these staff. The CAM does not provide for the important activities of developing and delivering in-country and in-Bank training, training new consultants for Bank missions, or for the analytical and planning work required to support poverty reduction, consultation and participation in project design, and in the social appraisal of projects. To partly meet the shortfall in resources, during FY91 and 92 ASTEN obtained \$200,000 from SIDA for support to task managers promoting People's Participation and \$380,000 from Norway for WID. Additional resources are being sought to support future activities.

Detailed Work Program

5. Resettlement. The South and East Asia Regions have 54 projects under implementation which have resettlement components. These projects will displace more than 1.2 million people. The FY93-95 pipeline currently contains 20 projects in South and East Asia which will displace another million people. However, experience within the Bank shows that the number of projects with resettlement and the number of affected people increases as projects move toward appraisal. Of the projects with resettlement (either under implementation or preparation) 24 are in China and 23 are in India, 27 are in all other countries combined. Past experience shows that at least four weeks per year per project is required to deal with resettlement issues, which means a total of 296 staff/consultant weeks at a minimum (seven staff years). At the present time, only 80 SW are allocated for this purpose from ASTEN.
6. Consultation and Participation. Consultation and participation are required (a) to identify the adverse impacts which projects may have on the affected people and to design measures for their mitigation; and (b) to take the views, ideas and culture of the people into consideration to improve developmental impact through project design and to ensure that projects are sustainable. There are a total of 55 category 'A' projects in South and East Asia Regions for environment assessment purposes. All require consultation with affected people during the EA process. To date the social team has assisted with review and preparation of terms of reference and the nomination of consultants, without CAM time for this purpose. Many projects also require participation at the preparation stages if they are to achieve their development objectives, for example, to ensure that the technology is appropriate, and the services to be provided are in forms compatible with, and desired by farmers and other beneficiaries. In the past year the social team has assisted twelve Task Managers to support people's participation in their projects through a grant from SIDA. This falls far short of the requests for support.
7. Indigenous Peoples and Tribal Issues. The importance of indigenous people in Bank work now extends beyond the requirements of OD 4.20 to forest dwellers in general, especially those in protected areas (20 projects to date). In addition, ASTEN staff are increasingly asked to assist in the development of projects which involve tribal peoples and ethnic minorities. The social team has also provided considerable support to both ESW and projects covering forestry, watershed protection and management of common property and marginal land. This work has been done primarily by consultants, with limited supervision from ASTEN.
8. Gender. A review of projects under implementation and those in the pipeline reveals a large number where attention to gender issues is important to project effectiveness. Out of 278 Asia Region projects which reached the implementation stage during the 1989-92 period, 144 contained specific measures or components for women. Eighty-nine of the 144 projects in the current pipeline (FY93-95) either already have WID interventions or present important opportunities for such interventions. The CDs are reasonably well staffed to handle WID issues in social sector projects, but their WID

expertise in the productive sectors - particularly in agriculture and resource management and in finance and enterprise development - is limited.

9. Poverty Reduction. Although poverty reduction is central to the Bank's mission, and covered by O.D. 4.15, ASTEN social staff have not been involved in work on poverty reduction to date. This is due to the fact that most staff time is spent on review and operational support of projects categorized as 'A' for EA purposes and resettlement. In the future, greater attention is needed to the involvement of social scientists in targeting projects to the poor, in promoting beneficiary participation, and in designing institutions for effective project delivery. The Regions need to strengthen capacity in this area.

#### Problem Areas

10. There are a number of problems which reduce ASTEN's effectiveness in supporting project work with a social dimension:

- (a) The number of staff, as noted, is inadequate to the range of tasks and volume of work.
- (b) The work of the ASTEN social team is 90% demand driven. Moreover, the demands of high profile projects with resettlement problems constantly assume priority over other projects. Staff therefore spend most of their time on resettlement and are unable to give other issues the attention they deserve.
- (c) 'A' category EA projects are given significant time, but the majority of 'B' and 'C' projects must be ignored. However, these projects contain the highest potential for poverty alleviation, planning through participatory design and for improving women's access to services and productive resources.
- (d) Given low staff numbers and the fact that most work must be CAMED, social staff do not have the opportunity to do the planning and training which would permit work to be devolved to the CDs.

11. The following strategy is intended to expand the Regions' capacity to deal with priority social concerns.

#### Improving Capacity to Deal with Social Concerns

12. The demands from the CDs for support on social issues are so large that priorities for attention must be clearly identified and changes must be made in the staffing and structure of the work program to meet these needs. In the short term, the social team must give priority to meeting the obligations imposed by operational directives on resettlement, consultation and on WID as a program of special emphasis. In the longer term, however, the team proposes to develop a program to promote beneficiary participation in project design and to support the Bank's poverty alleviation objectives more directly. In both cases the social team will focus on the institution development (formal and informal) which is critical to project success.

13. Resettlement. Over the past decade the Bank has developed detailed standards and procedures for resettlement. Therefore, where the volume of work justifies a full time specialist, this work can be devolved to the CDs provided positions can be allocated for this purpose. This would permit ASTEN staff to spend more time developing training materials for staff and line agencies, monitoring resettlement operations and providing analytical support. As 64% of projects with resettlement components are in China and India, these two CDs urgently require resettlement specialists. (Support would also be required from the social team.) Since other operations are scattered, technical specialists supporting the remaining CDs would most likely be located in the TD. To support this program, the social team would require one additional staff member with resettlement skills and additional financial resources for training.

As one example of the type of training materials needed, ASTEN is seeking \$150,000 to prepare a resettlement video. This video would cover Bank guidelines, consultation procedures, land acquisition, and reestablishment of the economic base of affected people. The video could be dubbed and used by staff, line agencies, NGOs and affected people who wanted to understand the guidelines and the options available.

14. Consultation, Participation and Social Design. In the short-term, ASTEN proposes to give priority to improving consultation in the environmental assessment process. A review of the work program indicates that from FY93-95 most EAs will occur in China (16), India (10) and Indonesia (11). During FY93, training programs for in-country and in-Bank training will be planned and organized and operational support provided for Environmental Assessment work in these countries. Most of the Departments have indicated that they would welcome such support. In FY94, this effort would be expanded to other countries. Training programs would also be designed to assist task managers to develop participatory projects. An appropriate methodology and procedures will be prepared during FY93. ASTEN is currently seeking bi-lateral support for the preparation of audio-visual training material and for supporting people's participation in project design and implementation.

15. Indigenous Peoples, Protected Areas and Natural Resource Management. If agreed by the Regions, ASTEN would hire one person in FY93 to assist Country Departments with projects involving indigenous people, tribal issues, and problems related to natural resource management. Priority would be given to support for GEF projects, of which 8 are currently under preparation and to projects with components subject to the new Indigenous Peoples OD. As time permits, this person would disseminate information on lessons learned and support emerging work on people's participation.

16. Gender and Poverty. In the short term, the Gender and Poverty team intends to consolidate ongoing work on agriculture, micro-enterprise

development and women's health. In each of these focal areas the strategy is to provide support to the CDs through a combination of operational support, conceptual leadership and training for regional staff, selected consultants and eventually, borrower governments. Financial resources are already available to support this work. In the longer term, the team intends to broaden its scope to address the social aspects of poverty. Low income households will remain as the starting point and the effort will be to learn what works to increase their access to productive resources and social services, with the strong presumption that many of the solutions developed to reach women are more broadly applicable to the poor.

Building on pilot work in Nepal, the Gender and Poverty team will undertake an assessment of financial service delivery systems in India and their ability to reach poor women in financially sustainable ways. The results will be used to improve the effectiveness of Bank lending in this sector. The team plans to extend this work to East Asia during FY 1994. The team will also prepare guidelines on enterprise development services for women in Asia in FY 1993 based on a completed review.

#### Procedures, Staffing and Structure

17. Procedures. At present there is no means of classifying projects with social impacts. As indicated in management's response to the Morse Commission, the social team will develop a system to identify and categorize projects with significant social impacts or requiring consultation with affected groups and/or people's participation in project design. This system will enable the team to review projects for applicability of ODs, WID and/or participation, and follow-up as appropriate with task managers. Follow-up activities could include:

- . Advice to TMs and assistance with project preparation.
- . Assistance to task managers with appraisal of projects for 'social soundness' and sustainability arising from participation.
- . Provision of training to Bank staff in areas where problems recur.
- . Maintenance of a roster of skilled consultants.
- . Preparation of guidelines on selected topics, as mentioned above.

18. Staffing and Other Resources Required. To support a minimum work program, six new positions are required. Of these at least one full time position for resettlement is needed in China and one or two in India (one in headquarters and another in the field). At least one resettlement position is needed in the TD to support other Departments. Positions are also needed in

ASTEN to support work on participation and indigenous people and eventually c. poverty (see proposed Staffing Sheet attached, Annex I). A potential candidate has been identified for China CD. These staff would need to receive adequate administrative and secretarial support.

19. The findings of the Independent Review Report have posed a challenge to the Bank. To meet this challenge effectively, there is a need for innovation changes in the ways of providing operational support to projects. Providing training to training institutions in borrower countries, holding interactive workshops for project managers in the Bank and in the borrower countries, and producing Videos on Bank procedures and lessons learned to be used in borrower countries are examples of such possible innovations. To act, the social team would need incremental financial resources totalling about \$564,000 (see Annex II). Funding would be sought from external sources to finance the other measures that would be introduced.

20. Structure. The Social Team in the Technical Department would be organized into three small subsections to correspond to divisions in the work program. These are:

- Resettlement
- Social Design
  - participation and consultation
  - indigenous people and natural resource management
- Gender and Poverty

All team members would cooperate in developing an integrated program on poverty and participation.

21. The Social Team could either be a unit in ASTEN or a new Division in the TD. There are several strong arguments for creating a Social Development Division. First, it would give a higher profile to social issues and have an important symbolic and substantive impact. Second, it would facilitate the development of appropriate procedures which could potentially be a model for the Bank. Third, it is likely to make it easier to mobilize resources internally and externally to support social initiatives. Finally, the span of control of ASTEN is already very broad and could become completely unwieldy with the addition of an expanded social team. The main drawback to two divisions would be reduced cross-fertilization between disciplines. A Division Chief and administrative staff would also need to be identified to support a work program of the size proposed.

PROPOSED STAFFING TO BUILD SOCIAL CAPACITY

Social Development Division

Vacant - Division Chief Staff\*

Social Design and Participation

David Butcher - Anthropologist Staff  
Vacant - Consultation Specialist Staff\*  
Vacant - Natural Resources/Indigenous People Staff\*

Resettlement

Ashraf Ghani - Anthropologist Staff  
Vacant - Resettlement Specialist Staff\*  
Sumila Gulyani - Planner LTC

Gender and Poverty

Lynn Bennett - Anthropologist Staff  
Rekha Dayal - WID Specialist Staff

SA2

Vacant - Resettlement Specialist Staff\*  
Vacant - Resettlement Specialist Staff\*

EA2

Vacant - Resettlement Specialist Staff\*

\* New Positions



**TRAINING BUDGET FOR SOCIAL DEVELOPMENT DIVISION FOR FY92-94**

	AMOUNT REQUESTED
<b><i>RESETTLEMENT</i></b>	
Video Production	\$150,000
Identification of Training Institutions	\$ 50,000
Workshops	\$300,000
<b><i>CONSULTATION AND PARTICIPATION</i></b>	
Workshops (In-house)	\$32,000
<b><i>GENDER AND POVERTY</i></b>	
Training	\$32,000
<b><i>TOTAL</i></b>	<b>\$564,000</b>

NOTE: External funds will requested to hold Workshops and Training under Consultation and Participation and Gender and Poverty.

THE WORLD BANK

<b>ROUTING SLIP</b>		DATE: 11/18/92	
<b>FROM THE VICE PRESIDENT, SECTOR AND OPERATIONS POLICY</b>			
NAME		ROOM NO.	
Mr. A. Karaosmanoglu			
Mr. S. Sandstrom			
Mr. E. Stern			
	APPROPRIATE DISPOSITION		NOTE AND RETURN
	APPROVAL		NOTE AND SEND ON
	CLEARANCE		PER OUR CONVERSATION
	COMMENT		PER YOUR REQUEST
	FOR ACTION		PREPARE REPLY
X	INFORMATION		RECOMMENDATION
	INITIAL		SIGNATURE
	NOTE AND FILE		URGENT
REMARKS:			
FROM: V. Rajagopalan		ROOM NO: S-13-131	EXTENSION: 33419



Chon

# OFFICE MEMORANDUM

DATE: November 18, 1992

TO: E. Jaycox (AFRVP); G. Kaji (EAPVP); J. Wood (SASVP); W. Thalwitz (ECAVP);  
C. Koch-Weser (MNAVP); S. Husain (LACVP)

FROM: V. Rajagopalan (OSPVP)

EXTENSION: 33419

SUBJECT: The Bankwide Review of Involuntary Resettlement in Projects:  
Initiating Memorandum

1. This is the Initiating Memorandum (IM) for the Bankwide Review (BR) of Bank projects with resettlement components.

2. **Background.** Management has decided to initiate several organizational and operational measures, in response to the Morse Independent Review report, to ensure adequate attention to projects in the current portfolio that entail resettlement, and also to benefit Bank work on forthcoming new projects with resettlement. Regarding the Bankwide resettlement review, management's response to the Board specified the following:

"...The Bankwide Resettlement Review. The Environment Department has been requested to carry out, in cooperation with all regions, a Bankwide analysis of all ongoing projects entailing resettlement, regarding quality and consistency of project implementation by the Borrower of the Loan and Credit agreements and Bank guidelines. A report, updating the 1986 review, to determine the extent to which post-1986 appraisal work and implementation assistance on R&R conforms to the Bank's operational directives, will be submitted to the management, and subsequently to the Board within about 12 months." (See Sec. M92-849, June 23, 1992)."

3. **Approach.** A draft approach paper for carrying out the BR was prepared by ENV, with input from regional staff, and circulated to all regional Vice Presidents for comments (see my memo to you dated September 24, 1992). We received valuable suggestions from all regions. The present Initiating Memorandum incorporates the comments and proposals received.

4. **Objectives.** The basic objective of the Bankwide review is to ensure the consistency of resettlement implementation with Bank policies and guidelines and with loan/credit agreements. It should provide consolidated information to management on the status of the Bank's resettlement portfolio, identify recurrent implementation issues, and make recommendations for further strengthening Bank work in this area. This exercise should: (a) provide operational support to resettlement operations in projects, through in-depth analysis carried out by the CDs with assistance from ENV and the regional Environment Divisions; (b) initiate improvements in implementation quality and performance, wherever needed, within the review period, through appropriate remedial actions; (c) help develop long-term institutional capacity, both in the borrowing countries and in the Bank, for addressing resettlement in a sound manner.

5. Timetable. The review starts with an initial desk assessment by each CD of their projects with resettlement components to develop the overall data base. This phase of the BR, in fact, has already commenced, through preliminary contacts between ENV and all regions. The review would then be continued at the field level through the normal project supervision process, benefiting from the one or two rounds of regular supervision missions that occur during the review period.
6. After the desk assessment, (Fall end-1992) an assessment would be made of the status of the resettlement components in the field during the first supervision round. The supervision missions would agree with borrowers on specific improvements, when needed, to be carried out over the next 5-6 months.
7. The subsequent supervision round (Spring 1993) would evaluate and report on the actual improvements achieved, as well as on outstanding issues, if any.
8. In-between the two supervision rounds, technical assistance to borrowers could also be arranged as needed by the relevant CDs for projects with major R&R operations. For some projects, a longer time frame than this one-year exercise may be needed to implement remedies in midstream, and the work would continue at the project level as necessary.
9. During the exercise, ENV would provide policy guidance and assistance to the regions, and prepare standardized indicators and data-formats for assessments of projects with resettlement. ENV would focus on cross regional and cross sectoral transfer of best practices and on the development of an inventory of innovative solutions to recurrent issues.
10. Based on information received from the regions, ENV would prepare an initial (progress) report to senior management at midterm (March 1993), and a final report at the review's end (September 1993), followed by a report from management to the Board.
11. Other activities. To achieve the broader goals pursued by management through this important exercise, the review and remedial actions would be supported in parallel by other activities such as: (a) courses and (b) contributions from relevant central departments, OED, and the Legal Department.
  - (a) Training. Stronger institutional capacity to deal with the complexities of resettlement will be developed through training and more effective dissemination of best practices. ENV and PMDTR will design and offer training courses for Bank staff working on resettlement. To assist borrowing agencies in projects with resettlement, EDI, in cooperation with ENV, will organize a program of courses for local project staff, as well as seminars for policy/decisionmakers in selected countries with large resettlement portfolios.
  - (b) Contributions from Central Departments. Inputs from central sectoral departments belonging to the Sustainable Development and Private Sector Development vice presidencies will be made on sector-specific resettlement issues since resettlement is part and parcel of lending in several sectors (agriculture, urban, industry and energy). In addition, OED will contribute to the overall review with lessons learned from past projects. LEG will analyze the adequacy and effectiveness of the resettlement-related legal provisions in the loan/credit agreements and the ways in which the Bank

helps developing legal frameworks for handling resettlement in borrowing countries.

12. **Working Arrangements.** All regions have designated the regional Environmental Division as their focal point for this review, to link with all regional CDs and with ENV. In addition, the Africa region has decided to create a working group on resettlement including representatives from relevant CDs. A special resettlement task force is being created in ENV, led by the senior sociology adviser, to coordinate the BR, link with the regions, and prepare the report to management and the Board.

13. Each region would work out its own review timetable to suit its overall program, taking care, however, to meet the overall Bank timetable (See Annex 1) for submitting the reports to management.

14. It is recognized that additional staff or consultant time (that was not anticipated at the beginning of this FY), will be required by this review. Each region may wish to put forward its own resource needs to management directly, if these needs cannot be absorbed within existing resources.

15. The list of key items for focusing the supervision missions' work, and standard project data-sheets on resettlement have already been shared by ENV with all regions in October, in order to ensure, consistency of data collection across regions. The regional environmental divisions are expected to work with the relevant CDs as required, and to contribute the following materials for ENV's preparation of the reports to management:

- (a) A regional aggregate of project data-sheets for all resettlement components, by December 15, 1992, and a first synthesis of substantive findings and issues after the first round of supervision missions, by January 15, 1993. These will serve as inputs into the first overall progress report to management (see para. 10 above). Guidance received at mid-point from management will inform the second part of the review. (Some regions have decided to include part of the resettlement information in their ARIS reports).
- (b) The final regional review syntheses will be prepared by all regions by May 15, 1993, based on the reports of the spring 1993 round of regular supervision. This will be the key input for the final overall report to management to be prepared by ENV.
- (c) The inputs from central sectoral departments, LEG and OED, will have completion dates, to be agreed upon between them and ENV.

16. A steering committee, consisting of the Directors of regional Technical Departments, the Director of ENV, and the social policy adviser in ENV, will guide the overall review work and will meet periodically, as necessary, to assess progress, issues, and results.

17. **Outcomes and Benefits.** The main expected benefits of the BR with respect to resettlement will be: (a) overall Bank/country portfolio quality improvement; (b) revisions in Bank policy, if needed; (c) better institutional capacity and better trained Bank staff, and borrower project staff; and (d) improved technical guidelines or instruments for operational work, for both staff and borrowers. The regional synthesis reports and consolidated data should directly serve regional managers in follow up work. The overall review report, to be submitted to senior

management and subsequently to the Bank's Board, will result in further guidance for addressing future Bank resettlement work.

cc: Messrs./Mmes. D. Ritchie (ASTDR); K. Cleaver (AFTDR); H. Kohli (EMTDR); E. Segura, S. Ayer (LATDR); J-H. Köpp (OEDDR); A Rigo (LEGOP); M. Petit (AGRDR); L. Pouliquen (INUDR); R. Stern (FPSIE); M. Cernea (ENVDR); A. Steer (ENVDR); R. Lynn (PBD)

Attachment: Annex I

**Summary Timetable\***

December 15, 1992	Project data-sheets aggregate from regions to ENV.
January 15, 1993	Preliminary regional reviews of resettlement portfolio to ENV.
March 1, 1993	First Progress Report from ENV to senior management.
May 15, 1993	Final regional reviews of resettlement portfolio to ENV.
June 15, 1993	Second Progress Report from ENV to senior management.
September 7, 1993	Final Bankwide Review report from ENV to senior management.
(to be determined) 1993	Bankwide Report to the Board.

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\* These are the key dates only. The deadlines for the inputs of the central sectoral departments, LEG, and OED, into the Bankwide review will be agreed upon between these units and ENV, depending on the time when various specific inputs are needed.

bcc: D. Mahar (LATEN); A. Seth (EMTEN); F. Falloux (AFTEN); M. Munasinghe (ENVPR); I. Newport (LEGSA); G. Davis (ASTEN); M. Koch-Weser (ENVAP); M. Cohen (INURD)

bcc: S. Guggenheim (ENVDR); D. Butcher, A. Ghani (ASTEN); W. Partridge (LATEN); C. Cook (AFTEN); A. Kudat (EMTEN); T. Serra (LATEN); S. Al-Habsy (LEGSA)



The World Bank

SVEN SANDSTRÖM  
Managing Director

11-18-92

Raj

Attila, Ernie and I agree with the attached. Please go ahead.

ENV and the Regions can, of course, come back later in the year and ask for budget support, but now is too early. (I suggest you copy the memo to PBD.)

If you feel a memo is required from Ernie or me to the RVPs in support of yours, please send a draft. At any rate, please send us copies of your final IM so that we can take this up during our weekly meetings with the RVPs.

Sven

## OFFICE MEMORANDUM

Draft

DATE: November 12, 1992

TO: E. Jaycox (AFRVP); G. Kaji (EAPVP); J. Wood (SASVP); W. Thalwitz (ECAVP);  
C. Koch-Weser (MNAVP); S. Husain (LACVP)

FROM: V. Rajagopalan (OSPVP)

EXTENSION: 33419

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"...The Bankwide Resettlement Review. The Environment Department has been requested to carry out, in cooperation with all regions, a Bankwide analysis of all ongoing projects entailing resettlement, regarding quality and consistency of project implementation by the Borrower of the Loan and Credit agreements and Bank guidelines. A report, updating the 1986 review, to determine the extent to which post-1986 appraisal work and implementation assistance on R&R conforms to the Bank's operational directives, will be submitted to the management, and subsequently to the Board within about 12 months." (See Sec. M92-849, June 23, 1992)."

3. Approach. A draft approach paper for carrying out the BR was prepared by ENV, with input from regional staff, and circulated to all regional Vice Presidents for comments (see my memo to you dated September 24, 1992). We received valuable suggestions from all regions, ~~for which we are grateful.~~ The present Initiating Memorandum incorporates the received comments and proposals, ~~into the approach adopted for this review.~~

4. Objectives. The basic objective of the Bankwide review is to ensure the consistency of resettlement implementation with Bank policies and guidelines and with loan/credit agreements. It should provide consolidated information to management on the status of the Bank's resettlement portfolio, identify recurrent implementation issues, and make recommendations for further strengthening Bank work in this area. This exercise should: (a) provide operational support to resettlement operations in projects, through in-depth analysis carried out by the CDs with ~~participation and~~ assistance from ENV and the regional Environment Divisions; (b) initiate ~~actual~~ ~~improvements in~~ implementation quality and performance, wherever needed, within the review period, through appropriate remedial actions; (c) help develop long-term institutional capacity, both in the borrowing countries and in the Bank, for addressing ~~unavoidable~~ resettlement in a sound manner.

5. Timetable. The review starts with an initial desk assessment by each CD of their individual projects with resettlement to ~~help~~ <sup>components</sup> develop the overall data base. This phase of the BR, in fact, has already commenced, through preliminary contacts between ENV and all regions. The review would then be continued at the field level through the normal project supervision process, benefiting from the one or two rounds of regular supervision missions that occur during the review period.

6. <sup>assessment</sup> ~~will be made of~~ <sup>would</sup> ~~supervise and assess~~ the status of the resettlement <sup>mission</sup> ~~component~~ in the field. The supervision mission <sup>will</sup> ~~will~~ agree with borrowers on specific improvements, when needed, to be carried out over the next 5/6 months.

7. The subsequent supervision round (Spring 1993) would evaluate and report on the actual improvements achieved, as well as on ~~any~~ outstanding issues, if any.

8. In-between the two supervision rounds, technical assistance to borrowers <sup>could</sup> ~~can~~ also be arranged as needed by the relevant CDs for projects with major R&R operations. For some projects, a longer time frame than this one-year exercise may be needed to implement remedies in midstream, and the work would ~~thereafter~~ continue at the project level as necessary.

9. During the exercise, ENV would provide policy guidance and <sup>assistance</sup> ~~operational support~~ to the regions, and prepare standardized indicators and data-formats for assessments of projects with resettlement. ENV would ~~place strong emphasis on~~ <sup>focus on</sup> cross regional and cross sectoral transfer of best practices and on the development of a ~~Bank~~ <sup>inventory</sup> of innovative solutions to recurrent issues.

10. Based on information received from the regions, ENV would prepare <sup>an</sup> ~~the~~ initial (progress) report to senior management at midterm (March 1993), and a final report at the review's end (September 1993), followed by a report from management to the Board.

11. Other activities. To achieve the broader goals pursued by management through this important exercise, the review and remedial actions would be supported in parallel by other activities such as: (a) courses and (b) contributions from relevant central departments, OED, and the Legal Department.

(a) Training. Stronger institutional capacity to deal with the complexities of resettlement will be developed through training and more effective dissemination of best practices. ENV and PMDTR will design and offer training courses for Bank staff working on resettlement. To assist borrowing agencies in projects with resettlement, EDI, <sup>with</sup> ~~from~~ ENV, will organize a program of courses for local project staff, as well as seminars for policy/decisionmakers in selected countries with large resettlement portfolios.

(b) Contributions from Central Departments. <sup>The</sup> ~~Inputs from central sectoral departments belonging to two thematic vice/presidencies (Sustainable Development and Finance and Private Sector)~~ <sup>Development</sup> will be made on sector-specific issues and adequate resettlement approaches in these domains, since resettlement is part and parcel of lending in several sectors (agriculture, urban, industry and energy). In addition, OED will contribute to the overall review with lessons learned from past projects. LEG will analyze the adequacy and effectiveness of the resettlement-related legal

provisions in the loan/credit agreements and the ways in which the Bank helps developing institutionalized frameworks for handling resettlement in borrowing countries.

12. Working Arrangements. All regions have designated the regional Environmental Division as their focal point for this review, to link with all regional CDs and with ENV. In addition, the Africa region <sup>has</sup> decided to create a working group on resettlement including representatives from relevant CDs. A special resettlement task force is created in ENV, led by the senior sociology adviser, to coordinate the BR, link with the regions, and prepare the report to management and the Board.

13. Each region would work out its own review timetable to suit its overall program, taking care, however, to meet the overall Bank timetable (See Annex 1) for submitting the reports to management.

14. It is recognized that additional staff or consultant time (that was not anticipated at the beginning of this FY), will be required by this review, ~~mandated by management and the Board~~. Each region ~~should~~ put forward its own resource needs to management directly, if these needs cannot be absorbed within existing resources.

15. The list of key items for focusing the supervision missions' work, and standard project data-sheets on resettlement ~~were~~ already shared by ENV with all regions in October, in order to ensure, ~~in essence~~, consistency of data collection across regions. The regional environmental divisions are expected to work with the relevant CDs as required, and to contribute the following materials for ENV's preparation of the reports to management:

- (a) a regional aggregate of project data-sheets for all resettlement components, by December 15, 1992, and a first synthesis of substantive findings and issues after the first round of supervision missions, by January 15, 1993. These will serve as inputs into the first overall progress report to management (see para. 10 above). Guidance received at mid-point from management will inform the second part of the review. (Some regions <sup>have</sup> decided ~~also~~ to ~~already~~ include part of the resettlement information ~~also~~ in their ARIS reports ~~in November 1992~~).
- (b) The final regional review synthesis will be <sup>3</sup> ~~readied~~ <sup>prepared</sup> by all regions by May 15, 1992, based on the reports of the spring 1993 round of regular supervision. This will be the key input for the final overall report to management to be prepared by ENV.
- (c) The inputs from ~~other~~ central sectoral departments, LEG and OED, will have ~~various~~ completion dates, to be agreed upon between them and ENV.

16. A steering committee, consisting of the Directors of regional Technical Departments, the Director of ENV, ~~and the lead advisor~~, will guide the overall review work and will meet periodically, as necessary, to assess progress, issues, and results.

17. Outcomes and Benefits. The main expected benefits of the BR will be: (a) overall Bank/country portfolio quality improvement; (b) revisions in Bank policy, if needed; (c) better institutional capacity and better trained Bank staff, and borrower project staff; and (d) improved technical guidelines or instruments for operational work, for both staff and borrowers. The regional synthesis reports and consolidated data <sup>should</sup> directly serve regional managers in follow up work.

The overall review report, to be submitted to senior management and subsequently to the Bank's Board, will result in further guidance for addressing complex resettlement work in Bank future activities.

cc: Messrs./Mmes. D. Ritchie (ASTDR); K. Cleaver (AFTDR); H. Kohli (EMTDR); E. Segura, S. Ayer (LATDR); J-H. Köpp (OEDDR); A Rigo (LEGOP); M. Petit (AGRDR); L. Pouliquen (INUDR); R. Stern (FPSIE)

cc: M. Cernea, A. Steer (ENVDR); D. Mahar (LATEN); A. Seth (EMTEN); F. Falloux (AFTEN); M. Munasinghe (ENVPR); I. Newport (LEGSA); G. Davis (ASTEN); M. Koch-Weser (ENVAP); M. Cohen (INURD)

cc: Guggenheim (ENVDR); D. Butcher, A. Ghani (ASTEN); W. Partridge (LATEN); C. Cook (AFTEN); A. Kudat (EMTEN); T. Serra (LATEN); S. Al-Habsy (LEGSA)

For information: I. Serageldin (ESDVP); A. Choksi (HRDVP); J-F. Rischard (FPSVP)

R&R Review File

Attachment: Annex I — >

## OFFICE MEMORANDUM

DATE: November 12, 1992

TO: E. Jaycox (AFRVP); G. Kaji (EAPVP); J. Wood (SASVP); W. Thalwitz (ECAVP);  
C. Koch-Weser (MNAV); S. Husain (LACVP)

FROM: V. Rajagopalan (OSPVP)

EXTENSION: 33419

SUBJECT: The Bankwide Review of Involuntary Resettlement in Projects  
Initiating Memorandum

11/17/92  
Sent to Sandstrom  
for info.  
PJC

1. This is the Initiating Memorandum (IM) for the Bankwide review (BR) of Bank projects with resettlement components.

2. Background. Management has decided to initiate several organizational and operational measures, in response to the Morse Independent Review report, to ensure adequate attention to projects in the current portfolio that entail population resettlement, and also to benefit Bank work on forthcoming new projects with resettlement. Regarding the Bankwide resettlement review, management's response to the Board specified the following:

"...The Bankwide Resettlement Review. The Environment Department has been requested to carry out, in cooperation with all regions, a Bankwide analysis of all ongoing projects entailing resettlement, regarding quality and consistency of project implementation by the Borrower of the Loan and Credit agreements and Bank guidelines. A report, updating the 1986 review, to determine the extent to which post-1986 appraisal work and implementation assistance on R&R conforms to the Bank's operational directives, will be submitted to the management, and subsequently to the Board within about 12 months." (See Sec. M92-849, June 23, 1992)."

3. Approach. A draft approach paper for carrying out the BR was prepared by ENV, with input from regional staff, and circulated to all regional Vice Presidents for comments (see my memo to you dated September 24, 1992). We received valuable suggestions from all regions, for which we are grateful. The present Initiating Memorandum incorporates the received comments and proposals into the approach adopted for this review.

4. Objectives. The basic objective of the Bankwide review is to ensure the consistency of resettlement implementation with Bank policies and guidelines and with loan/credit agreements. It should provide consolidated information to management on the status of the Bank's resettlement portfolio, identify recurrent implementation issues, and make recommendations for further strengthening Bank work in this area. This exercise should: (a) provide operational support to resettlement operations in projects, through in-depth analysis carried out by the CDs with participation and assistance from ENV and the regional Environment Divisions; (b) initiate actual improvements in implementation quality and performance, wherever needed, within the review period, through appropriate remedial actions; (c) help develop long-term institutional capacity, both in the borrowing countries and in the Bank, for addressing unavoidable resettlement in a sound manner.

5. **Timetable.** The review starts with an initial desk assessment by each CD of their individual projects with resettlement to help develop the overall data base. This phase of the BR, in fact, has already commenced, through preliminary contacts between ENV and all regions. The review would then be continued at the field level through the normal project supervision process, benefiting from the one or two rounds of regular supervision missions that occur during the review period.

6. After the desk assessment, the first supervision round (Fall end-1992) would supervise and assess the status of the resettlement component in the field. The supervision mission will agree with borrowers on specific improvements, when needed, to be carried out over the next 5-6 months.

7. The subsequent supervision round (Spring 1993) would evaluate and report on the actual improvements achieved, as well as on still outstanding issues, if any.

8. In-between the two supervision rounds, technical assistance to borrowers can also be arranged as needed by the relevant CDs for projects with major R&R operations. For some projects, a longer time frame than this one-year exercise may be needed to implement remedies in midstream, and the work would thereafter continue at the project level as necessary.

9. During the exercise, ENV would provide policy guidance and operational support to the regions, and prepare standardized indicators and data-formats for assessments of projects with resettlement. ENV would place strong emphasis on cross regional and cross sectoral transfer of best practices and on the development of a Bank inventory of innovative solutions to recurrent issues.

10. Based on information received from the regions, ENV would prepare the initial (progress) report to senior management at midterm (March 1993), and a final report at the review's end (September 1993), followed by a report from management to the Board.

11. **Other activities.** To achieve the broader goals pursued by management through this important exercise, the review and remedial actions would be supported in parallel by other activities such as: (a) courses and (b) contributions from relevant central departments, OED, and the Legal Department.

(a) **Training.** Stronger institutional capacity to deal with the complexities of resettlement will be developed through training and more effective dissemination of best practices. ENV and PMDTR will design and offer training courses for Bank staff working on resettlement. To assist borrowing agencies in projects with resettlement, EDI, with cooperation from ENV, will organize a program of courses for local project staff, as well as seminars for policy/decisionmakers in selected countries with large resettlement portfolios.

(b) **Contributions from Central Departments.** Inputs from central sectoral departments belonging to two thematic vice presidencies (Sustainable Development and Finance and Private Sector) will be made on sector-specific issues and adequate resettlement approaches in those domains, since resettlement is part and parcel of lending in several sectors (agriculture, urban, industry and energy). In addition, OED will contribute to the overall review with lessons learned from past projects. LEG will analyze the adequacy and effectiveness of the resettlement-related legal

provisions in the loan/credit agreements and the ways in which the Bank helps developing institutionalized frameworks for handling resettlement in borrowing countries.

12. **Working Arrangements.** All regions have designated the regional Environmental Division as their focal point for this review, to link with all regional CDs and with ENV. In addition, the Africa region decided to create a working group on resettlement including representatives from relevant CDs. A special resettlement task force is created in ENV, led by the senior sociology adviser, to coordinate the BR, link with the regions, and prepare the report to management and the Board.

13. Each region would work out its own review timetable to suit its overall program, taking care, however, to meet the overall Bank timetable (See Annex 1) for submitting the reports to management.

14. It is recognized that additional staff or consultant time (that was not anticipated at the beginning of this FY), will be required by this review, mandated by management and the Board. Each region should put forward its own resource needs to management directly, if these needs cannot be absorbed within existing resources.

15. The list of key items for focusing the supervision missions' work, and standard project data-sheets on resettlement were already shared by ENV with all regions in October, in order to ensure, in essence, consistency of data collection across regions. The regional environmental divisions are expected to work with the relevant CDs as required, and to contribute the following materials for ENV's preparation of the reports to management:

- (a) a regional aggregate of project data-sheets for all resettlement components, by December 15, 1992, and a first synthesis of substantive findings and issues after the first round of supervision missions, by January 15, 1993. These will serve as inputs into the first overall progress report to management (see para. 10 above). Guidance received at mid-point from management will inform the second part of the review. (Some regions decided also to already include part of the resettlement information also in their ARIS reports in November 1992).
- (b) The final regional review synthesis will be readied by all regions by May 15, 1992, based on the reports of the spring 1993 round of regular supervision. This will be the key input for the final overall report to management to be prepared by ENV.
- (c) The inputs from other central sectoral department, LEG and OED, will have various completion dates, to be agreed upon between them and ENV.

16. A steering committee, consisting of the Directors of regional Technical Departments, the Director of ENV, and the lead advisor, will guide the overall review work and will meet periodically, as necessary, to assess progress, issues, and results.

17. **Outcomes and Benefits.** The main expected benefits of the BR will be: (a) overall Bank/country portfolio quality improvement; (b) revisions in Bank policy, if needed; (c) better institutional capacity and better trained Bank staff, and borrower project staff; and (d) improved technical guidelines or instruments for operational work, for both staff and borrowers. The regional synthesis reports and consolidated data will directly serve regional managers in follow up work.



The overall review report, to be submitted to senior management and subsequently to the Bank's Board, will result in further guidance for addressing complex resettlement work in Bank future activities.

cc: Messrs./Mmes. D. Ritchie (ASTDR); K. Cleaver (AFTDR); H. Kohli (EMTDR); E. Segura, S. Ayer (LATDR); J-H. Köpp (OEDDR); A Rigo (LEGOP); M. Petit (AGRDR); L. Pouliquen (INUDR); R. Stern (FPSIE)

cc: M. Cernea, A. Steer (ENVDR); D. Mahar (LATEN); A. Seth (EMTEN); F. Falloux (AFTEN); M. Munasinghe (ENVPR); I. Newport (LEGSA); G. Davis (ASTEN); M. Koch-Weser (ENVAP); M. Cohen (INURD)

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For information: I. Serageldin (ESDVP); A. Choksi (HRDVP); J-F. Rischard (FPSVP)

R&R Review File

Attachment: Annex I

**The World Bank**

Washington, D.C. 20433

U.S.A.

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FAXED EARLIER TODAY

October 29, 1992

OFFICE OF THE OSPVP  
SECTOR & OPERATIONS POL.

ERNEST STERN  
Managing Director

Mr. Rajagopalan

1. Thank you for your note of 10/23 on the resettlement review.
2. I certainly agree that this review cannot exceed 12 months. In practice, I would suggest that we schedule the final draft for Senior Management review no later than September 7, 1993. This, of course, will be preceded by staff and regional reviews. I believe that the basic objective of the review is to focus on the 102 projects in the portfolio, identify any problems, and indicate the status of remedial action. I would like to have from you a date by which an initial management information report can be provided. I would assume that this is, by now, readily available or can soon be.
3. I am not sure why the 57 projects in the immediate pipeline should be part of this review. Presumably, guidelines are adequate and Regional Loan Committee meetings should be adequate fora for reviewing compliance.
4. If the focus of the review is the existing pipeline, and its problems, we need not delay completion pending remedial action. This will not be explained easily to the Board. It may be, however, that some field work is necessary to get a clear definition of the problem(s). That, however, should be done by the Regions and not by the Task Force. We can discuss this further on my return.
5. Re the staff issues, I agree with your approach in paragraph 7. No doubt, Regions will wish to reassess their needs in light of recent staffing changes.
6. Re the budget issue in paragraph 5, I should have thought most regional costs are small enough to be absorbed. OSP costs may be reduced, in light of above and, no doubt, ENV has redeployment capacity. However, I am not opposed, in principle, to modest use of CF. Please initiate discussion with PBD so they can prepare recommendation for consideration.

Ernest Stern



The World Bank  
Washington, D.C. 20433  
U.S.A.

ERNEST STERN  
Managing Director

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October 29, 1992  
OFFICE OF THE OSPVP  
SECTOR & OPERATIONS PCL.

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Ernest Stern


THE WORLD BANK

ROUTING SLIP		DATE: Oct. 29, 1992
FROM THE VICE PRESIDENT SECTOR AND OPERATIONS POLICY		
NAME		ROOM NO.
Mr. M. El-Ashry		
cc: M. Cernea		
APPROPRIATE DISPOSITION	NOTE AND RETURN	
APPROVAL	NOTE AND SEND ON	
CLEARANCE	PER OUR CONVERSATION	
COMMENT	PER YOUR REQUEST	
<input checked="" type="checkbox"/> FOR ACTION	PREPARE REPLY	
INFORMATION	RECOMMENDATION	
INITIAL	SIGNATURE	
NOTE AND FILE	URGENT	
REMARKS:		
Please prepare preliminary outlines for use in initiating discussions with PBD.		
PREPARED BY:	V. Rajagopalan	513-131
EXTENSION:		33419

## OFFICE MEMORANDUM

DATE: October 23, 1992

TO: Mr. Ernest Stern, EXC

FROM: V. Rajagopalan, OSPVP 

EXTENSION: 33419

SUBJECT: Bankwide Resettlement Review  
Resources Needed

1. Following your June 25 memo to regional VPs (attached), and the Management's response to the Board on the Morse Review (para. 10a), ENV has prepared a draft approach paper for the Bankwide resettlement review. All regional VPs were consulted, and the approach paper was also extensively discussed at the working levels between ENV and relevant regional staff. Agreement was reached with all regions. The formal Initiating Memorandum will go out next week.

2. In practical terms, the review has in fact started. The initial tally identified 102 projects with resettlement in the portfolio currently under implementation. An additional new 57 projects with resettlement impact are now in the immediate project pipeline for FY93-95; there are also 8 GEF projects under preparation that involve resettlement. An OSP-interregional working group was created for this review, led by Mr. Cernea. Outgoing SPN missions and TMs are being directed to include resettlement issues in their TORs for the current/next supervision round, wherever appropriate.

3. Two recurrent issues have been raised by all regions and require your guidance:

- (a) duration of review: several regional managers feel that in order to obtain the desired improvements in R&R prior to the report for the Board, more than 12 months may be necessary;
- (b) resources: all regions pointed out that they are under-staffed for resettlement work. They specified: (i) the resources they need immediately for the corrective review exercise, and (ii) the resources needed for long term regular work on resettlement.

4. On duration, we took the position that 12 months from now should be enough to achieve progress and correction in many problem projects. ENV's report will reflect progress achieved by the 12 month deadline, and that the remedial work **would continue** after the report's submission, with possibly an updating report in Spring 1994.

5. On resources, the short term Bankwide needs for carrying out the intensified review and remedial work amount to some 6.6 incremental staff years, to be used over the following 12 months. The bulk of this additional time (4.5 staff years) will consist of intensified operational work and increased technical assistance to borrowers for improving R&R at project level, provided primarily through specialized consultants. By regions, the breakdown of these requests is: LAC and Africa - one staff year each; South and East Asia - 16 months together; MENA - 6 staff months; and ENV - three staff years for review coordination, analysis, preparing reports to management and the Board, and operational support to regions. In financial terms, this amounts to some \$1.6 million.

6. Regarding long term resource needs, your memo also requested all CDs to "ensure that our evolving understanding of the complexity of such operations (resettlement and environment) is appropriately reflected in our staffing patterns" and, specifically, to inform management on the adequacy of their current technical staff to handle the current and prospective portfolio of such projects. I received responses from all CDs and the initial request for resettlement was for 15 new staff positions, with the following breakdown: South Asia and East Asia - 3 each; ECA, MENA, LAC and ENV - 2 each; Africa - 1.

7. After my September 16, 1992 EM to you, we re-examined these responses with the regions. It appears that 10 new positions instead of 15 could meet the key immediate needs, distributed as follows: LAC, Africa, MENA, and ECA - one each; South Asia, East Asia, and ENV - 2 each. These are needs for staff in CDs or TDs, not consultants. Subject to senior management agreement, these could be phased in during the next two years through the normal budget process.

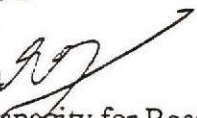
8. Immediate action needed now concerns the Bankwide review. We are not in a position to determine the feasibility for redeployment within the regions, but are concerned that this important review-cum-corrective exercise you requested may not be completed in reasonable time or with the degree of quality needed unless the estimated short term resources are made available through the President's contingency fund. A comparable recent precedent was the mid-year introduction of EAs, when \$3.5 million was approved from the President's contingency fund to meet immediate needs, before phasing the EA work into the following year's budget exercise.

9. Our estimate is that \$1.6 million would be required now for short term needs, including salaries, support and mission travel costs, basically for consultants, plus a minimum of one regular staff slot to be approved for immediate allocation and use in ENV. (The Morse review entailed a cost of some \$1 million for only one project with resettlement; the Bank review will cover the entire portfolio).

10. The regions' staffing requests for long term needs for resettlement and environment could be considered and resolved separately, but also before long, preferably in the context of the ongoing rearrangements in TDs and the new central vice presidencies.

cc: Messrs. M. El-Ashry, Cernea (ENVDR)

# OFFICE MEMORANDUM

DATE: June 25, 1992  
TO: Distribution  
FROM: Ernest Stern   
SUBJECT: Technical Capacity for Resettlement and Environment

1. As you know, in the response to the Report of the Independent Commission on Narmada, we have committed ourselves to a review of all projects in the portfolio which involve resettlement. The Environment Department is responsible for this review which is to be available, in draft, early in 1993. The review will depend on the full cooperation of your staff.
2. We have also committed to a review by each Country Department of the adequacy of their technical staff to handle the current and prospective portfolio of projects with resettlement and environment impact. Please arrange for that appraisal expeditiously and forward your conclusions and recommendation to Mr. Rajagopalan, with a copy to Mr. El-Ashry, by August 30, 1992. Portfolios are diverse and there is no presumption that current units are inadequate as to size and composition. However, we would like to be sure that our evolving understanding of the complexity of such operations is reflected appropriately in our staffing patterns.

Distribution: Messrs. Husain, Kaji, Koch-Weser, Jaycox, Thalwitz

cc: Messrs. Alisbah, Wood, Rajagopalan, Wyss, El-Ashry

# OFFICE MEMORANDUM

DATE: September 24, 1992

TO: Messrs. S. Husain (LACVP); G. Kaji (EAPVP); C. Koch-Weser (MNAVVP); K. Jaycox (AFRVP);  
W. Thalwitz (ECAVP); J. Wood (SASVP)

FROM: V. Rajagopalan, OSPVP



EXTENSION: 33419

SUBJECT: Bankwide Review on Resettlement

1. As you know, among the measures taken to respond to the Morse Report on Narmada, Bank senior management has requested the Environment Department to carry out, in cooperation with the regions, an analysis of all ongoing projects entailing resettlement with respect to the quality of project implementation by the borrower, and the consistency of project implementation with the Bank's resettlement guidelines and loan/credit agreements. A report on that review will be submitted to Management, and subsequently to the Board. More details about the actions decided by senior management are in the document issued by the Secretary (No. M92-849, June 23, 1992).
2. The Environment Department has prepared the attached proposed working arrangements for this review. I should be grateful for any feedback and suggestions you may have before we finalize these proposals.
3. I would appreciate receiving comments from your region by October 2, with a copy to Mr. El-Ashry. Thank you.

cc: Messrs. Sandstrom, Stern (EXC); El-Ashry (ENVDR)

Attachment



## OFFICE MEMORANDUM

DATE: September 24, 1992

TO: Mr. V. Rajagopalan, OSPVP

FROM: Mohamed T. El-Ashry, ENVDR *MTE*

EXTENSION: 33202

SUBJECT: The Bankwide Review of Resettlement

1. Background. Senior management informed the Board of its decision to initiate a set of Bankwide remedial actions on resettlement in response to the Morse Review (see Management Response to the Board, Sec.M92-849, June 23, 1992). Management committed to a Bankwide analysis of all projects with resettlement, and has asked ENV to carry it out, in cooperation with the regions. This review is intended to update the management's 1986 resettlement review and corrective actions exercise, which achieved a considerable improvement of the project portfolio. Progress and final reports on the new review will be submitted to Bank senior management within one year. Subsequently, Management will present a report on the resettlement review to the Board.
2. Objectives. Management has indicated that the objective of the Bankwide review is to ensure the consistency of resettlement implementation with Bank policies and guidelines and with loan/credit agreements. It should provide consolidated information to management on the status of the Bank's resettlement portfolio, including projects in the pipeline. The exercise should: (a) be an in-depth analysis carried out primarily by the CDs themselves, with participation and assistance from ENV and the regional Environment Divisions; and (b) initiate actual improvements in project quality, whenever needed, within the review period, through defining appropriate remedies and implementing them.
3. We propose the following review process and work arrangements for carrying out this exercise. In this, we have had preliminary consultations with our regional and legal colleagues.
4. Timetable. The review would start with an initial desk assessment and analysis by each CD on a project-by-project basis. The review would then be continued at the field level through the normal project supervision process, focusing on the next two rounds of regular supervision missions that will occur during this period. After the desk assessment, the first supervision round (Fall 1992) would analyze the situation in the field and agree with borrowers on specific remedies, when needed, to be carried out over the next 5-6 months. The subsequent supervision round (Spring 1993) would evaluate and report on progress in implementing the remedies and on the actual improvements achieved. Based on information received from the regions, ENV would prepare the initial (progress) report to senior management at midterm, and a final report at the end, followed by a report from management to the Board.
5. During the exercise, ENV would provide policy guidance and prepare standardized indicators and data-formats for assessments of projects with resettlement. ENV would place strong emphasis on cross regional and cross sectoral transfer of best practices and on the development of a Bank inventory of innovative solutions to recurrent issues.
6. In parallel, the review and remedial exercise would be supported by other activities such as: (a) training courses on resettlement for Bank staff; (b) contributions from relevant sectoral OSP departments, OED, and the Legal Department; and (c) training for borrowers to be offered by EDI. Working/organizational arrangements are suggested below.

7. Working Arrangements. To carry out this exercise, it is suggested that an ad hoc working group on resettlement (RG) be created in each region, led by the regional TD director, and comprising the RED Chief and representatives of relevant CDs. A resettlement work group would be created in ENV to link with the regions and to provide assistance as required. Each region would work out its own timetable to match the overall Bank timetable for submitting the reports to management. Each RG would carry out the initial project-by-project review and would prepare the data sheets and initial regional report on the region's portfolio, SPN missions, and measures initiated with borrowers. These reports will be inputs into ENV's Bankwide initial report to management. After the next supervision round (Spring 1993) and based on the SPN reports about actual improvements, best practices, innovations, etc., the RGs would prepare the phase II regional reports, to serve as inputs into the final consolidated report to management.

8. In between the two supervision rounds, technical assistance to borrowers can also be arranged as needed by the relevant CDs and RGs, for projects with major R&R operations. For some projects, a longer time frame than this one year exercise may be needed to implement remedies in midstream and the work would therefore continue at the project level as necessary.

9. Projects now in the pipeline (forthcoming in FY94-96) with significant resettlement components would also be covered by the review, as a specific subcategory. In this case, attention would be focused on adequate preparation and preappraisal of the R&R component.

10. Cooperation with Central Departments. Contributions from the central sectoral departments, plus Legal and OED, are needed on sector-specific issues and adequate R&R approaches in those domains, as inputs into the overall Bank report to management. During this exercise, it would be important to engage the participation of OSP departments directly, since resettlement is part and parcel of lending for these sectors. The relevant central departments are INU, AGR, IEN. In addition, important inputs are needed from OED on lessons learned from past projects and from LEG on the R&R provisions in the legal loan/credit agreements.

11. Special training activities will be set up to parallel the above project-focused work. Training for Bank staff working on resettlement will be designed and offered by PMDTR jointly with ENV. In turn, EDI, with assistance from ENV, will organize courses for borrower project staff, and for policy/decision makers in countries with large resettlement portfolios.

12. Outcomes. The main expected benefits of the review will be: (a) overall Bank/country portfolio improvement; (b) revisions in Bank policy, if needed; (c) better trained Bank staff and borrower project level staff; and (d) improved technical guidelines or instruments for operational work for staff and borrowers. The key specific products will be the three reports to senior management and the Board, which will synthesize the portfolio analysis, the Bankwide remedial process, and the improvements achieved. The regional synthesis reports and consolidated data will serve regional managers in follow up work.

13. We should be grateful for guidance from you and the Regional Vice Presidents on the above proposed approach. An action plan would then be prepared.

14. We propose that the formal Initiating Memorandum for this exercise be sent out in early October.

cc: Messrs. Steer, Cernea (ENVDR)

A L L - I N - 1    N O T E

DATE: 16-Sep-1992 06:04pm

TO: Ernest Stern ( ERNEST STERN )

FROM: V. Rajagopalan, OSPVP, OSPVP ( V. RAJAGOPALAN, OSPVP )

EXT.: 33419

SUBJECT: Technical Capacity for Resettlement and Environment

1. We have received responses from the Regions to your June 25, 1992 memorandum on the above. The submissions are of varying quality, and we are following up with bilateral meetings with Regional representatives to firm up the estimates.

2. The preliminary outcome is that 12-13 additional technical staff members are desired for social analysis, and 29 for environmental impact analysis. In some instances, these increases can be met through redeployment of staff from other activities. But the Regions argue that they will need incremental resources to meet the demands being placed on them.

3. The Regional breakdown is as follows:

	<u>Social</u>	<u>Environmental</u>
Africa	1	7
East Asia	3	11
South Asia	3	7
ECA	2	--
MNA	1-2	--
LAC	2	4
-----	-----	-----
Total	12-13	29

4. Meanwhile, we are preparing the draft Action Plan for the Bankwide Review of the Resettlement Portfolio. The Initiating Memorandum will be available for your review in October.

CC: Sven Sandstrom ( SVEN SANDSTROM )

CC: Mohamed T. El-Ashry ( MOHAMED T. EL-ASHRY )

The World Bank/IFC/MIGA  
O F F I C E M E M O R A N D U M

DATE: September 21, 1992 07:37pm

TO: Sven Sandstrom ( SVEN SANDSTROM )

FROM: V. Rajagopalan, OSPVP, OSPVP ( V. RAJAGOPALAN, OSPVP )

EXT.: 33419

SUBJECT: RE: Technical Capacity for Resettlement and Environment

Sven,

The short answer to your question is that East Asia has fully twice as many category A projects (scheduled for FY93-95) as Africa or South Asia. Of course, there are other differences as well, which we will be sorting out in our bilateral meetings.

Raj

CC: Mohamed T. El-Ashry  
CC: Joanne Salop

( MOHAMED T. EL-ASHRY )  
( JOANNE SALOP )

## OFFICE MEMORANDUM

MR. RAJAGOPALAN  
SIB-131

RECEIVED

001

92 SEP 11 AM 10: L

OFFICE OF THE OSPVP  
SECTOR & OPERATION POL.

/ Lec: JS

DATE: September 10, 1992

TO: Distribution

FROM: D. Joseph Wood, Vice President, SASVP  
Gautam S. Kaji, Vice President, EAPVP

EXTENSION: 81429 and 81384

SUBJECT: Social Capacity

1. The Asia Regions have recently reviewed their capacity to deal with environment and social issues. Our findings have been communicated to Mr. Rajagopalan. In light of this analysis, we are seeking your agreement to move immediately to strengthen our capacity to deal with social concerns. This note provides the rationale for this action and sets out the resources required. A background paper is attached.

2. The social dimensions of our work are increasing. The two Asia Regions currently have 74 projects with resettlement components (under preparation and implementation) and these projects will relocate more than two million people. We are mandated to carry out consultation in the environmental assessment process and we have 55 "A" projects in which this must be done. The Regions have nearly 90 projects with WID components and new operational directives on "tribal" people raise issues on the treatment of indigenous and isolated people in Bank and GEF projects. Participation to improve the social soundness of Bank projects and to improve their sustainability is also a matter of growing concern, and the recently issued O.D. 4.15 on poverty reduction is placing new demands on our staff for attention to social factors in project design.

3. To address these issues, the ASTEN social team currently includes two technical staff working on resettlement and two on gender issues. This is simply inadequate to the task. To build regional capacity to take social issues into account in project design and implementation, we propose to create a Social Development Division within the Asia Technical Department. This Division would provide technical support to the Country Departments and it would help the CDs improve borrower capacity to deal with resettlement, consultation, participation and other social concerns. To provide the necessary support, we propose to add six additional positions to cope with the growing volume of work. Of these, three positions would be located in the Social Development Division and three in the India and China Country Departments. A breakdown of staff needs is shown in the attached table. Three positions would be allocated from within our existing staff complement, and we are requesting three additional positions with a budget from the President's contingency fund.

4. The new Social Development Division would be expected to develop a proactive program to deal with social issues. For example, the team would develop a resettlement video with segments on Bank guidelines, consultation, land acquisition and income restoration. This video would be used as a tool for training Bank staff and Government officials and it

could be dubbed in local languages to facilitate communications with local level officials, affected people and community based NGOs. We estimate that the cost of developing and distributing this video would be about \$350,000 and the cost of developing training materials in other social sectors about \$150,000, or \$500,000 to be spent mainly in FY93. We are now requesting \$350,000 from the President's contingency fund to enable us to proceed immediately with the resettlement component. Additional resources for work on participation and WID would be mobilized from external sources.

5. Anticipating a favorable decision, we have already contacted Ian Scott to request the support of ORG. If a decision could be taken quickly we would suggest announcing the formation of this Division and the provision of incremental positions and financial resources at the Board discussions on Narmada, now scheduled for October 1. We would be grateful for your early consideration to this request.

Attachment

Distribution:

Messrs. Rajagopalan (OSPVP), Stern (EXC), Eccles (CTRVP)

GDavis:mld

ATTACHMENT I

<i>SOCIAL STAFF NEEDED TO SUPPORT THE ASIA REGIONS</i>		
<i>SOCIAL DEVELOPMENT DIVISION</i>	<i>EXISTING POSITIONS</i>	<i>NEW POSITIONS</i>
Resettlement Specialist	2	1
Consultation/Participation		1
Indigenous People and Natural Resource Management		1
Gender/WID	2	
<i>INDIA COUNTRY DEPARTMENT</i>		
Resettlement Specialist		2
<i>CHINA COUNTRY DEVELOPMENT</i>		
Resettlement Specialist		1
<b>TOTAL</b>	4	6

## ASIA REGIONS TECHNICAL DEPARTMENT

### BUILDING SOCIAL CAPACITY IN THE EAST AND SOUTH ASIA REGIONS

#### Overview and Conclusions

i. Work on social issues in projects in Asia is increasing. The two Asia Regions currently have 54 projects under implementation and 20 in the pipeline which involve the resettlement of over 2.2 million people. There are 55 projects of environmental category 'A' which require consultation with affected groups in the EA process, and an increasing number of projects affecting indigenous people. Participation to improve the social soundness of projects and to improve their sustainability is also a matter of growing concern, the recently issued OD 4.15 on Poverty Reduction and the emphasis on participation and WID or gender matters is also placing new demands on the Regions for attention to social issues.

ii. The ASTEN social team has two anthropologists working mainly on resettlement, and two staff working on WID. This is inadequate to the task. To build capacity to take social issues into account in project design and implementation, the attached paper proposes to establish a Division for Social Development within the Technical Department. A strategy similar to that used in environment whereby skills and experience would be built-up initially in the Social Division and progressively devolved to the CDs. The India and China Departments would be encouraged from the start to recruit resettlement experts.

iii. There are several strong arguments for a Social Division. First, it would give a higher profile to social issues and have an important symbolic and substantive impact. Second, it would facilitate the development of appropriate procedures which could potentially be a model for the Bank. Third, it is likely to make it easier to mobilize resources internally and externally to support social initiatives. Finally, the span of control of ASTEN is already extremely broad and could become unwieldy with the addition of an expanded social team. The main drawback to two divisions would be reduced cross-fertilization between disciplines, however, the Social Division could provide support to ASTEN as required. A level 26 Division Chief would also need to be identified to support a work program of the size proposed (approximately ten staff and consultants).

iv. To provide the necessary support, the Social Division would need three additional positions (one each for resettlement, indigenous people, consultation and participation) and two to three resettlement specialists need to be recruited by the India and China Departments. The new Social Division would also require the time and resources to develop a proactive program to deal with social issues. To this end the Social Team has requested financial resources to develop a resettlement video which explains Bank procedures and could be used with borrowers, NGOs and affected people. It also proposes a series of workshops to be held initially in India and China on resettlement and consultation. This program would be extended to other CDs in subsequent years. Additional financial resources could potentially be mobilized from bi-lateral funders for work on participation and WID.



ASIA REGIONS TECHNICAL DEPARTMENT

BUILDING SOCIAL CAPACITY IN THE EAST AND SOUTH ASIA REGIONS

BUILDING SOCIAL CAPACITY

Goals and Objectives

1. To enable the Bank lending program to achieve its development objective by improving the social soundness and sustainability of projects.

Current Obligations and Resources Available

2. Operational Support. In the past two years, requests for support from the social team in ASTEN have expanded significantly, even though there have been only a limited number of social scientists available. Requests for operational support from the ASTEN social team and resources provided are shown in Table 2.

FISCAL YEAR	PLANNED (CAM)	ACTUAL (CAM)	EXTERNALLY FINANCED	TOTAL
FY91	126.9	112.8	0	113.8 ACTUAL
FY92	120	187.4	54.2 <sup>1</sup>	241.6 ACTUAL
FY93	169.6	NA	79.0 <sup>1</sup>	248.6 PLANNED

1/ These resources are primarily for WID and participation.

3. Requests to ASTEN for technical advice have expanded beyond support on resettlement to GEF Biodiversity projects, consultation with affected groups in the EA process, indigenous people's issues, gender and poverty issues, and social factors in natural resources management. The planned (CAMed) figure of 169.6 staff weeks (4 SY) for FY93 includes all social sectors covered by ASTEN: 47% is for resettlement, 35% for gender work, and 18% for participation and natural resource management.

4. ASTEN currently has four positions for social scientists: two for resettlement and two for WID. The CAM requests for operational support during FY93 require the full time services of these staff. The CAM does not provide for the important activities of developing and delivering in-country and in-Bank training, training new consultants for Bank missions, or for the analytical and planning work required to support poverty reduction, consultation and participation in project design, and in the social appraisal of projects. To partly meet the shortfall in resources, during FY91 and 92 ASTEN obtained \$200,000 from SIDA for support to task managers promoting People's Participation and \$380,000 from Norway for WID. Additional resources are being sought to support future activities.

Detailed Work Program

5. Resettlement. The South and East Asia Regions have 54 projects under implementation which have resettlement components. These projects will displace more than 1.2 million people. The FY93-95 pipeline currently contains 20 projects in South and East Asia which will displace another million people. However, experience within the Bank shows that the number of projects with resettlement and the number of affected people increases as projects move toward appraisal. Of the projects with resettlement (either under implementation or preparation) 24 are in China and 23 are in India, 27 are in all other countries combined. Past experience shows that at least four weeks per year per project is required to deal with resettlement issues, which means a total of 296 staff/consultant weeks at a minimum (seven staff years). At the present time, only 80 SW are allocated for this purpose from ASTEN.

6. Consultation and Participation. Consultation and participation are required (a) to identify the adverse impacts which projects may have on the affected people and to design measures for their mitigation; and (b) to take the views, ideas and culture of the people into consideration to improve developmental impact through project design and to ensure that projects are sustainable. There are a total of 55 category 'A' projects in South and East Asia Regions for environment assessment purposes. All require consultation with affected people during the EA process. To date the social team has assisted with review and preparation of terms of reference and the nomination of consultants, without CAM time for this purpose. Many projects also require participation at the preparation stages if they are to achieve their development objectives, for example, to ensure that the technology is appropriate, and the services to be provided are in forms compatible with, and desired by farmers and other beneficiaries. In the past year the social team has assisted twelve Task Managers to support people's participation in their projects through a grant from SIDA. This falls far short of the requests for support.

7. Indigenous Peoples and Tribal Issues. The importance of indigenous people in Bank work now extends beyond the requirements of OD 4.20 to forest dwellers in general, especially those in protected areas (20 projects to date). In addition, ASTEN staff are increasingly asked to assist in the development of projects which involve tribal peoples and ethnic minorities. The social team has also provided considerable support to both ESW and projects covering forestry, watershed protection and management of common property and marginal land. This work has been done primarily by consultants, with limited supervision from ASTEN.

8. Gender. A review of projects under implementation and those in the pipeline reveals a large number where attention to gender issues is important to project effectiveness. Out of 278 Asia Region projects which reached the implementation stage during the 1989-92 period, 144 contained specific measures or components for women. Eighty-nine of the 144 projects in the current pipeline (FY93-95) either already have WID interventions or present important opportunities for such interventions. The CDs are reasonably well staffed to handle WID issues in social sector projects, but their WID

expertise in the productive sectors - particularly in agriculture and resource management and in finance and enterprise development - is limited.

9. Poverty Reduction. Although poverty reduction is central to the Bank's mission, and covered by O.D. 4.15, ASTEN social staff have not been involved in work on poverty reduction to date. This is due to the fact that most staff time is spent on review and operational support of projects categorized as 'A' for EA purposes and resettlement. In the future, greater attention is needed to the involvement of social scientists in targeting projects to the poor, in promoting beneficiary participation, and in designing institutions for effective project delivery. The Regions need to strengthen capacity in this area.

#### Problem Areas

10. There are a number of problems which reduce ASTEN's effectiveness in supporting project work with a social dimension:

- (a) The number of staff, as noted, is inadequate to the range of tasks and volume of work.
- (b) The work of the ASTEN social team is 90% demand driven. Moreover, the demands of high profile projects with resettlement problems constantly assume priority over other projects. Staff therefore spend most of their time on resettlement and are unable to give other issues the attention they deserve.
- (c) 'A' category EA projects are given significant time, but the majority of 'B' and 'C' projects must be ignored. However, these projects contain the highest potential for poverty alleviation, planning through participatory design and for improving women's access to services and productive resources.
- (d) Given low staff numbers and the fact that most work must be CAMED, social staff do not have the opportunity to do the planning and training which would permit work to be devolved to the CDs.

11. The following strategy is intended to expand the Regions' capacity to deal with priority social concerns.

#### Improving Capacity to Deal with Social Concerns

12. The demands from the CDs for support on social issues are so large that priorities for attention must be clearly identified and changes must be made in the staffing and structure of the work program to meet these needs. In the short term, the social team must give priority to meeting the obligations imposed by operational directives on resettlement, consultation and on WID as a program of special emphasis. In the longer term, however, the team proposes to develop a program to promote beneficiary participation in project design and to support the Bank's poverty alleviation objectives more directly. In both cases the social team will focus on the institution development (formal and informal) which is critical to project success.

13. Resettlement. Over the past decade the Bank has developed detailed standards and procedures for resettlement. Therefore, where the volume of work justifies a full time specialist, this work can be devolved to the CDs provided positions can be allocated for this purpose. This would permit ASTEN staff to spend more time developing training materials for staff and line agencies, monitoring resettlement operations and providing analytical support. As 64% of projects with resettlement components are in China and India, these two CDs urgently require resettlement specialists. (Support would also be required from the social team.) Since other operations are scattered, technical specialists supporting the remaining CDs would most likely be located in the TD. To support this program, the social team would require one additional staff member with resettlement skills and additional financial resources for training.

As one example of the type of training materials needed, ASTEN is seeking \$150,000 to prepare a resettlement video. This video would cover Bank guidelines, consultation procedures, land acquisition, and reestablishment of the economic base of affected people. The video could be dubbed and used by staff, line agencies, NGOs and affected people who wanted to understand the guidelines and the options available.

14. Consultation, Participation and Social Design. In the short-term, ASTEN proposes to give priority to improving consultation in the environmental assessment process. A review of the work program indicates that from FY93-95 most EAs will occur in China (16), India (10) and Indonesia (11). During FY93, training programs for in-country and in-Bank training will be planned and organized and operational support provided for Environmental Assessment work in these countries. Most of the Departments have indicated that they would welcome such support. In FY94, this effort would be expanded to other countries. Training programs would also be designed to assist task managers to develop participatory projects. An appropriate methodology and procedures will be prepared during FY93. ASTEN is currently seeking bi-lateral support for the preparation of audio-visual training material and for supporting people's participation in project design and implementation.

15. Indigenous Peoples, Protected Areas and Natural Resource Management. If agreed by the Regions, ASTEN would hire one person in FY93 to assist Country Departments with projects involving indigenous people, tribal issues, and problems related to natural resource management. Priority would be given to support for GEF projects, of which 8 are currently under preparation and to projects with components subject to the new Indigenous Peoples OD. As time permits, this person would disseminate information on lessons learned and support emerging work on people's participation.

16. Gender and Poverty. In the short term, the Gender and Poverty team intends to consolidate ongoing work on agriculture, micro-enterprise

development and women's health. In each of these focal areas the strategy is to provide support to the CDs through a combination of operational support, conceptual leadership and training for regional staff, selected consultants and eventually, borrower governments. Financial resources are already available to support this work. In the longer term, the team intends to broaden its scope to address the social aspects of poverty. Low income households will remain as the starting point and the effort will be to learn what works to increase their access to productive resources and social services, with the strong presumption that many of the solutions developed to reach women are more broadly applicable to the poor.

Building on pilot work in Nepal, the Gender and Poverty team will undertake an assessment of financial service delivery systems in India and their ability to reach poor women in financially sustainable ways. The results will be used to improve the effectiveness of Bank lending in this sector. The team plans to extend this work to East Asia during FY 1994. The team will also prepare guidelines on enterprise development services for women in Asia in FY 1993 based on a completed review.

#### Procedures, Staffing and Structure

17. Procedures. At present there is no means of classifying projects with social impacts. As indicated in management's response to the Morse Commission, the social team will develop a system to identify and categorize projects with significant social impacts or requiring consultation with affected groups and/or people's participation in project design. This system will enable the team to review projects for applicability of ODs, WID and/or participation, and follow-up as appropriate with task managers. Follow-up activities could include:

- Advice to TMs and assistance with project preparation.
- Assistance to task managers with appraisal of projects for 'social soundness' and sustainability arising from participation.
- Provision of training to Bank staff in areas where problems recur.
- Maintenance of a roster of skilled consultants.
- Preparation of guidelines on selected topics, as mentioned above.

18. Staffing and Other Resources Required. To support a minimum work program, six new positions are required. Of these at least one full time position for resettlement is needed in China and one or two in India (one in headquarters and another in the field). At least one resettlement position is needed in the TD to support other Departments. Positions are also needed in

ASTEN to support work on participation and indigenous people and eventually on poverty (see proposed Staffing Sheet attached, Annex I). A potential candidate has been identified for China CD. These staff would need to receive adequate administrative and secretarial support.

19. The findings of the Independent Review Report have posed a challenge to the Bank. To meet this challenge effectively, there is a need for innovation changes in the ways of providing operational support to projects. Providing training to training institutions in borrower countries, holding interactive workshops for project managers in the Bank and in the borrower countries, and producing Videos on Bank procedures and lessons learned to be used in borrower countries are examples of such possible innovations. To act, the social team would need incremental financial resources totalling about \$564,000 (see Annex II). Funding would be sought from external sources to finance the other measures that would be introduced.

20. Structure. The Social Team in the Technical Department would be organized into three small subsections to correspond to divisions in the work program. These are:

- Resettlement
- Social Design
  - participation and consultation
  - indigenous people and natural resource management
- Gender and Poverty

All team members would cooperate in developing an integrated program on poverty and participation.

21. The Social Team could either be a unit in ASTEN or a new Division in the TD. There are several strong arguments for creating a Social Development Division. First, it would give a higher profile to social issues and have an important symbolic and substantive impact. Second, it would facilitate the development of appropriate procedures which could potentially be a model for the Bank. Third, it is likely to make it easier to mobilize resources internally and externally to support social initiatives. Finally, the span of control of ASTEN is already very broad and could become completely unwieldy with the addition of an expanded social team. The main drawback to two divisions would be reduced cross-fertilization between disciplines. A Division Chief and administrative staff would also need to be identified to support a work program of the size proposed.

PROPOSED STAFFING TO BUILD SOCIAL CAPACITY

Social Development Division

Vacant - Division Chief Staff\*

Social Design and Participation

David Butcher - Anthropologist Staff  
Vacant - Consultation Specialist Staff\*  
Vacant - Natural Resources/Indigenous People Staff\*

Resettlement

Ashraf Ghani - Anthropologist Staff  
Vacant - Resettlement Specialist Staff\*  
Sumila Gulyani - Planner LTC

Gender and Poverty

Lynn Bennett - Anthropologist Staff  
Rekha Dayal - WID Specialist Staff

SA2

Vacant - Resettlement Specialist Staff\*  
Vacant - Resettlement Specialist Staff\*

EA2

Vacant - Resettlement Specialist Staff\*

\* New Positions

TRAINING BUDGET FOR SOCIAL DEVELOPMENT DIVISION FOR FY92-94

	AMOUNT REQUESTED
<b>RESETTLEMENT</b>	
Video Production	\$350,000
Identification of Training Institutions	\$ 50,000
Workshops	\$ 50,000
<b>CONSULTATION AND PARTICIPATION</b>	
Workshops (In-house)	\$ 25,000
<b>GENDER AND POVERTY</b>	
Training	\$ 25,000
<b>TOTAL</b>	<b>\$500,000</b>

NOTE: External funds will requested to hold Workshops and Training under Consultation and Participation and Gender and Poverty.



# OFFICE MEMORANDUM

10/14 —  
VR discussed  
w/ El-Ashry.  
BSC

No comments

VR

10/2

DATE: September 24, 1992

TO: Messrs. M. Petit (AGRDR); A. Churchill (IENDR); L. Pouliquen (INUDR)

FROM: V. Rajagopalan, OSPVP

EXTENSION: 33419

SUBJECT: Bankwide Review on Resettlement

1. As you know, among the measures taken to respond to the Morse Report on Narmada, Bank senior management has requested the Environment Department to carry out, in cooperation with the regions, an analysis of all ongoing projects entailing resettlement with respect to the quality of project implementation by the borrower, and the consistency of project implementation with the Bank's resettlement guidelines and loan/credit agreements. A report on that review will be submitted to Management, and subsequently to the Board. More details about the actions decided by senior management are in the document issued by the Secretary (No. M92-849, June 23, 1992).
2. The Environment Department has prepared the attached summary outline and working arrangements proposals for this review. In addition to the work to be done in Operations, it is proposed that several OSP sectoral departments make contributions to the review.
3. I would welcome your comments, as well as specific suggestions concerning your own Department's contribution to this review, by October 2, with copy to Mr. El-Ashry. Thank you.

cc: Mr. El-Ashry (ENVDR)

Attachment

Mr. R — 10/9/92

This package is now complete. ENV also have all the comments. I informed Becky that someone from ENV should now be doing something & to let me know who.

7

Mr. Mayers

↓

Pl follow up with Env. Director and let me know.

called MTE but he did not get back to me.

10/14

VR

10/11

# OFFICE MEMORANDUM

DATE: September 24, 1992

TO: Messrs. S. Husain (LACVP); G. Kaji (EAPVP); C. Koch-Weser (MNAVVP); K. Jaycox (AFRVP);  
W. Thalwitz (ECAVP); J. Wood (SASVP)

FROM: V. Rajagopalan, OSPVP

EXTENSION: 33419

SUBJECT: Bankwide Review on Resettlement

1. As you know, among the measures taken to respond to the Morse Report on Narmada, Bank senior management has requested the Environment Department to carry out, in cooperation with the regions, an analysis of all ongoing projects entailing resettlement with respect to the quality of project implementation by the borrower, and the consistency of project implementation with the Bank's resettlement guidelines and loan/credit agreements. A report on that review will be submitted to Management, and subsequently to the Board. More details about the actions decided by senior management are in the document issued by the Secretary (No. M92-849, June 23, 1992).

2. The Environment Department has prepared the attached proposed working arrangements for this review. I should be grateful for any feedback and suggestions you may have before we finalize these proposals.

3. I would appreciate receiving comments from your region by October 2, with a copy to Mr. El-Ashry. Thank you.

cc: Messrs. Sandstrom, Stern (EXC); El-Ashry (ENVDR)

Attachment

ENV

Resettlement and Environment

THE WORLD BANK/INTERNATIONAL FINANCE CORPORATION/MIGA  
**OFFICE MEMORANDUM**

RECEIVED  
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92 OCT -2 PM 5: 20  
OFFICE OF THE OSPVP  
SECTOR & OPERATIONS POL.

DATE: October 2, 1992  
TO: Mr. V. Rajagopalan, Vice President, OSP  
FROM: L. Pouliguen, Director, INUDR  
EXT.: 33786  
SUBJECT: Bankwide Review on Resettlement

1. As you know, INURD has been involved with resettlement issues in the past and contributed, last year, with ENV to the organization and financing of a conference on urban relocation in The Hague.
2. We agree that there is an important urban dimension that needs to be considered when conducting a Bankwide review on resettlement.
3. Procedurally, we believe that INURD should interact with ENV on (a) indicators for assessments of projects with resettlement; (b) training courses on resettlement; (c) work group; (d) review of pipeline of urban projects with resettlement components.
4. Considering that this activity is not part of our existing work program, we would expect that the Department could receive additional resources (i.e 4 to 6 months of consultant time during the year).

cc: Mr. El-Ashry

CFarvacque/vid

11

The World Bank/IFC/MIGA  
O F F I C E M E M O R A N D U M

DATE: October 6, 1992 05:15pm

TO: V. Rajagopalan, OSPVP ( V. RAJAGOPALAN, OSPVP )

FROM: Michel Petit, AGRDR ( MICHEL PETIT )

EXT.: 30340

SUBJECT: Bankwide Review on Resettlement

The memo from Mr. El-Ashry to you on the above subject indicates that collaboration of OSP departments will be important. But the memo does not specify what input is needed, in what form, and when. Thus, it is difficult to react. A priori a current activity, conducted in collaboration with ENV, on the role of fisheries and aquaculture in resettlement activities for people displaced by the construction of water reservoirs should be relevant. More generally, our agricultural technology assessment studies should also be a source of useful information. But in matters of resettlement sociological issues are critical. In this area, AGR has lost most of its expertise with the departures of M. Cernea, S. Guggenheim and R. Meyers.

In conclusion, AGR is of course willing to help within the limitations of its expertise and very scarce resources. We will need however further clarification from ENV regarding what input they would like from us.

CC: Anthony A. Churchill ( ANTHONY A. CHURCHILL )  
CC: Mohamed T. El-Ashry ( MOHAMED T. EL-ASHRY )  
CC: Louis Pouliquen ( LOUIS POULIQUEN )

## OFFICE MEMORANDUM

DATE: October 5, 1992

TO: Mr. V. Rajagopalan, Vice President, OSP

FROM: D. Joseph Wood, Vice President, SAS  
Callisto Madavo, Acting Vice President, EAP

EXTENSION: 81429 &amp; 82856

SUBJECT: Bankwide Review on Resettlement

1. We have reviewed Mr. El-Ashry's proposal for a Bankwide Review on Resettlement and we have the following comments.

2. As you are aware, normal supervision should cover resettlement and propose remedial action as necessary, though we acknowledge that reporting is often incomplete and proposed actions may be weak or inadequate if time and specialist skills are not available to the task manager. To address these problems and internalize the issues, we feel we should strengthen ongoing supervision, improve reporting on Form 590s, and reflect project findings on a regular basis in the Country Department ARIS. The ARIS would focus on generic issues which need to be tackled in the country dialogue, such as how to build capacity, to acquire land, or consult with affected people; and it would indicate problem projects.

3. Consistent with this strategy, we propose the following approach. If ENV can provide a short statement of the information required from the desk review within one week, we would seek to have task managers fill it out by end-October. The preliminary results of this analysis would be incorporated into the Country Department ARIS (now due in draft by early November) and a brief overview would be prepared by ASTEN. Our Regions have also initiated in-depth reviews of resettlement in China and India. Findings from these two studies plus the ARIS material would be incorporated into an Asia-wide resettlement report by mid-March. The report would suggest how issues might be tackled on a country by country basis and propose a follow-up program. This, plus the information to be provided by Task Managers could provide the basis for the ENV report.

4. We do not see the need for a regional coordinating group, or any other off-line procedures other than the initial one-time baseline monitoring form which would subsequently be followed up in the Form 590. Under our proposed approach, data would not be standardized and more troublesome projects (and countries) would get more resources and projects with minor problems far less.

5. If agreed, we would attempt to cover the above agenda using the staff and resources of an expanded social team in ASTEN and the proposed resettlement specialists in China and India.

cc: Messrs./Mmes. El Ashry, Cernea (ENVDR), Ritchie (ASTDR), Drysdale (SASVP), El Maaroufi (EAPVP), Kraske (SA1DR), Vergin (SA2DR), Isenman (SA3DR), Burki (EA2DR), Haug (EA3DR)

GDavis:mld

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OFFICE OF THE OSPVP  
SECTOR & OPERATIONS POL.

to ENV.  
Following  
up on this?

to ENV -  
at note

# OFFICE MEMORANDUM

DATE: October 7, 1992

TO: Mr. V. Rajagopalan, OSPVP

FROM: Katherine Marshall, Acting RVP, Africa Region

EXTENSION: 36923

SUBJECT: Bankwide Review on Resettlement  
Comments from Africa Region

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OFFICE OF THE OSPVP  
SECTOR & OPERATIONS POL.

MP  
Env. Team

1. We have the following comments on the proposed exercise:

(a) We have no problem with the objectives of the review.

(b) The timetable seems unrealistic, if an Initiating Memorandum is to be issued in early October, regional working groups are to be organized and a desk review carried out by each CD, and subsequent field supervision missions to be mounted in the fall. It is more likely that a desk review could be completed by the end of December and that the first field missions could take place in the spring. It is also unrealistic to expect that agreement will be readily reached with borrowers on the existence of problems or on specific remedies, and that these remedies will be implemented in time to be evaluated by a second supervision mission within a few months. Thus, the report on problems diagnosed and proposed actions could be ready for the Board by end FY93, but the report on implementation of proposed actions is more likely to be ready sometime in FY 94 (earliest December 1993).

(c) The proposed working arrangements imply work by regional staff that is additional to the agreed work program for FY 93. The region cannot undertake this work in FY 93 without the necessary additional resources. These resources should cover the time spent by the resettlement working group (16 SW if we assume 2 SW each for the TD Director, the AFTEN Chief, and one representative from each of 6 CDs); the CD desk reviews (say 4 SW each, or 24 in total); and the supervision missions (participation of a resettlement specialist will be required in several cases; this means consultant fees and travel budget which can be estimated at \$15,000 per mission, or \$30,000 per project if two missions are carried out). Resources are also needed for the proposed technical assistance to be provided to borrowers between missions.

cc: Jaycox o/r  
P. Landell-Mills, AFTDR  
F. Falloux, C. Cook, AFTEN  
M. El-Ashry, M. Cernea, ENVDR

Cleared with and cc: Mr. Serageldin

THE WORLD BANK/IFC/MIGA

**OFFICE MEMORANDUM****DATE:** October 5, 1992**TO:** Mr. V. Rajagopalan**FROM:** Ram K Chopra, Acting Vice President, MENA**EXTENSION:** 32707**SUBJECT:** Bankwide Review on Resettlement

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OFFICE OF THE OSPVP  
SECTOR OPERATIONS POL.

1. Thank you for the opportunity to comment. The proposal for the bankwide review on resettlement is welcome; however, as presented, it is very ambitious. The proposal suggests that the regions carry out i) desk assessments, and ii) supervisions, including reaching agreements with borrower on specific remedies to be carried out for the next 6 months, and in addition provide training courses to Bank staff. May I suggest that rather than have two supervision missions, we should plan for only one during the next 6 months, in which the remedies may be defined but without undertaking an assessment of their implementation by the borrower. We should be realistic if we are to be credible.

2. The MENA region has done a desk study of its portfolio. Currently we have 5 projects with resettlement issues, and our proposals for FY93-95 are likely to contain between 3 and 7 additional projects with resettlement issues.

3. Let me reiterate that we strongly believe that we should focus on tackling resettlement issues during project design. Alternatives to displacement and resettlement should be considered before decisions on these are taken, and these issues should be an integral part of project design. In the proposed review, the Bank should prepare a practical check list on how to handle resettlement issues during project preparation.

4. The training of Bank staff is of crucial importance. But this cannot be rushed, particularly when it is not obvious what such training would comprise. Recruitment of experienced professionals would also seem to be necessary.

cc: Messrs. El-Ashry, Bottelier, Chopra, Kohli, Husain, Squire, Seth, Murli, Bouhabib

SNV  
PT note



cc: El-Ishty

  
10/11

A L L - I N - 1   N O T E

DATE: 09-Oct-1992 01:54pm

TO: V. Rajagopalan, OSPVP

( V. RAJAGOPALAN, OSPVP )

FROM: Anand K. Seth, EMTEN

( ANAND K. SETH )

EXT.: 32502

SUBJECT: Resettlement

Resettlement Review:

Mr Thalwitz is away; last week the ECA Management group had been briefed by Mr Kohli on the issue and had confirmed that ECA endorses the views expressed by MNA RVP on the proposed resettlement review.

Anand

CC: Harinder Kohli

( HARINDER KOHLI )

CC: Claude Blanche

( CLAUDE BLANCHI )

CC: Patricia Gallagher

( PATRICIA GALLAGHER )

CC: Tariq Husain

( TARIQ HUSAIN )

CC: J. Murli

( J. MURLI )

# OFFICE MEMORANDUM

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92 OCT -5 PM 5:41

OFFICE OF THE OSPVP  
SECTOR & OPERATIONS POL.

DATE: October 5, 1992  
TO: Mr. V. Rajagopalan, OSPVP  
FROM: Ping-Cheung Loh, Acting Vice President, LAC  
EXTENSION: 39001  
SUBJECT: Bankwide Review on Resettlement

1. We agree that the review of resettlement components under ongoing projects should be carried out through regular supervision missions. However, many supervision missions will have already been completed by the time the Initiating Memorandum for this exercise is issued in October 1992. Furthermore, not all projects with resettlement components will be supervised during Fall 1992. For these reasons, a 10 month/12 month time horizon for the interim and final reports would be more realistic than the proposed 5-6 month.

ENV.  
7/1 note

2. On working arrangements, rather than creating a special regional working group on resettlement, LAC would prefer to designate LATEN as coordinator of the review.

3. In terms of resources, an estimated 40 staffweeks of resettlement specialist time plus travel expenses will be required for two rounds of supervision in LATEN. LATEN resettlement staff are fully committed. Therefore, an additional full-time consultant position for a resettlement specialist should be allocated by ENV to LATEN.

4. The review's focus upon "best practices" in resettlement operations is timely and important in the aftermath of the Morse Report, but would be more effective if the proposed working arrangements were modified as suggested above.

cc: Messrs. Husain o/r (LACVP); Sandstrom, Stern (EXC); Kaji (EAPVP); Koch-Weser (MNAV); Jaycox (AFRVP); Thalwitz (ECAVP); Wood (SASVP); El-Ashry (ENVDR); Segura (LATDR)



# Record Removal Notice



<b>File Title</b> Resettlement & Environment - 1v		<b>Barcode No.</b>  1153501		
<b>Document Date</b> 6/11/1990	<b>Document Type</b> Report			
<b>Correspondents / Participants</b> Risk Management and Financial Policy Department				
<b>Subject / Title</b> 1991 Country Risk Management and Portfolio Review, Volume II - Country Risk Assessments				
<b>Exception(s)</b> Corporate Administrative Matters				
<b>Additional Comments</b>		<p>The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information. This Policy can be found on the World Bank Access to Information website.</p> <table border="1"><tr><td><b>Withdrawn by</b> Bertha F. Wilson</td><td><b>Date</b> 15-Jun-23</td></tr></table>	<b>Withdrawn by</b> Bertha F. Wilson	<b>Date</b> 15-Jun-23
<b>Withdrawn by</b> Bertha F. Wilson	<b>Date</b> 15-Jun-23			

THE WORLD BANK  
Operations Committee

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SECTOR POLICY & RESEARCH

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Minutes of the Operations Committee to consider  
The 1991 Country Risk Management and Portfolio Review  
Held on June 24, 1991, 3 p.m., in Room D10-002.

DECLASSIFIED

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WBG ARCHIVES

A. Present:

Operations Committee

Others

Messrs. A. Qureshi (chairman)  
S. Husain (LACVP)  
K. Jaycox (AFRVP)  
W. Wapenhans (EMNVP)  
S. Burki (ASIVP)  
J. Wood (FPRVP)  
H. Scott (LEGVP)  
K. Kashiwaya (CFSVP)  
D. Bock (OPNSV)  
L. Summers (DECVP)

Messrs/Mss. Picciotto (CPBVP)  
F. Kilby (FRS)  
P. Hansen (FRS)  
M. Muller (FRS)  
M. de Nevers (FRS)  
S. Burmester (SEC)  
F. Levy (EAS)  
M. Guerard (AFRCE)  
C. Robless (OPNMS)  
N. Okonjo-Iweala (OPNSV)  
A. Khanna (EXC)  
T. Hutcheson (PRDRA)

B. Issues

1. At the suggestion of the Chairman, the discussion of the paper, which had been prepared by FRS, was divided into two parts. Committee members were asked to comment first on the paper's analysis of global economic prospects and the impact on the Bank's borrowing countries, specific country risk recommendations, and the implications for the Bank's total portfolio (Chapters 1-3). The suggestions offered in Chapter 4 for the modification of risk categories and exposure guidelines and for Bank review procedures were discussed separately. In their discussion of Chapters 1-3, Committee members commented on a number of interrelated issues: (i) the paper's assertion that country projections for the high-risk countries tended to be optimistic; (ii) the paper's treatment of downside risk; (iii) individual country risk assessments; and (iv) the 5-year projection of portfolio risk. The discussion of Chapter 4 centered on the question of whether there was any reason to modify the current risk management system.

2. In introducing the paper, the Finance representative noted that a high proportion of the Bank's loan portfolio was concentrated in high-risk countries. The Bank is supporting programs to help countries to improve their creditworthiness over time, and there is every reason to believe that many of these programs will be successful. Some will not succeed, however, and the situations of some currently low-risk countries are likely to deteriorate. Such possibilities represent high risk for the Bank, and the recommendations of the paper seek to place the focus of the risk management process more sharply on the situations of greatest

risk. Finance seeks approval of the general approach and suggests the formation of a working group to work out the details.

3. The Chairman urged discussants to keep in mind that, while there are obvious links between the global economic environment and country risk, the risk of concern for this review was that of interrupted debt service to the Bank and the steps that might be taken to protect against such eventualities and to maintain the Bank's preferred creditor status.

4. Country Projections. A Committee member disagreed strongly with the paper's observation that projections for the high-risk countries tended to be overly optimistic. He pointed out that such projections were not intended in most cases to be predictions of outcomes but were meant instead to explore the implications of clearly stated, transparent assumptions about government policies. The lending that was projected under optimistic policy assumptions was not to be carried out regardless of the policies actually implemented, and indeed actual lending programs often turned out to be far less than projected at the beginning of a fiscal year. This relationship in practice between the volume of lending to a country and the quality of its economic management provided a self-regulating mechanism with regard to portfolio risk management. He said that the paper was flawed technically in concluding that high implicit marginal propensities to save were evidence of over-optimism in the country projections, pointing out that relatively small improvements in the public sector budget in a country experiencing low growth would result in a very high MPS in the short-term. This point was supported by another Committee member, who said that, in his view, the MPS should be banned forever as a projection criterion.

5. Global Downside Risk. A Committee member was critical of the paper for assuming that all the variables affecting the global projections would move in the same adverse direction simultaneously, in his view a very unlikely scenario. He argued, moreover, that, by assuming that developing countries were dependent on external capital to overcome such adversities, the paper had missed the major lesson of the 1980s. During that period, the LDCs did not have external capital to compensate them; not only had they implemented theretofore unimaginable adjustments and reforms, but they had maintained debt service to the Bank in the process. The paper, in his view, should give prominence to that fundamental fact. Another Committee member noted that the rapid adjustment of countries affected by the Middle East crisis had greatly reduced the demand of those countries for external capital, improving the global picture regarding the availability of external finance. A third member agreed that the tone of the report was more pessimistic than warranted by the facts, particularly the wide implementation of reforms taking place in borrowing countries. At the same time, he observed that the report had failed to discuss the risks implied by the greater incidence of negative net transfers from the Bank projected for the coming decade. In his view, this was the most likely source of potential problems for the Bank. He also thought that more discussion should be given to debt and debt service reduction operations (affecting both private and official debt) and their impact on creditworthiness. He criticized the notion that a new class of debt senior to Bank-held debt was being created as erroneous.

6. Evolution of the Bank's Portfolio. Several Committee members argued that the portfolio projections were inconsistent, inasmuch as they assumed lending levels based on good policy performance by the borrowing countries, while also assuming that those countries in 1995 would be in the same risk categories as in 1991. This gave an unwarranted pessimistic bias to the portfolio projections. Another member also objected to the tone of the discussion of the deteriorating future trend of the portfolio as not warranted by the projected risk scores, even under the above assumptions. A third Committee member said that the paper was missing a link to what the Bank should do. He noted that the Bank has many ways to manage risk besides exposure management. Indeed, increasing exposure was itself part of an overall risk management package, insofar as the Bank's lending serves to improve a country's debt servicing capacity over time. The real surprise, in his view, is how well the Bank had managed risk over the 1980s. Not only are economies now more open, but the Bank has, in effect, positioned itself as the "gatekeeper" to the international economy. This flavor and that of the strengthening relationship between the Bank and its borrowers does not come through in the paper.

7. In contrast, one Committee member and one observer considered the paper's general tone justified, observing that the Bank's portfolio is clearly riskier now than it was 10 years ago, and that the Bank is planning to disburse a large volume of funds into countries that are indeed risky. Moreover, there is now a lesser cushion of commercial bank lending and a reduced will on the part of official lenders to bail countries out in their obligations to the Bank and Fund. Besides, as one remarked, risk analysis is pessimistic by nature.

8. The Finance representative agreed that much lending would not go forward if the policy conditions were not in place. Nevertheless, experience showed that there would be slips and failures. The Bank is supporting good programs, but they will not succeed uniformly, and management cannot be complacent. The paper is not arguing that the Bank should avoid all risk. On the contrary, it is appropriate that the Bank should lend to high-risk countries, but the attendant risks have to be managed carefully and selectively.

9. Country Risk Ratings. A number of members questioned the individual country ratings set out in the paper. Among the specific comments: inflation and fiscal deficits had not prevented a strong growth performance in Turkey and the growth of that country's external reserves; Morocco meets all the criteria of a lower-risk category; Romania has no external debt and is undertaking reform; Yugoslavia had twice as much debt and lower reserves ten years ago, its exposure ratios are acceptable in all respects, and its debt is very likely to be repaid even if the country is "reconfigured"; China's strong performance merited its being restored to the low-risk category of a few years ago; the inclusion of the Philippines in the special watch list resulted from a miscalculation; Mexico belongs in a lower-risk category as evidenced by the rapid pace of capital repatriation and foreign direct investment, which were financing its current account deficit while all debt indicators were improving, and by the rapid growth of nontraditional exports; Argentina is implementing massive structural reforms, has reduced its external debt, has created a

much more viable public sector, and has maintained debt service to the Bank, even if stabilization efforts have not been successful; Bolivia's economic management deserves a higher rating, even though it is not eligible for IBRD lending--its problems are of a long-term structural nature, not of performance. The Chairman stressed the importance of applying the same criteria uniformly across countries and urged that a country's past record of meeting debt service obligations to the Bank be one of the criteria.

10. One Committee member stressed the importance of the Bank's catalytic role. In this regard, he objected to the restrictions suggested for ECO operations as a function of country risk category. In his view, decisions should be made on a case-by-case basis, and it should be possible for the Bank to use guarantees to support good projects, even in high-risk countries.

11. Modification of Exposure Guidelines and Risk Management Procedures. A Committee member disagreed with the proposed change from a portfolio to a net income guideline, explaining that the latter provided a highly unstable base that depended largely on the Bank's income from investments. Moreover, he noted that the change would cause a cutback of lending in several large borrowing countries precisely when they were making significant progress. The Chairman expressed some reservations about the proposal to widen the variability of debt service/export guidelines as a function of risk category, fearing it might further constrain lending decisions without really improving effective risk management.

12. Several members questioned whether any change in risk management procedures were called for at the present time. In their view, the Bank had managed risk very successfully over the past difficult decade, and that there was little evidence of a problem that needed fixing. Moreover, they were concerned that the proposals made in the paper would only lead to further bureaucratization of the decision-making process. Concern was also expressed that the philosophy implied in Chapter 4 was that of an institution primarily focused on the avoidance of risk, an emphasis not consistent with the Bank's development and poverty alleviation mission. Other members, however, supported the broad objective of seeking simplification of the guidelines and greater efficiency from a more focused management review process. While not endorsing the specific recommendations presented in the paper, they supported the setting up of a working group to study the matter.

#### D. Summation

13. The Chairman, in summing up the two segments of the discussion, made the following points:

- The paper was found to be overly pessimistic in its tone and substance, and seemed to be contradictory in places regarding its implications for what the Bank should do. In many countries, the worst period of adjustment may now be over, and prospects appear better than one or two years ago.

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8. The Finance representative agreed that much lending would not go forward if the policy conditions were not in place. Nevertheless, experience showed that there would be slips and failures. The Bank is supporting good programs, but they will not succeed uniformly, and management cannot be complacent. The paper is not arguing that the Bank should avoid all risk. On the contrary, it is appropriate that the Bank should lend to high-risk countries, but the attendant risks have to be managed carefully and selectively.

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much more viable public sector, and has maintained debt service to the Bank, even if stabilization efforts have not been successful; Bolivia's economic management deserves a higher rating, even though it is not eligible for IBRD lending--its problems are of a long-term structural nature, not of performance. The Chairman stressed the importance of applying the same criteria uniformly across countries and urged that a country's past record of meeting debt service obligations to the Bank be one of the criteria.

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12. Several members questioned whether any change in risk management procedures were called for at the present time. In their view, the Bank had managed risk very successfully over the past difficult decade, and that there was little evidence of a problem that needed fixing. Moreover, they were concerned that the proposals made in the paper would only lead to further bureaucratization of the decision-making process. Concern was also expressed that the philosophy implied in Chapter 4 was that of an institution primarily focused on the avoidance of risk, an emphasis not consistent with the Bank's development and poverty alleviation mission. Other members, however, supported the broad objective of seeking simplification of the guidelines and greater efficiency from a more focused management review process. While not endorsing the specific recommendations presented in the paper, they supported the setting up of a working group to study the matter.

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13. The Chairman, in summing up the two segments of the discussion, made the following points:

- The paper was found to be overly pessimistic in its tone and substance, and seemed to be contradictory in places regarding its implications for what the Bank should do. In many countries, the worst period of adjustment may now be over, and prospects appear better than one or two years ago.

- The focus on risk should not lead to a mechanistic approach to risk management. The business of the Bank is that of a lender of last resort; lending to developing countries is its raison d'etre and all such lending is risky. Risk cannot be made the principal criterion of its lending decisions.
- The paper should present the issue of negative net transfers and their implication for the risks facing the Bank in the years ahead.
- Risk assessments must be based on criteria applied uniformly across countries, and their focus should be on ability and willingness of the borrowers to meet their debt service obligations to the Bank, and not to creditors in general. The relegation of new borrowers, such as Romania and Bulgaria, to the highest-risk category is, from this perspective, questionable.
- Exposure management is only one aspect of risk management in the Bank. The Bank uses various ways including lending and non-lending approaches to manage risk. The likelihood of maintaining debt service payments to the Bank may in some circumstances be enhanced by increased lending, and in others by reduced or discontinued lending. The paper needs to present a more balanced discussion in this regard.
- There are some questions and doubts regarding the desirability of the specific proposals made in the paper for changes in exposure guidelines and procedures, but simplification and greater efficiency are worth pursuing. Operations will be glad to participate in the proposed working group toward that end.

FDLevy 

13:46:00/1-JUL-91

## OFFICE MEMORANDUM

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OFFICE OF THE ASSISTANT  
SECTOR POLICY & RESEARCH

DATE: June 19, 1991

TO: Operations Committee

FROM: Fred D. Levy, Acting Director, EAS *DL*

EXTENSION: 81947/9

SUBJECT: 1991 Country Risk Management and Portfolio Review - Notice of Meeting

The above paper, prepared and circulated by FRS, will be discussed at an Operations Committee meeting on June 24, 1991, at 3:00 p.m., in Room E1243. An agenda will be circulated shortly.

Operations Committee

Messrs. Qureshi, Husain, Jaycox, Karaosmanoglu, Wapenhans, Rajagopalan, Summers, Shihata, Kashiwaya, Wood, Bock.

cc: Messrs/Mss. Thahane/Burmester, SECGE; Picciotto, CPB; Goldberg, LEGOP; Wyss, COD; Sandstrom, EXC; Isenman, PRD; Linn, CEC; Stoutjesdijk, FRS; Okonjo-Iweala, OPNSV; Grilli, EAS (o/r); Parmar, IFC-CIO; Rao, IEC; Kavalsky, FRM; Pfeffermann, IFC-CEI; Liebenthal, PRD; Kilby, FRS; Robless, OPNSV; Walton, DECVP; Khanna, EXC; Shakow EXT; Institutional ISC.

FDLevy:cmc

# OFFICE MEMORANDUM

Fkc

DATE: June 20, 1991  
 TO: Operations Committee  
 FROM: Fred D. Levy, Acting Director, EAS *LDL*  
 EXTENSION: 81947  
 SUBJECT: 1991 Country Risk Management and Portfolio Review--Agenda

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 SECTOR POLICY & RESEARCH

1. The Operations Committee will meet on Monday, June 24, 1991, at 3:00 p.m. in Room E-1243 to discuss the subject paper, prepared by FIN.

I. Global Prospects and Downside Risks

2. As a prelude to its analysis of risk management issues, Chapter 1 analyzes the economic prospects of the Bank's borrowing countries, based on the global projections of IEC and the Regions' projections for individual countries. Short-term global prospects are described as remaining "rather bleak" with recession in the U.S. and U.K. and slowing growth in Germany and Japan. Only modest global improvement is foreseen in the medium term. Moreover, there is a strong probability, in FIN's view, that the availability of external financing to LDCs will be substantially lower than projected by IEC.

3. Against this backdrop, the authors find a pattern of country projections, in which the prospects of less risky countries are treated conservatively, but the higher-risk countries are viewed too optimistically. Regarding the latter, excessive optimism is ascribed particularly to projections of domestic savings (marginal savings rates averaging above 30% for most countries) and of the availability of external finance (net inflows projected to average \$67 billion per annum in 1991-95, compared to \$34 billion in 1986-90, with especially rapid growth of foreign direct investment being anticipated). Probable shortfalls in the levels of financing available from private and bilateral sources would mean that the Bank's contribution would be substantially higher than projected, with the increases in relative exposures particularly concentrated in the high-risk countries.

4. Even if projected capital flows are realized, the paper sees considerable down-side risks of higher interest rates, slower growth in world trade, inflationary pressures from the continuing U.S. fiscal deficit, and a higher trajectory for oil prices. The highest-risk countries would be the hardest hit and the least capable of responding by increasing exports, drawing down reserves, or increasing adjustment efforts.

- Does the Committee agree with the base-case scenario as a reasonable basis for country risk assessment? Does the Committee share the pessimism expressed regarding the availability of external financing and with regard to the likelihood attached to the down-side scenario? Is the overall tone regarding the future risk of arrears to the Bank justified?

## II. Country Creditworthiness Ratings

5. Chapter 2 analyzes trends in four "key risk clusters" of countries. Prospects of the East European countries have been improved by their adherence to reform programs and the acceptance by the EC of the idea of some form of eventual association. Implementation problems abound, however, in the transition from central planning and have been exacerbated by the collapse of trade with the USSR. Improvement is seen in the prospects of Central American countries. On the other hand, debt-servicing problems will "loom large" in the CFA countries, and, among the high-risk oil producers, only Nigeria has a demonstrated capacity to undertake needed stabilization measures.

6. Among individual countries, seven (Malaysia, Chile, Paraguay, Egypt, El Salvador, Guyana, and Honduras) are upgraded, the last two as a result of clearing arrears; while four (India, Jordan, Yugoslavia, and Guatemala) have been downgraded. Three countries (Jamaica, Nigeria, and Poland) have been removed from the "marginally creditworthy watchlist". Twelve countries are placed in category IIIC--marginally creditworthy (Table 2.2).

7. In reviewing the experience with arrears workouts in three countries--Guyana, Honduras, and Zambia--the paper notes three lessons: the increasing reluctance of donors to provide direct financial assistance beyond normal aid programs to enable clearance of Bank and Fund arrears; the high risk of recidivism because of the tightness of financing packages (an anticipated lesson); and the necessary lengthiness of workout programs. While prospects are good that other nonaccrual countries will clear their arrears in the next couple of years, the paper also cites the danger that, given the "significant number of other high-risk countries that need to implement tough economic programs in order to reach a viable medium-term external payments situation," the share of nonaccruals in the portfolio could increase suddenly and substantially.

- Does the Committee agree with the proposed changes in country risk ratings? Do the trends perceived by Committee members justify the tone of the danger warning noted above?

## III. Portfolio Outlook

8. Chapter 3 notes that, "despite the relatively conservative posture of Bank lending, the riskiness of the portfolio has increased substantially, due to a steady slide in the creditworthiness of many of our borrowers." The share of high-risk borrowers (IIIb and below) rose from 19% in FY80 to 39% in FY91 (Table 3.6), and "Future lending plans, which are based on a high standard of performance in the high-risk group of countries, would lead to a surge of exposure in these high-risk countries." (According to the table, this "surge" would lead to a 40% portfolio share in FY95.) In projecting to the future, countries remain in their FY91 risk categories, even though projected lending in many cases would imply performance that would be likely to warrant upgrading. "However, there is a clear risk that some countries will falter in their adjustment efforts and many are vulnerable in the event of a financial shortfall or an external shock. Over the past decade the dominant trend has been downward;

and at present there is nothing in sight to indicate that a reversal is in the offing."

9. Projections of Bank lending are based on the FY92-94 Lending Allocation Review, Medium-Term Planning Framework, Unified Survey and Country Business Plans, as explained in paras. 3.9-3.13. Base-case and "structured" high-case projections are presented. The distribution of the portfolio among risk categories under both projection scenarios would change only slightly from FY91 to FY95, the overall level of risk, as measured by a weighted scoring by risk categories, rising from 60 to 62 (as compared to 59 in FY90 and 37 in FY80). Meanwhile, portfolio concentration is projected to fall slightly. Whereas the share of the five largest borrowers had risen from 35% of the portfolio in FY80 to 45% in FYs90-91, it is projected to ease to just under 44% by FY95 (Table 3.8). The risk levels attributed to the five countries, however, has increased. Finally, Table 3.9 provides a summary list of countries considered to require close monitoring because of high risk ratings, high or rising exposures, or both.

- Does the Committee agree with these projections? What are the Committee's views on the implications of the indicated trends for the vulnerability of the Bank's financial condition and, consequently, for the management of country risk?

10. Chapter 4 offers a number of preliminary suggestions for strengthening risk management in the Bank by establishing a clearer linkage between country risk and the review of lending levels and composition. In brief, these would involve: (i) reducing the number of risk categories; (ii) varying exposure guidelines as a function of country risk category; (iii) giving risk management concerns greater weight in country strategy formulation in high-risk/high-exposure countries; and (iv) varying the intensity of management review and restraints on lending and exposure as a function of country risk. While set out as agenda items to be worked on over the coming year with OPS and PRE, the tone of the recommendations put forward suggest conclusions already reached by FIN.

11. The paper argues that, for operational purposes, the present risk categories I, IIa, and IIb are identical: i.e., lending is subject only to exposure guidelines; country risk is not a factor. It is recommended that they be regrouped in a single category. Countries currently in categories IIIa-c would be regrouped into two categories: countries considered risky but not a threat to the Bank's portfolio--risk management in these cases could be adequately implemented through the CSP process; and countries that do represent a portfolio threat given the combination of risk and exposure--lending in these countries would require closer Senior Management review. A fourth category would group those countries in non-accrual status and former-IBRD, now-IDA countries where collectability is in doubt.

12. The paper then goes on to propose new procedures for strategy review, lending allocation, and loan approval that would be differentiated according to the suggested four risk categories. A strengthened review process is argued to be necessitated, in part, by alleged "creeping exposure", whereby country lending tends to exceed or frontload approved lending programs. It is also suggested that an off-cycle process be established for review of specific country risk ratings when warranted by

changes in country situations. Such reviews would be initiated by FIN. Exposure guidelines would also be made variable as functions of risk categories (see Table 4.2), and the guideline on portfolio share would be converted into a guideline on share of net income.

- Does the Committee agree that a review of present risk management categories and procedures is desirable? If so, does the Committee agree with the agenda proposed for such a review? Have the right issues been identified?
- Do Committee members share the perception that risk management concerns do not currently exercise effective constraint on lending decisions? Is "creeping exposure" a problem? What are its causes?
- While only offered at this point as suggestions for further study, do Committee members wish to express their views regarding the specific recommendations set out by the paper?

Operations Committee

Messrs. Qureshi, Husain, Jaycox, Karaosmanoglu, Wapenhans  
Rajagopalan, Summers, Shihata, Kashiwaya, Wood, Bock.

cc: Messrs/Mss. Thahane/Burmester, SECGE; Picciotto, CPB; Goldberg, LEGOP;  
Wyss, COD; Sandstrom, EXC; Isenman, PRD; Linn, CEC;  
Stoutjesdijk, FRS; Okonjo-Iweala, OPNSV; Grilli, EAS (o/r);  
Parmar, IFC-CIO; Rao, IEC; Kavalsky, FRM; Pfeffermann, IFC-  
CEI; Liebenthal, PRD; Kilby, FRS; Robless, OPNSV; Walton,  
DECVP; Khanna, EXC; Institutional ISC.

FDLevy



# OFFICE MEMORANDUM

DATE: June 20, 1991

TO: Mr. D.C. Rao, IECDR  
THROUGH: Mr. Robert Liebenthal, Chief, PRDRA  
FROM: Thomas Hutcheson, PRDRA

EXTENSION: 31273

SUBJECT: Finance Policy Committee - June 20 Meeting

RECEIVED

91 JUN 24 PM 7:37

OFFICE OF THE VICE PRESIDENT  
SECTOR POLICY & RESEARCH

1. Two papers will be considered at the meeting on Thursday, June 20, 1991: "Allocation of FY91 Net Income and Plan for FY92," and "1991 Country Risk Management and Portfolio Review." Both raise important issues.

### Net Income

2. The paper on net income is incremental in approach. It follows on previous decisions in three major regards: provisions (raised to 2.5 percent of loans) reserves (maintained at 11 percent of loans), and loan charges (reduced to 25 basis points). These decisions leave approximately \$750 million for disposition which the paper recommends be allocated to IDA \$350 million and surplus \$400 million.

3. Two issues may be raised about these proposals. First, although the decision to begin provisioning on the basis of both general as well as specific portfolio risk is positive, the 2.5 percent target level may well be inadequate. While it is not possible to reopen the discussion of the provisioning level at this time, it is important not to create any expectations that a dependable supply of net income is available for "good works." It is debateable whether a transfer to IDA or an allocation to surplus is a safer (less compromising) use of net income. Although donors could come to rely on transfers from the Bank to IDA and slacken off on their contributions, the existence of a pot of "available" funds in surplus could also attract doubtful proposals for its use. [In this regard, the "dummy" transfer to \_\_\_\_\_ of \$\_\_\_\_\_ millions to in the draft allocation resolutions (Para. 2d of Annex II and Para. 3b) may be unnecessarily inviting.] In light of this uncertainty, the approximate 50-50 split between IDA and surplus is as defensible as any other.

4. Second, the arguments advanced both for IDA and for surplus, however, are disturbing. With regard to IDA, it does not appear wise to argue for the allocation based on the entry of new countries whose eligibility has not been established, especially RCI whose eligibility looks quite doubtful. On the other hand, the suggestion that the surplus could be transferred to reserves if, because of faster growth in loans, net income were insufficient to permit loan charge waivers, suggests that reserves do not have "first call" on net income after all. In that event it would be better to leave the surplus untouched and available for transfer to provisions or to reserves if a substantial weakening of the portfolio became evident.

### Portfolio Review and Risk Management

5. A superb paper -- substantive, well-written, and right. I will concentrate on two portions, the country risk ratings and the recommendations.

6. I have canvassed the opinions of the other country reviewers and we largely agree with the country risk classification. The analysis of risk clusters was also very good (although a footnote definition of each would have been helpful). Following are reactions to specific countries:

Malaysia:	}	Strong agreement with these upgrades.
Chile :		
Paraguay;		
Egypt:		The change in country circumstances is indeed dramatic, but there was some concern that the upgrade may be premature.
India:	}	Downgrades definitely required
Jordan:		
Yugoslavia:		
Mexico:		Agree to delaying the upgrade, especially until the price control regime (PECE) is fully removed or non-binding.
Turkey:	}	Upgrading deserved very little consideration.
Zimbabwe:		
Argentina:		
Trinidad:		Upgrading should have been considered.
Brazil:		A close call, but agree that downgrade not quite appropriate.
Ecuador:		Another borderline candidate for downgrading.

#### Recommendations

7. The recommendations are far-reaching, but deserve favorable consideration. The reduction of the risk categories about which judgements are required from six to three makes a lot of sense on its terms and is related to the recommendation to draw more operational implications from risk classifications. Further differentiating the Bank DSR by the new risk category is also a good idea. In view of the difficulty many governments have in translating external surpluses into debt service payments because of fiscal deficits, some consideration could be given to developing a fiscal as well as balance of payments guideline. Also, would it be possible to further refine the risk classifications to enable them to be used to guide provisioning decisions?

8. The shift from a portfolio share to an income share exposure limit is not well argued. While it is true that the income risk is more fundamental (or at least more immediate) than the portfolio risk aspect of non-accrual, converting this into an operational guideline seems unnecessarily complex. The new ratio, for example, would be affected by differences between the average interest rates paid by different countries, but would these differences be significant enough to justify the additional calculation. The new ratio would also be affected (as it properly should be) by a general movement in interest rates, but these tend to move slowly and the same operational effects could be achieved by revising the portfolio limits. A lot more work needs to be done on this idea before it is accepted, if at all.

9. PRE should support more frequent CSPs and PC reviews for high-risk countries as recommended, but compliance with existing frequency policies would solve most problems. Also, my impression is that CSPs of most of these countries are already reviewed by the PC.

10. Concerning adjustment lending, some of the proposed changes are puzzling. All adjustment lending is aimed at "exceptional" financing needs and all ALs are supposed to be in support of "strong stabilization and adjustment programs." I share the implicit criticism that there have been too many ALs with weak financial justification and inadequate programs, but the remedy is beyond the scope of this paper and should not be applied only to the higher risk countries. The new guideline would insure that ALs would almost always be covered by a current CSP, but PRE should second the recommendation to require CSP before ALs to long dormant borrowers or high risk borrowers where AL was not part of the existing strategy.

11. Greater involvement of risk considerations in investment lending should be welcomed, as a greater share of Bank lending will be moving in that direction. Consideration should be given to requiring OC review of relatively quick disbursing policy based sector investment and financial intermediary loans at least in the moderate risk/high exposure and high risk countries.

12. PRE should support the recommendation that business plans be explicitly related to the CSP and that the levels of lending proposed be consistent with the policy triggers in the most recent CSP (or be re-justified in a strategy update). This proposal is consistent with the message of the lending instruments paper on relating the entire lending program to advancing policy reform.

13. The recommendation on negative pledge and guarantees look plausible, but they are not discussed in the paper.

cc: Messrs./Ms. Thalwitz (PRESV) Rajagopalan, Colaco (PRSVP), Summers, de Tray, Walton, (DECVP), Shakow (EXTDR), Isenman (PRDDR), Husain, (IECDI), Stoutjesdijk (FRSDR), Opper (FRSFP), Kilby (FRSRM)



# Record Removal Notice



<b>File Title</b> Resettlement & Environment - 1v		<b>Barcode No.</b>  1153501		
<b>Document Date</b> 6/14/1991	<b>Document Type</b> Report			
<b>Correspondents / Participants</b> Risk Management and Financial Policy Department				
<b>Subject / Title</b> 1991 Country Risk Management and Portfolio Review, Volume 1 - Main Report				
<b>Exception(s)</b> Corporate Administrative Matters				
<b>Additional Comments</b>		<p>The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information. This Policy can be found on the World Bank Access to Information website.</p> <table border="1"><tr><td><b>Withdrawn by</b> Bertha F. Wilson</td><td><b>Date</b> 15-Jun-23</td></tr></table>	<b>Withdrawn by</b> Bertha F. Wilson	<b>Date</b> 15-Jun-23
<b>Withdrawn by</b> Bertha F. Wilson	<b>Date</b> 15-Jun-23			

S-5049

THE WORLD BANK  
RISK MANAGEMENT & FINANCIAL POLICY DEPARTMENT

FAX NO.: 202 477-0861

NO. OF PAGES: 5  
(including this page)

FACSIMILE TRANSMITTAL FORM

DATE: October 1, 1991  
TO: Mr. D. C. Rao, 477-0661  
Mr. Fred Levy, 477-1569  
Mr. Richard Lynn, 334-0566  
FAX NO.:  
FROM: Fred Kilby, FRSCR

cc. Summers  
J. Linn  
F. Colaco  
R. Liebenthal

SUBJECT: Report of Working Group on Risk Management Procedures

Del  
10/1

On Ardy's behalf, I am attaching the final version of the report of the Risk Management Country Group, which takes into account your helpful comments and suggestions on the earlier draft.

Thank you for your help and advice in this endeavor.

*Fred Kilby*  
Fred Kilby

Attachment

Oct. 2  
Mr. Rajagopalan  
for info. *RP 10/7*  
Francis  
Pankaj  
PT keep a copy in *man files*  
*RP 10/7*

## REPORT OF WORKING GROUP ON RISK MANAGEMENT PROCEDURES

September 16, 1991

1. The 1991 Portfolio Review recommended changes in the country risk management system in place in the Bank. Among the decisions taken following the President's Council meeting of July 10, 1991 was to request the Senior Vice-President Finance to appoint a working group with representations from OPN, PRE and CPB to report to the President with recommendations by September 30, 1991. Following is the report of this working group.
2. There was unanimous agreement by the members of the group that the risk management classification system should be streamlined and that the classification system should have clearer operational implications. The group accepted the proposal made in the 1991 Portfolio Review to introduce four risk categories:
  - Category A - Low Risk Countries (countries currently classified as I, IIa and IIb). For this group of countries, the pace, pattern and level of Bank lending would be determined primarily by the comparative advantage of the Bank in assisting the country in meeting its development objectives in relation to the Bank's overall resource and exposure constraints.
  - Category B - Moderate Risk Countries (countries currently classified as IIIa and the less risky IIIb countries). For this group of countries, exposure management concerns can be effectively addressed through CSPs. Country Departments would, however, be given broad latitude to adjust lending programs to reflect changing realities in the period between CSP reviews. In line with the recommendations of the Bank Task Force on the Lending Allocation Review, lending programs which differ significantly from agreed country strategies would require special justification in the annual business plan or through an updated CSP or country strategy note.
  - Category C - High Risk Countries (countries currently classified as IIIc and the marginally creditworthy watchlist countries in category IIIb). For this group of countries, the security of the Bank's preferred creditor position is more seriously in question. This group of countries is likely to be or come under exceptionally severe financial pressures that could lead to protracted arrears to the Bank. This risk arises either because even with a strong policy effort, the likely level of external financial assistance available to the country may be insufficient to alleviate the country's liquidity problems, or because there are serious doubts concerning the capacity or willingness of the country to implement a sufficiently strong policy effort that could lead to medium-term financial viability and a restoration of creditworthiness. For these countries, the design of the lending program should give particular attention to explicit risk management objectives.

- 2 -

Category D - Uncreditworthy (countries currently classified as IIIId). This group would consist of the non-accrual countries and former IBRD/IDA countries that are now IDA-only.

3. Operational Implications. The advantage of the proposed risk classification system is that it provides a simpler basis for managing country risk effectively, in terms of identifying the minimum frequency with which country lending levels should be reviewed and by whom, the relative weight which should be given to exposure management concerns in the formulation of country assistance strategy, and the lending authority delegated to regional management.
4. The Group recommends that the appropriate Managing Director should determine which countries should be classified as high risk based on the recommendation of the Vice President, Financial Policy and Risk Management and information provided by the Regional Vice Presidents. The determination of whether the Bank's preferred creditor status is seriously at risk is clearly a matter for judgment. The Group agreed that this category should be limited to the countries which on prudential grounds require the closest guidance from the Managing Directors, in terms of lending authority and where changes from the agreed strategy would require the approval of the relevant Managing Director. Also, in a departure from current practice, the annual portfolio review should make specific recommendations on the risk management procedures that would be followed in each particular high risk country. The Group agreed that the lending posture of the Bank should reflect the circumstances of the individual country and that the downgrading of a country to high risk should not automatically lead to a move to a core lending program. Most members agreed that country strategy in high risk countries should be reviewed at least every two years. This change would only affect countries with annual lending programs of less than \$500 million, since countries with lending programs above this level are reviewed at least bi-annually.
5. The Group agreed that in view of the costliness of producing CSPs, it would not be necessary for Country Departments to produce full CSPs in the smaller high risk countries every two years. Rather the Country Department's strategy would be reviewed in a relatively brief "codicil" to the CSP, which would focus on the country's creditworthiness prospects and the Country Department's specific proposals for managing country risk. These codicils should also be prepared for large borrowers which are downgraded to high risk status in off-CSP cycle years.
6. Exposure Guidelines. The group agreed that the exposure guidelines were useful risk management tools. They serve an important function in triggering management scrutiny of exposure issues in country strategy and lending allocation reviews, and in safeguarding the Bank's preferred creditor status. It was accepted that country lending strategies needed to take explicit account of the implications of the Bank lending in relation to the guidelines and that senior management approval should continue to be required for lending programs that would result in the guidelines being exceeded. With one member dissenting, the Group endorsed the proposal to raise the exposure

- 3 -

guideline for IBRD debt service in relation to exports to 6 percent of exports for low risk borrowers from 5.5 percent currently, and introduce a lower share of exports guideline of 5 and 4 percent of exports for moderate and high risk countries, respectively. Most members believe the proposal has the merit of introducing some selectivity into the risk management process and is in keeping with the current management practice of endorsing lending programs that exceed the guidelines for countries with superior performance and credit-worthiness. Moreover, the Board has expressed its support for differentiated guidelines linked to country considerations.

7. The representative from Operations dissented from the recommendation to widen the variability of the guideline on IBRD debt service relative to exports, arguing (i) that setting a lower bound for high risk countries was redundant and unnecessary, inasmuch as the lending programs for category C countries were routinely subjected to greater management scrutiny in any event; and (ii) that efforts to fine-tune the guidelines in this fashion lend them a deceptive aura of precision not supported by our ability to predict debt-servicing problems. In his view, it would be preferable to return to the uniform guideline that previously had been applied. Another member felt that there would be a practical problem if the Bank were to establish differentiated guidelines for different risk categories since this could lead to countries breaching the guidelines as a result of downgrading. It might be impossible to bring countries below the guidelines for that risk group for several years, since a downgrading from category A to category B or from category B to category C would imply that countries might need to increase exports by as much as 20 and 25 percent, respectively, to remain within the lower guidelines. However, in the view of Finance, it was entirely appropriate for a downgrading to lead to a presumptively tighter exposure guideline. It was clearly understood that the guideline was meant to serve as a trigger for management scrutiny rather than as a formal exposure limit. The other members of the Group concurred with this view.

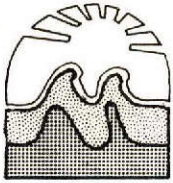
8. The Concentration Guideline. When the present portfolio guideline was last reviewed, the 10% threshold was considered appropriate for two reasons. From an equity standpoint, it appeared reasonable and from a financial standpoint, the 10% threshold was a strong prudential limit in relation to the Bank's prospective net income. In practice, the guideline has not been particularly successful in promoting portfolio diversification, the top two borrowers account for 22 percent, and the top five borrowers 45 percent, of the portfolio. More importantly, as the Bank balance sheet has evolved the protection offered by the 10 percent guideline has changed. Loan income from a country at the 10 percent exposure guideline has increased substantially in relation to the Bank's net income over the years, from 30 percent in FY85 to 65 percent in FY91. In response to this changing pattern of risk, the 1991 Portfolio Review suggested moving away from the portfolio share guideline to an alternative directly based on the Bank's risk-bearing capacity. It was felt that such a change would be particularly helpful in focusing Senior Management attention on the specific income risks that the Bank was facing in lending to large borrowers.



- 4 -

9. In view of these concerns, the Group considered a number of proposals made by Finance to modify the present concentration guideline from the current situation, where loans and guarantees outstanding to a single borrower should not normally exceed 10 percent of the total portfolio, to a guideline that would relate exposure more directly to the income risk that the Bank faces when large borrowers go into non-accrual. After careful consideration, the Group endorsed a two-pronged approach to exposure risk management. It is believed better to retain the current concentration limit, since it felt that the portfolio limit was both well established and well suited to ensure a broad geographic distribution of Bank lending. At the same time, the margin of Bank net worth over the exposure to the largest borrower can be made a more explicit part of the annual review and recommendations on the adequacy of provisions and reserves. Depending upon the assessed probability of non-accruals and the probabilities of other risks, the target margin can be raised or lowered. If, for whatever reason, the target margin cannot be achieved, the trade-off is to reduce the loan portfolio exposure limit to the largest borrower or to countenance a weakening of the Bank's financial protection standards. The Group believes that this important tradeoff can and should be explicitly addressed in determining the level of Bank lending to the Bank's five largest borrowers.

FKilby:01Oct91



WATER AND AIR RESEARCH, INC.

P. O. BOX 1121  
GAINESVILLE, FLORIDA 32601  
TEL. 372-1500  
378-1500

Date Rec'd. 5/1/73

Date Ack'd. \_\_\_\_\_

April 27, 1973 Assigned to Raja o/R

Novel

Rasmussen o/R

IN/221

Mr. V. Rajagopalan  
International Bank for Reconstruction and Development  
1818 H Street, N. W.  
Washington, D. C. 20433

Water Treatment at Bombay

Dear Raj:

*Inserted*  
*21*

Transmitted herewith are two introductory statements prepared for insertion into the April 13 report: one for Enclosure C; and the other for Enclosure D of my April 13 report. I believe these accomplish the intent we developed during our recent telephone conversation. The material is obviously fairly technical, and is aimed at a readership having some acquaintance with water treatment technology.

It occurs to me that perhaps BMC may not have personnel with such background. I do not know the training background of the one man who was highly recommended: Shri Mirchandani. Hopefully, he will have had graduate training in environmental engineering and science. If not, BMC probably should move to either provide such training to one or more of its people, or else employ someone who has had it. BMC will need to have several highly-qualified people to supervise purification and water quality control. Two whose names come to my mind are Bengalis: Drs. Deb and Ghosh.

Unless you find further information is needed on the April 13 report, I plan to consider the present engagement by the Bank to be completed with this transmittal. We would be glad to be associated with the supervision of the pilot plant work and, should that prove to be desirable, we will be glad to submit a proposal for such work.

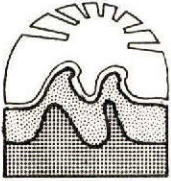
Permit me to express our appreciation for being brought into this investigation. It has been enjoyable and, I feel, constructive.

Best personal regards,

H. E. Hudson, Jr.

HEH/am  
Encl.





# WATER AND AIR RESEARCH, INC.

P. O. BOX 1121  
GAINESVILLE, FLORIDA 32601  
TEL. 372-1500  
378-1500

April 26, 1973

Date Rec'd. 4/30/73

Date Ack'd. \_\_\_\_\_

Assigned to Raja o/r

based

Rasmussen o/r

INV/219

Mr. V. Rajagopalan  
International Bank for Reconstruction and Development  
1818 H Street, N. W.  
Washington, D. C. 20433

Dear Mr. Rajagopalan:

Pursuant to our telephone conversation yesterday, I am working on preparation of some supplementary material for the report I forwarded to you April 13, 1973. This will be descriptive material to clarify the content and intention of the computations and sketches in Enclosures C and D of that report.

You have asked me to state the qualifications of the person who should be supervising the planning, guiding and evaluating of pilot plant work at Bombay toward the end of establishing sound design criteria for the final treatment plant design. He should be an individual with wide field experience in treatment plant operation, which experience might have been obtained through work on water treatment operations in a governmental or water utility agency, a research organization, a consulting office or a water treatment equipment manufacturer. He must also have had experience in the techniques of pilot plant construction and operation at several different locations where they have been used to provide the basis for design of full-fledged large plants. His knowledge in this field should be such that he can quickly identify adverse results while the data are being collected, so that the testing program may be modified in ways that would hold promise of yielding more-favorable results.

The treatment scheme proposed for the Bhandup plant is somewhat unorthodox, although there are some precedents for its employment under similar circumstances. It is in the Bank's interest to be sure that the design is soundly based on adequate and appropriate pilot plant data to be obtained before September 1973. Without such data, it is quite probable that the Bhandup design could yield a plant that could be very difficult to operate satisfactorily. This requires the services



Mr. V. Rajagopalan  
Page 2

of an individual having experience such as I have described above. I found nothing in the communications from BMC and GOI, nor in the consultants reports to indicate that any person of such qualification had participated in the project up to the present time.

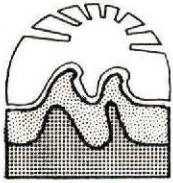
Derek Miller of the Water Research Association has such qualifications. So does my associate, Dr. J. H. Sullivan, Jr. There are, no doubt, others who are similarly qualified, but they are not easy to find.

Very truly yours,

A handwritten signature in cursive script, appearing to read "H. E. Hudson, Jr.", written in dark ink.

H. E. Hudson, Jr.  
President

HEH/am



WATER AND AIR RESEARCH, INC.

P. O. BOX 1121  
GAINESVILLE, FLORIDA 32601  
TEL. 372-1500  
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April 13, 1973

Mr. V. Rajagopalan  
International Bank for Reconstruction and Development  
1818 H Street, N. W. (Room 622)  
Washington, D. C. 20433

Appraisal of Bombay Water Supply.  
Review of Treatment Plants Design.

Dear Mr. Rajagopalan:

Herewith is draft copy of my report on the subject activity. I have tried to keep it concise, and have not added new material at any length. If you feel that more information is needed, I'll be glad to provide it.

I want to express my appreciation to you, Mr. Mould and Mr. Rasmussen for the help and assistance provided to me. In addition, you should know that the personnel at Binnie and Partners were most cordial and helpful to me, particularly Messers Crowley, Atkin, Gibbs, and Phillips.

Very truly yours,

H. E. Hudson, Jr.

HEH/am

Encl.

Discussed with Mr. Hudson on telephone on April 23. He has agreed to send a letter giving his comments on the capability of BMC, CPHEERI or Binmies to undertake the pilot plant studies. He will also expand notes in section C & D with descriptive material and forward copies as soon as possible.

Date Rec'd. 4/17/73

Date Ack'd. By Telephone

Assigned to Raja

~~Need~~  
Rasmussen

IN/206

WD  
23/4/73.





## CONTENTS

### REPORT ON APPRAISAL OF BOMBAY WATER SUPPLY PROJECT

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#### ENCLOSURES

- A. COMMENTS MARCH 16, 1973
- B. LETTER RE PILOT PLANT WORK  
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APRIL 1973

Report

COPPER REINFORCED  
Made in U. S. A.

Report  
to the  
International Development Association  
on  
Appraisal of Bombay Water Supply Project

by  
H. E. Hudson, Jr.\*

Authority

The writer carried on his review of planning for the proposed expansion of the Bombay water supply under authority of letter dated February 27, 1973 from M. vanGent, Chief, Consultants Section, IBRD, Washington, D. C.

Terms of Reference

The terms of reference were briefly stated in the letter mentioned above, and more fully stated in an IBRD memorandum dated March 9, 1973 to the writer, prepared by Mr. V. Rajagopalan, requesting the writer to confer in the offices of IBRD, Washington, D. C. on March 9, and then to proceed to London March 10 to discuss with Binnie and Partners the proposed work, and to collect relevant data. Extracts from the Consultant's (Binnie's) reports were provided to me by IBRD on March 9. The objective of the work under this engagement was to review, before the design proceeds further, the concepts as to treatment processes, plant design and capacity of the master balancing reservoir.

\*President, Water and Air Research, Inc.  
P. O. Box 1121, Gainesville, Florida 32601

More specifically Mr. Rajagopalan's memorandum stated that the review should include, but not necessarily be limited to the following subjects:

- (i) qualities of the raw water available from the various sources and the expected blended water qualities;
- (ii) need for the proposed treatment plants and if they are justified, the adequacy of the treatment processes proposed;
- (iii) review of the treatment plant designs prepared by the consultants with a view to suggesting modifications, if any, required in order to ensure the desired performance from the treatment plants;
- (iv) review of possible harmful effects due to residual alum floc carry over, deposits, corrosion, etc. on the transmission mains between Panjrapur and Bhandup;
- (v) review of effects of the treatment as proposed at Bhandup on frequency of filter washings, possibilities of delayed chemical reactions, floc carry over, etc.;
- (vi) review of the general site plans of the proposed treatment works at Panjrapur and Bhandup; and
- (vii) review of the need for and the capacity of the proposed master balancing reservoir and the filtered water reservoir.

Mr. Rajagopalan's memorandum also requested the writer to return from London via Washington and to discuss findings with IBRD representatives March 19, 1973. This was done. An additional conference was arranged at IBRD's Washington office March 29 which was attended by the writer, and representatives of the Bank, Binnie and Partners, and of the Bombay Municipal Corporation.

### Procedure Followed

In London the writer conferred much of the first two days (March 12-13) with Messers Atkin, Gibbs and Crowley of Binnie and Associates, accumulating information on the proposed design. During this same period and in the two following days, he studied reports and design drawings for the proposed treatment works, together with information sent to Binnie and Partners by CPHERI (Central Public Health Research Institute) on pilot plant work conducted at the Pogaon filtration plant by CPHERI in August-September 1971.

On March 14 and 15, I prepared a "Note on Control of Operation of Bhandup Filtration Plant" which was reviewed with Binnie's personnel. On the 15th and 16th I prepared further "Comments on Bombay Water Supply Project as Planned by Binnie and Partners for the Bombay Municipal Corporation and Government of India". This (Enclosure A) was reviewed with Binnie's personnel on March 16. The earlier "Note on Control ....." was attached to this summary of "Comments" as Annex I. These comments are attached as Enclosure A.

On March 21, the writer wrote Binnie's (with copy to IBRD) to provide supplemental comments and reference material. That letter, dealing chiefly with plans for pilot plant work, included 5 annexes as follows:

1. Reprint of paper "Physical Aspects of Filtration".
2. Reprint of paper "Density Considerations in Sedimentation".

3. Copy of paper now in press: "Evaluation of Plant Operating and Jar Test Data".
4. Copy of manuscript Chapter III in book now under preparation "Residence Times in Pretreatment". (6 additional pages have since been added to this).
5. Copy of similar manuscript Chapter X "Declining Rate Filtration".

My March 21 letter with its annexes is attached as Enclosure B.

In preparation for the March 29 meeting, 8 pages of notes and computations were prepared and they are attached as Enclosure C. These have to do with need for further pilot plant work, cost of coal filter media, revision in design of Bhandup filters, and need for and outline of pilot plant work. All the material in Enclosures A-C have been given to IBRD and Binnie, and presumably passed on to BMC.

Subsequent to March 29, additional computations and sketches for pilot plant units have been made and they are included as Enclosure D. These have not been previously distributed. In a number of instances, early conclusions have been superseded as the work progressed. Where conflicts between the various Enclosures appear, the later one should prevail.

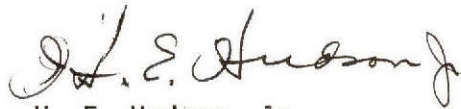
#### Findings and Conclusions.

Major findings and conclusions are stated below with references to the Enclosures in which more detailed information is contained.

- 1) Further pilot plant work during the 1973 monsoon season *and after* is needed to establish design criteria for both the Panjrapur and Bhandup plants.

- 2) The design criteria needed for both plants have to do with mixing intensities. For Bhandup, filter media criteria must be established to prevent the periodic occurrence of short filter runs (Encl. C.).
- 3) Use of coal filter media will probably be essential at Bhandup. An intensive search should be initiated for Indian coal to minimize import costs.
- 4) A pilot plant test program has been outlined (Encl. C.) and sketch plans for equipment have been included (Encl. D.).
- 5) To date filter run computations have been based on too-limited test data, and on a questionable computation procedure based on suspended solids, assuming that filters would clog when the suspended solids applied reached one pound per square foot. In my experience I have found filters to clog completely with an applied suspended solids load of 0.12 lb/sq ft. Volume of floc applied to the filter is a more meaningful concept (Encl. 2, Annex 1). In some instances the presence of algae, particularly diatoms, will cause very rapid clogging at the filter surface. Careful selection of the filter media is necessary to avoid very rapid filter clogging.
- 6) Data from two pilot plants with which the writer has worked in 1972 and 1973 show that, with similar pre-treatment and filtration with coarse coal-fine sand beds at similar filtration rates, filter runs of 7 hours were frequently experienced. Data in Encl. C show that runs that short could cut plant capacity by 15 per cent.
- 7) On the face of the data described under 5) above, the Panjrapur plant appeared necessary during part of the monsoon season. Since those data are of questionable applicability, and indicate that the plant would be needed only a small fraction of each monsoon season, it would appear desirable to plan to defer construction of the Panjrapur treatment facilities until the necessity for them is more clearly established.
- 8) A modified scheme of operational control for the Bhandup filters is recommended in Annex I to Encl. A. This scheme makes operational control simpler and, at the same time saves some operating head and pumping cost.
- 9) Use of hand-operated butterfly valves for filter control is recommended instead of power-operated valves.

- 10) In view of the necessity to continue rationing of water in the City and the resulting flow control difficulties, the Master Balancing Reservoir recommended at Bhandup appears necessary.
- 11) Numerous other matters of detail are discussed or listed in the several enclosures.



H. E. Hudson, Jr.

HEH/am



ENCL A

ENCLOSURE A

SUMMARY

COMMENTS ON BOMBAY WATER SUPPLY PROJECT,  
AS PLANNED BY BINNIE & PARTNERS FOR THE  
BOMBAY MUNICIPAL CORPORATION AND GOVERNMENT OF INDIA  
BY H. E. HUDSON JR.  
AT BEHEST OF WORLD BANK

Note: Hudson's terms of reference were primarily pointed toward water quality, treatment processes, plant functioning, and process control.

## BOMBAY

### General Observations

1. On conclusion of the present program, as soon as finances will allow, a complete new source of supply should be developed, probably from Bhatsai, Ulhas and other rivers and impoundments south of existing sources, transmitted by tunnel to the city.
2. It appears that this new supply should be fed into the City's southernmost reservoirs. Existing transmission capacity from the vicinity of Vehar Lake through the city could then be integrated into the city's distribution system and, if the new source is made large enough, 24-hour safe supply could be obtained in one stroke.
3. Existing and proposed reservoirs appear larger than should be needed for a city having a demand of 500 mgd, but appear to be necessary because of (a) the lack of information on true demands and their hourly variation, and (b) because of the manual rationing system now in use, which is certainly very difficult to regulate and control. As supply and demand grow, the reservoirs will shrink to more nearly their proper proportion of the peak day demand.

(i) Qualities of the Raw Water Available from the Various Sources  
and the Expected Blended Water Qualities

Quality of water to be treated at Bhandup, obtained from the Vaitarna and Tansa sources, is steady and of a nature that should be easy to treat by the proposed flocculation - filtration process. The writer has participated in design of two plants now operating satisfactorily with this process, at London, Ontario (in association with Jas. McLaren Assoc.), and at Tuxedo Park, N. Y. He is currently involved in pilot plant work on similar processes at Bridgeport, Conn., and Lynn, Mass. These studies have led to design criteria for filter media and rates essentially the same as those recommended in the Binnie report.

Quality of the Bhatsai water, however, will be considerably more variable than the impounded sources, especially during the monsoon season, due to high solids loads. These concentrations occasionally rise to levels as high as 300 mg/l. When the 100 mgd of pumped Bhatsai water is blended with the 320 mgd of upland water, the suspended solids concentration in the mixture will drop to the range of 75 - 100 mg/l. From North American experience, I would judge this to be too high a level to treat successfully with the proposed flocculation - filtration process. To reduce the concentration, flocculation and sedimentation of the Bhatsai water will be required at times, as proposed.

The attached graph, Figure (i)-1, shows that on the average, during the 3-month monsoon season, flocculation will be needed about 12 days per year. Assuming that coagulant dosages are kept as low as is needed to obtain the desired reduction in solids, the residual floc carry-over should not cause substantial impairment of the Panjrapur rising main, nor of the Vaitarna mains.

TURBIDITY AND SUSPENDED SOLIDS IN THE BHATSAI RIVER AT PISE  
MONSOON PERIOD 1970 - 1972

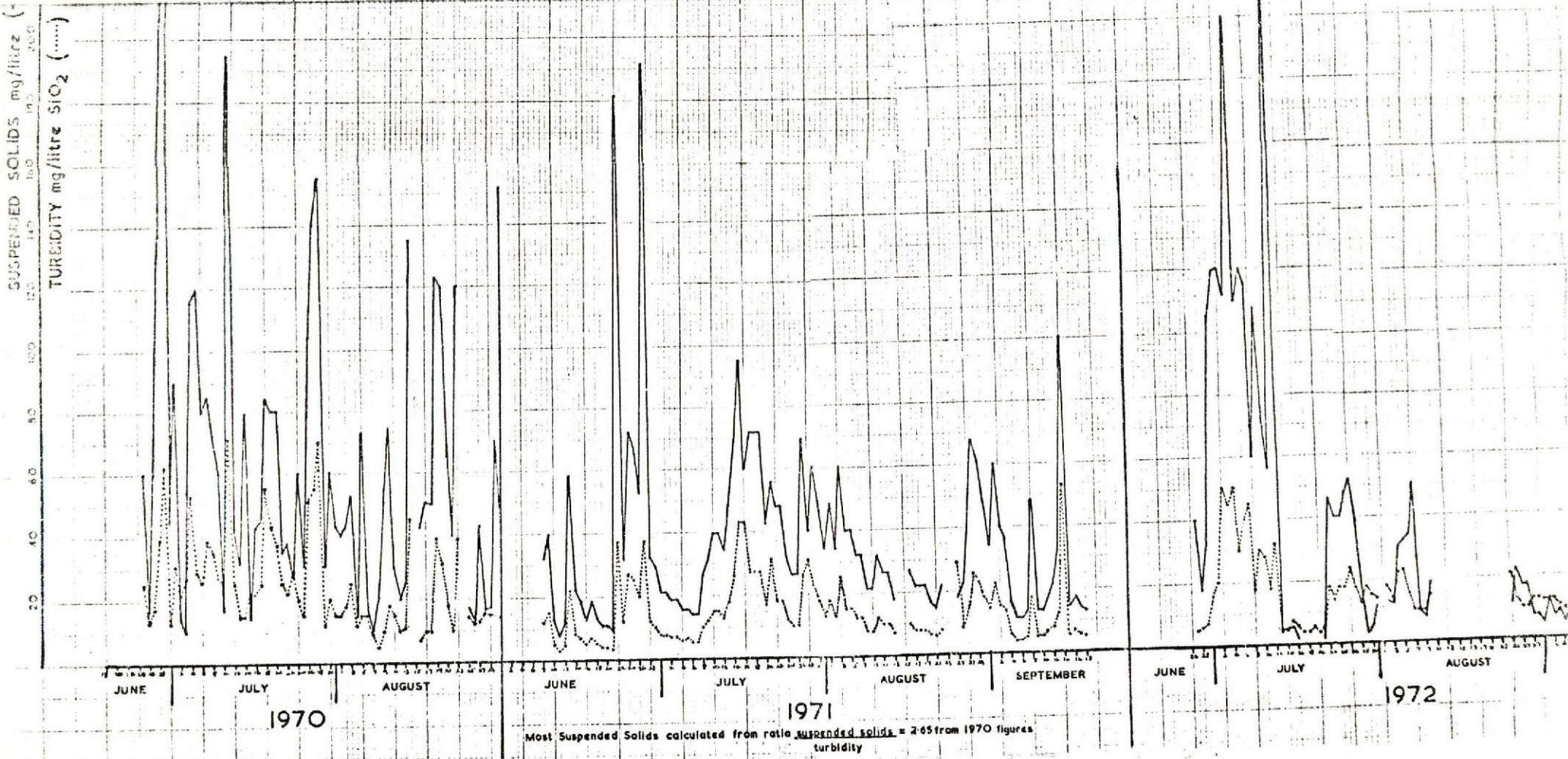


FIG 1-1

(ii) Need for the Proposed Treatment Plants and, if they are Justified,  
the Adequacy of the Treatment Processes Proposed

Both plants are needed and justifiable. There could be question as to the need for the Panjrapur works but, since Bombay urgently needs the entire capacity and more, at once, it appears prudent to build the Panjrapur works. They will provide year-round plain sedimentation in addition to flocculation - sedimentation protection against peak solids loading. In general, the processes, residence times and loadings appear reasonable, appropriate, and adequate.

(iii) Review of the Treatment Plant Designs - Modifications to Ensure the Desired Performance

A modification of the Bhandup plant and filter control scheme is recommended, as described in Annex I.

As presently indicated in the reports, insufficient mixing intensity is provided for flocculation in both plants. Baffled mixing and flocculation chambers should be provided, and these will require more head loss than is currently contemplated. Further jar testing will be needed to establish design criteria firmly. On the basis of present experience, the contact opportunity, or camp number may be taken as  $Gt = 30,000$ . Tapered flocculation appears desirable. Until more precisely defined, an allowance of 3 feet head loss would appear reasonable. Further jar testing should be done to develop the design criteria.

Settling basin outlets at Panjrapur are now shown as weirs. Submerged launders would be preferable, as they would allow use of storage in the basins to absorb differences in pumped flows between Pise and Panjrapur.

Whether filter washing should be done by direct draft on the treated water rising mains, is questioned. Consideration should be given of connection to the Master Balancing reservoir or to a washwater tank.

Alum diffusers should be relocated directly above the mixing weir plunge points.

At Panjrapur, settling basin inlets should be revised to provide permeable baffles to provide more uniform horizontal and vertical introduction into the basins.

At Panjrapur, in addition to the inlet permeable baffles, intermediate permeable baffles may also be desirable in the settling basins because the flocculation - settling process will only be used under conditions that will produce serious diving density currents.

The report recommends 0.8 - 0.9 mm uniform sand unless a 0.6 mm sand - 1.2 mm coal bed proves less expensive. In my judgement, this is not put as it should be. I believe the coal - sand beds offer so much advantage in longer filter runs and better effluent quality as to justify spending at least twice as much for the dual media as for sand alone. Further pilot plant testing should be done in this regard at Pogaon

(iv) Effect of Alum Flocculation Carryover on Corrosion and Deposition

Nil.

(v) Filter Washing Frequency, Flocculation Carryover, etc.

- a. Filter washing with sand may be as frequently as 6 hours.
- b. Dual media can render important aid here and further pilot plant work is required.

(vi & vii) Site Plans and Reservoirs

- a. Suggest putting MCC closer to plant control center.
- b. Layouts otherwise O.K.
- c. Storage in MBR and Filter Plant needed because of difficulty to control rationing to city, and sensitivity of plant to flow fluctuations.



ANNEX I - A

NOTE

ON CONTROL OF OPERATION OF  
BHANDUP FILTRATION PLANT

1. Flow discharged from Bhandup treated water pumping station is to be maintained at 420 mgd at all times. Variations in demand in Bombay due to the operations of the rationing crews are to be taken up in the Master Balancing Reservoir.
2. Flow out of the treatment plant will be governed hydraulically by the demand of the treated water pumping station.
3. A chosen differential head, between (a) the flocculated water level and (b) the filtered water level in the chlorine contact - reservoir basins, will be maintained by the treatment plant operators. The differential selected will probably be in the range of 1.25 - 1.5 meters. The operators will be instructed to maintain the selected differential within  $\pm 10$  per cent, or some other range if found desirable on the basis of experience.
4. The treatment plant operators will maintain the selected differential by changing the filter washing schedule as decided by the plant chief: if the differential is seen to be increasing, the interval between upwashing each filter is reduced; and vice versa.
5. Responsibility for maintenance of flocculated water levels in the plant must pass through the Main Control Center. For this reason, it is suggested that the Main Control Center should be located within the treatment plant, at the operating floor level, where control personnel can visually observe the flocculated water levels, and so that the MCC personnel can check with plant personnel personally as to whether level variations are caused by plant manipulations.
6. Control of flocculated water level will be attained by adjustments to the control valves on the Vaitarna and Tansa lines at Agra Road Yard. Flocculated water level should be kept at or near the level of the overflows in the treatment plant. A level variation of about 30 cm. may be anticipated.
7. When filtered water pumping capacity, owing to the combination of pumps used, must perforce exceed the selected filtered water discharge

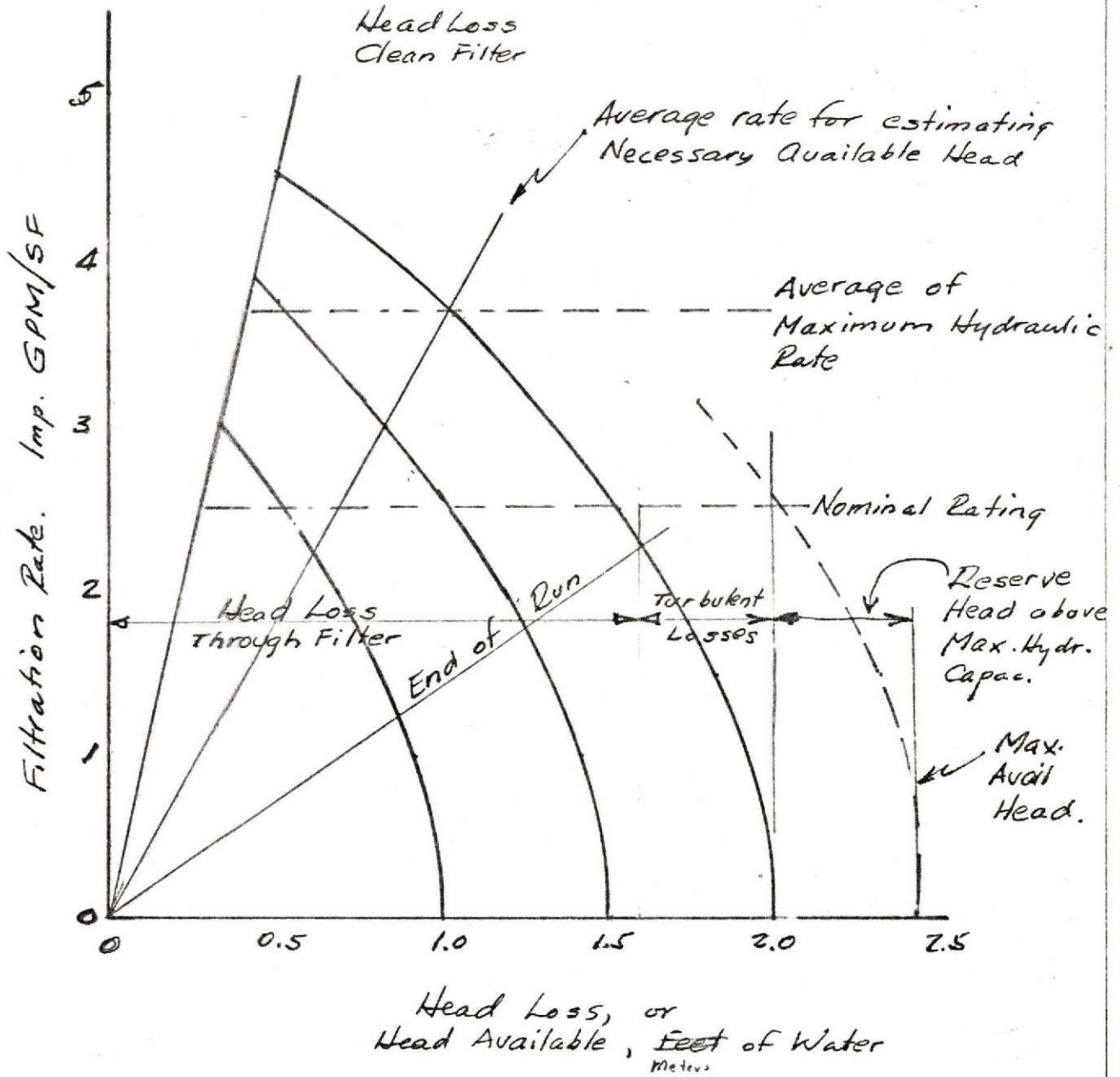
rate, discharge of filtered water will be trimmed by bleeding pumped filtered water back to the filtered water reservoir. The bleed connection should be located between pump discharge and flow meter.

8. In the event of a power failure at Bhatsai or a burst trunk main upstream of Bhandup, flow to Bhandup will diminish rapidly. Action to be taken in this event will be to increase flow from reservoirs, if possible. If that is not or cannot be done promptly, the Bhandup filtered water pumping rate will automatically be reduced in steps by reservoir low-level controls.
9. The normal flow line in the chlorine contact chamber and the filtered water reservoir will be raised from the originally-proposed level of about 83.0 m. to 84.5 or 85.0 m. Thus the floors of this chamber and the pumping station may be raised 1.5 to 2.0 m., depending on site conditions. Correspondingly, the walls should also be heightened, and the soffit of the roof should be located at a level above the highest level of water in the filtered water inlet channels when the plant is overflowing at a 520 mgd. Failure of one pump or the entire filtered water pumping plant at Bhandup will cause the filtered water reservoir level to rise, reducing the differential head available for filtration. This, in turn, will hydraulically cause the rate of filtration to reduce, or even halt completely. Unless the inflow to the plant is promptly reduced by action on the Bhatsai scheme or at Agra Road Yard, the treatment plant overflows and the raw water overflow will begin to function. These may need to handle the full plant flow for a time.
10. The system described above will have a potential head loss approaching 2.4 meters (difference between settled water level and outlet sealing weir crest), but will ordinarily operate with a total head loss through the filtering system of about 1.25 meters.
11. The proposed system described above is intended to provide the following characteristics:
  - a. Savings of head in pumping the entire 420 mgd of about 1.5 - 2 meters.
  - b. Provision of a hydraulic back-pressure control over filtration rates for all filters simultaneously. The system automatically slows, speeds or halts filtration rates in response to inflow or outflow changes.
  - c. Any rate changes that do occur are cushioned by the hydraulically-balanced use of storage throughout the treatment plant, so that water quality is not impaired as a result of rate increases.

- d. Decisions as to effluent valve settings are taken away from individual filter attendants. These valves are either entirely open, or closed.
- e. Each filter should be fitted with an effluent piezometer and sampling tap to enable identification of rogue units.
- f. A fixed procedure for gradual opening of filter inlet valves will provide a slow start for the filters.
- g. The use of manually-operated butterfly valves for the entire filter control system should have high priority. There should be no hesitation about manual operation of butterfly valves up through 30-inch line size.
- h. The control of overall filtration rates proposed in the Binnie reports was manual, by the judgement of the individual filter attendants. Under the system proposed herein, the control is under the direction of the plant chief operator, and can be directly checked by the Master Control Center.
- i. The scheme above described calls for elimination of the individual filtered water weirs and the weir at the chlorine contact chamber outlet, provision of a sealing weir at the inlet to the contact chamber, and revision of the filter effluent piping as shown in ~~Figure I-1~~.

End. C

42 381 50 SHEETS 5 SQUARE  
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NATIONAL



PRELIMINARY DESIGN SCHEME  
FOR DECLINING-RATE FILTERS.

ENCL B

ENCLOSURE B

March 21, 1973

Binnfe and Partners  
Artillery House  
Artillery Row  
Westminster, London  
SWIP IRX

Attention: Mr. Frank Crowley

Gentlemen:

In accordance with discussions in your office with respect to the proposed new 420 mgd water supply for Bombay, I am transmitting herewith several documents that provide supplemental details for your information.

Three of these are reprints of recent papers of mine. Item 1 deals with floc volumes, calculated from readings of piezometers at various depths within the test filters. The same kind of testing procedure should be used on the pilot filters at Pogoan. Item 2 deals with the density current problems to be expected at the Panjrapur Plant, if it is built. I am, however, very sympathetic to Mr. Rajogopalon's suggestion that the Pise-Yewai diversion could easily be shut down during high solids periods in the Monsoon season, thus eliminating the need for the plant.

Item 3 is in press at present, and will appear in the April or May Journal of AWWA. It deals to some extent with jar test procedures, and particularly with plants using sedimentation. Item 3 is not fully relevant to the present job.

Item 4 consists in two parts, one being copy of the manuscript for Chapter 3 in a book I have under preparation. It is a semifinal draft, and partly explains why I feel the baffling of your flocculating chambers is vital. The second part is a rough draft of part of Chapter 10 and contains an explanation of the computation of the turbulent friction component for declining rate filters. I have sought to put it in metric units with only partial success. This latter material needs a couple of complete rewrites, and I apologize for sending it to you in the present form, but know it will be weeks before I can complete and finish polishing it.

In the forthcoming test work at Pogoan, the water flocculated in the plant should not be used. Data to date, showing filtered water turbidities of 2-5 jtu, indicate that the mixing and flocculation there are most unsatisfactory. Filtered water turbidities should at all time be below 1.5, and preferably below 0.15 jtu. It will be desirable to build a special baffled mixing chamber, or perhaps two of them, with one serving as a fixed control, while mixing conditions in the other are varied.

The intent of the pilot work at Pogoan is to derive design criteria for mixing and filtration at Bhandup. This, on reflection, I find cannot be done by jar tests. Instead it requires model testing of mixing, followed by use of test filters. If two parallel streams are tested, both treated with a common coagulant dose in a single high-intensity mixer, then four test filters would be used, two for each separately flocculated stream: one coarse sand only; and the other with carefully-graded dual media. To freeze one variable, I'd suggest fixing the available head for filtration at 1.5 meters, and operating all filters at a fixed starting rate (which can be set by a permanently-set throttle valve or cock on each effluent). The filters would decline from a beginning rate of about 4.0 l/gpm/sf to a terminal rate of about 2.5 l/gpm/sf and a terminal head loss of about 1.0 m of water.

I am in accord with the nominal filter media sizes recommended in your report but feel that, in the dual media beds, a greater thickness of coarse media (say 60 cm) would help give longer runs. The underlying sand should be no less than 30 cm thick.

Without having done any computational work on the test data currently available, but on the basis of many years working with pilot plant filter data, I am satisfied from inspection of the 1971 data from Pogoan that the data do not correctly represent the performance of the beds you have recommended in your report. Neither do the data correctly represent the results that should be expected from the media described in the August 30, 1971 report from CIPHERI. That the filter runs from such dissimilar beds would be so nearly alike has not ever been reported, to my knowledge, and it seems to me inconceivable that this could truly have happened. The circumstances must have contained some unreported variables.

These are strong statements and require an explanation. I think there are two major things that may have been associated

with the unusual results reported. They are:

1. Flocculation at Pogoan was remarkably poor. This is shown by the small reduction in turbidity by sedimentation, which was commonly in the range of 30 to 50%, whereas with comparable waters (See Item 3, Figure 6) removals in the range of 60-95 per cent should have occurred. The poor flocculation is further borne out by the high filtered water turbidities.
2. I suspect most strongly that the filter beds, especially the dual media beds, had residual quantities of fine particles, at the top of either the anthracite or the sand, or both, that caused too-rapid surface plugging. Visual inspection during backwashing would reveal this. Such material should be removed, both in pilot and field size beds. It is commonly necessary to discard the top 2 or 3 per cent of the bed, after classifying by backwashing. The use of multiple piezometers tapped in at various depths below the bed surface, is also revealing in this regard.

It is not possible for me to overemphasize the urgent need for pilot plant work to complete the refinement of mixing criteria and to complete the selection of the ultimate filter media, to be purchased after the initial tenders for mechanical equipment are settled. The pinning down of the mixing and filter media criteria is absolutely central to the good functioning of the plant. Further, a serious effort should be expended on development of an Indian source of coal, for it is nearly certain to be required to replace attrition losses at Bhandup, and it will be wanted for use in other plants in India.

Very truly yours,

H. E. Hudson, Jr.

HEH/am

Encls.

cc: V. Rajagopalan



Herbert E. Hudson Jr.

# PHYSICAL ASPECTS OF FILTRATION

Relying on the work of John R. Baylis, the author describes the behavior of the traditional rapid sand filter, then extends the discussion to cover dual-media beds and higher filtration rates.

DESPITE intense efforts devoted to development of a reliable theory of filtration, pilot or full-scale testing has remained necessary as a basis for filter design.<sup>1-4</sup> Some of the theoretical and testing work has not made use of or recognized conclusions reached by early observers.

The purpose of this paper is to provide a physical description of what happens in filters, as a basis for further improvement of mathematical models. Much of this description is based on the work of John R. Baylis.<sup>5</sup> To keep the picture simple, the discussion is based on data on the behavior of the traditional rapid sand filter, then extended to the application of dual-media beds and higher rates.

In 1937, on the basis of 30 years of operating experience and detailed observations of the removal of floc by filters, Baylis described the process of filtration. The author vividly remembers the many weeks he watched Baylis peering into glass-walled filters with a hand magnifier, observing the floc particles moving toward and passing down into the sand in beds of many kinds of filter media. Thin dye streams and dye pulses were also used to observe the movement of the water and floc into and through the pores of the beds.

At the same time, in the Chicago Experimental Filtration Plant, one filter was equipped with pressure taps at various distances beneath the filter bed surface. Baylis's physical observations of the behavior of floc within the filter were backed up by a study of the changing hydraulic gradients within the filter.

## Filtration Process

Baylis observed that the floc particles that reach the filters are those remaining after settling and are not usually representative of those in the

floculator outlet. Large particles break up as they enter and move through the filter bed. At the beginning of the filter run, the floc lodges in the sand near the top of the bed. As the deposited matter collects between the sand grains, the void area diminishes, and the bed offers increasing resistance to the flow of the water. Conditions then begin to change. The flow through the larger openings increases, and flow through the smaller and partly clogged openings diminishes. As filtration continues, the small openings become so clogged that they are almost closed. Larger openings, always present, permit the shearing of floc as the hydraulic gradient increases, and floc penetration progresses downward.

In order to produce good quality water with a conventional sand filter, a penetration of no more than 2 to 4 in. is desirable, and a penetration of this magnitude is necessary to obtain reasonably long filter runs; when there is little penetration, the hydraulic gradient rapidly becomes large, and the filter runs are too short for practical operation.

There is little dislodgment of previously removed particles. Instead, the material most recently applied to the filter generally was found at the greatest depth. This can be observed by starting and stopping carbon treatment. It was also quantitatively confirmed by use of radioactive tracers by Stanley.<sup>6</sup>

Baylis also observed that flocculated matter removed in the filter compacts during the filtration process, and that the process of compacting causes the removed material to adhere more firmly to the filter media or to other compacted material. He believed that the compacting takes time, and that if too great a volume of suspended material is applied to a filter, it may break

through before it becomes compacted. He pointed out that the compaction of the material is very easily observed by comparing the nature of flocculated material in filter waste wash water with that of the floc of the water applied to the filters. Filter waste wash water contains very compact floc.<sup>7, 8</sup>

Doubling the rate of filtration from 2 to 4 gpm/sq ft reduced filter runs about 45 per cent, so that more water is filtered per run at higher rates than at lower rates. Baylis interpreted this to mean that there was substantially greater penetration of floc at high rates than at low ones.<sup>9</sup>

## Evaluation Filter Behavior

Analysis of what happens in the filter can be made on the basis of the following simplifying assumptions:

1. The filter media particle size and porosity are homogeneous throughout the depth of the bed.

2. The hydraulic gradient in the clogged part of the bed is defined by the Kozeny-Fair-Hatch porosity-head loss relation. Thus, the available porosity in the clogged part of the bed can be calculated.

In uniform-sand experimental filters, the first assumption is reasonably reliable. The second assumption is supported by the work of Camp<sup>1</sup> and of Kreissl, Robeck, and Sommerville.<sup>10</sup>

The Kozeny-Fair-Hatch equation is:

$$i = \frac{js^2v}{g} \frac{(1-p)^3}{p^3} \frac{V}{d^2} \quad (1)$$

in which  $i$  is the hydraulic gradient, or loss of head per unit depth of bed;  $js^2$  characterizes the shape and geometry of the media;  $v$  is the kinematic viscosity;  $p$  is the porosity;  $g$  is the gravity constant;  $V$  is filtration rate of approach velocity; and  $d$  is the filter media grain diameter.<sup>11</sup>

For a bed of a stated particle size and for a fixed filtration rate:

$$\frac{i_i}{i_o} = K \frac{(1-p_i)^3}{p_i^3} \quad (2)$$

---

*A paper presented on Jun. 4, 1968, at the Annual Conference, Cleveland, by Herbert E. Hudson Jr. (Honorary Member, AWWA), Partner, Hazen and Sawyer, Engrs., New York, N.Y. [Q]*

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in which  $i_t$  is the hydraulic gradient in the depth of bed penetrated by floc at time  $t$ ;  $i_0$  is the initial gradient;  $p_t$  is the porosity at time  $t$ ; and  $K$  is a proportionality constant. The porosity of the clean bed is normally 42–43 per cent for rounded sand after backwashing, and about 52–55 per cent for anthracite, depending on its angularity. Crapps used a 40 per cent value, obtained by vibrating the bed after washing. For analysis of sand bed data, the value of  $P = 0.40$  has been used in this paper.

It is necessary to know the depth of penetration,  $l_t$ , to calculate the hydraulic gradient in the depth that is clogged. Crapps has shown that there is good agreement between the visible depth of penetration in a filter having a transparent wall and that determined by the changes observed in pressure taps at various levels in the filter.<sup>12</sup> Figure 1 shows the penetration data observed and determined for one of his filters receiving floc at pH 7. The visible penetration was slightly less than that determined by the loss-of-head data.

From the head loss and depth-of-penetration data,  $i_t/i_0$  may be determined. From this ratio, using a graph of Eq 2,  $p_t$  and the decimal part of the bed occupied by the floc—called the

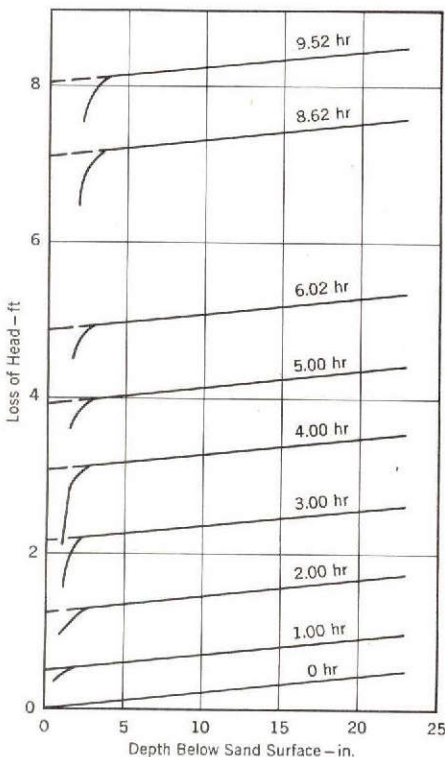


Fig. 1. Change in Hydraulic Gradient at Different Filter Depths

TABLE 1  
Effect of Anions and pH on Filter Performance\*

	Demineralized Water	Chlorides Added	Sulfates Added	Phosphates Added
Hydraulic gradient				
pH 5	26.7	26.7	2.2	1.7
pH 7	20.7	25.1	5.4	0.7
pH 9	0.57	1.12	1.31	0.47
Floc volume—vpm				
pH 5	455	445	1200	850
pH 7	645	870	1275	970
pH 9	815	605	710	605
Fe <sub>2</sub> O <sub>3</sub> in floc—mg/ml				
pH 5	0.34	0.27	0.26	0.24
pH 7	0.33	0.20	0.21	0.23
pH 9	0.31	0.24	0.29	0.32

\* Crapps Runs 4 = 6, 0.8 g Fe applied.

deposit ratio—are readily determined. From this ratio—the depth of penetration, the rate of filtration, and the time of filtration—the volume of floc per million volumes of water (vpm) can be calculated. There are insufficient data to confirm whether the calculated floc volume is actually occupied by floc, or whether the calculated value includes pores that are simply blocked out of the flow pattern. The latter seems probable, and the calculated volumes are probably higher than the actual ones because of this.

### Deposit Ratio Change

Although the filtration process can and should be studied in detail by calculating deposit ratio values for each layer between a pair of adjacent pressure taps, overall understanding is made simpler by study of the change in deposit ratio in the total depth penetrated by floc. Thus, from the data in Fig. 1, Fig. 2 has been prepared; it shows the hydraulic gradient, the depth of penetration, and the floc volume per million volumes of water as the run progresses.

In this case, the gradient first steadily increased, then slowed up in its rise. Floc penetration was first rapid, then slower, then more rapid as the hydraulic gradient approached its apparent limit. The volume data indicate more than two-fold compaction in the bed as the run progresses.

O'Melia and Crapps worked with 24-in. sand beds having uniform 20–30 mesh Ottawa sand of 0.784 mm diameter, as determined by the count-and-weigh method.<sup>13</sup> The filters operated at 2 gpm/sq ft. Ferric sulfate was the coagulant, the dosage being such that influent Fe concentration was about

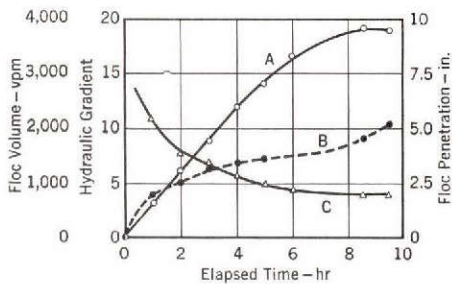
4 mg/l. In three sets of runs, at pH 5.0, 7.0, and 9.5, respectively, the mineral quality of the water containing preformed floc was modified. One filter received floc prepared with demineralized water; the other three received floc contained in water with sulfate, chloride, or phosphate added. In Table 1 the hydraulic gradients, floc deposit volumes, and concentrations of Fe<sub>2</sub>O<sub>3</sub> in the floc are summarized.

On the basis of full-scale plant experience with flocculated and settled waters, based on the "breakthrough index,"<sup>14</sup> the hydraulic gradient data indicate that, at pH 5 and 7, demineralized water and water with chloride added produce strong floc; for other conditions floc strength range from "acceptable" to "very weak."

At Chicago, changes in head were measured at depths 0.5, 1, 2, 3, 4, 6, 12, and 20 in. below the surface of the sand in a filter having 24 in. of 0.5 mm effective size sand, a uniformity coefficient of 1.40, and operated at 1.9 gpm/sq ft. This filter, having 100 sq ft of surface area, was continuously monitored from November 1935 until May 1936, with hourly loss-of-head readings at each tap. During this period, the longest filter run was on Dec. 20, 1935, and the shortest was on Apr. 23, 1936. At no time in the period were there breakthrough conditions producing effluent turbidities above 0.2 JTU on this filter, but breakthrough data for other filters show that Dec. 20, 1935 was a time of relatively weak flocculation. The longest and shortest runs were analyzed by the method of Fig. 1, yielding the data shown in Fig. 3 and 4.

For the run shown in Fig. 3, the floc strength would be classified moderate-to-acceptable. Floc collected in the bed apparently compacted somewhat as the run progressed, but to a lesser degree than that shown in Fig. 2, in which the final hydraulic gradient was 19, as compared with 12.5 for Fig. 3.

For the shortest run in the Chicago series, the hydraulic gradient rose to 49, and there was decided floc compac-



**Fig. 2. Change in Floc Penetration, Hydraulic Gradient, and Floc Volume During Filter Run**

*Key: A, hydraulic gradient; B, floc penetration; and C, floc volume.*

tion, as shown in Fig. 4, though the compacted volume at the end of the run was not much lower than that shown in Fig. 4. Floc penetration increased rapidly at first, then levelled off at 2 in. The rate of increase of hydraulic gradient rose throughout the run. This was a run with very strong floc.

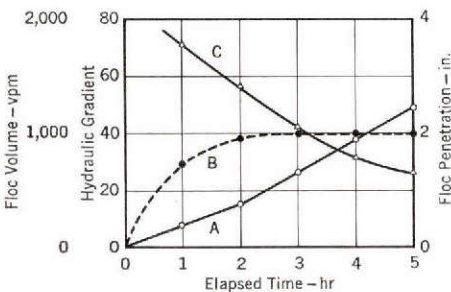
**Floc Volume Estimates**

In the preceding section, attention was focused primarily on the strength of the floc. As Baylis pointed out, the quantity of floc also has an effect on

filter behavior. Yet little effort has been devoted to determining floc quantity, which can be measured gravimetrically, but whose volume is also of great importance. It deserves much more study.

Baylis measured floc volumes in flocculated and settled water by centrifuge.<sup>15</sup> For the water applied to the filter during the runs shown in Fig. 3 and 4, floc volumes determined by centrifuging were 30 and 50 vpm respectively and corresponding turbidities were 6 and 8 JTU. In a series of measurements in 1930-32, volumes of floc in the water prior to settling, determined by centrifuge, ranged from 30 to 300 vpm.<sup>16</sup>

Floc volumes calculated from jar test data and from theoretical considerations ranged from 30 to 1,000 vpm,<sup>16</sup> on the assumption that the ratio of particles remaining in contact with each other during flocculation to those that contacted each other during the process is 1. If this ratio is smaller,



**Fig. 4. Change in Floc Penetration, Hydraulic Gradient, and Floc Volume During 1936 Filter Run**

*Key: A, hydraulic gradient; B, floc penetration; and C, floc volume.*

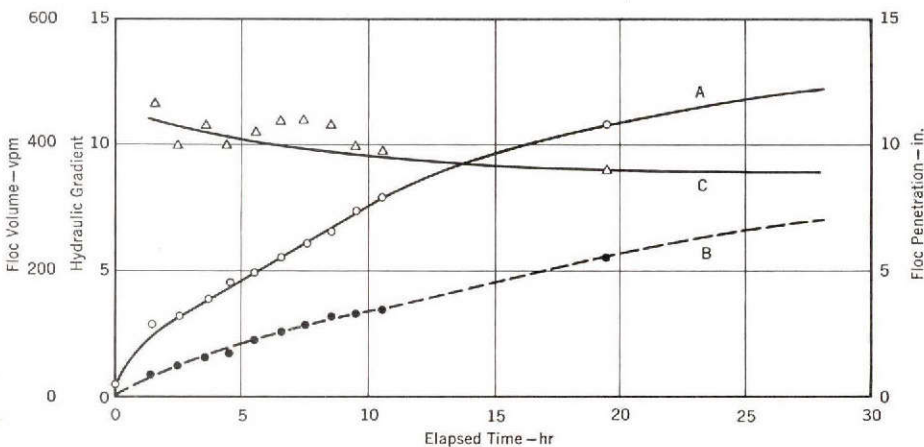
as Camp suggests,<sup>17</sup> the volume of floc is proportionately larger.

Figure 5 shows the relationship of solids concentrations to corresponding densities of alum sludge samples removed from deposits in the settling basin at the Chicago experimental plant, after treatment of the water with alum flocculation. Densities were measured by pycnometer and solids concentrations by evaporation to dryness at 110°C overnight. The highest value found was 12.5 per cent dry solids in sludge that had compacted on the basin floor for weeks.

To Fig. 5 have been added data calculated in the Soviet Union from measurements of the volume of floc settled in cylinders, after flocculation of turbid or colored waters with alum and with varying dosages of polyacrylamide.<sup>18</sup> The addition of coagulant aid produced two- to threefold denser floc. The measured United States and the calculated Soviet data are in good agreement. Minz reports that, although the floc densities in the samples from 880 ppm turbidity solutions ranged from 1.02 to 1.04 gm/l, floc densities produced in clear waters were in the range 1.001-1.003 g/ml.

Gemmell and Lagvankar have been studying formation and floc density in the laboratory. Using jar test techniques, with 64 ppm of  $Fe_2(SO_4)_3$ , alkalinity provided by  $Na_2HCO_3$ , and turbidity added in the form of kaolin, they have produced floc particles whose size they measured and whose density they determined by buoyancy in sucrose solutions of various standard densities.<sup>19</sup> Their data for a flocculation velocity gradient of 11 fps/ft are summarized in Table 2. By means of Fig. 5, from the density data given, solids contents of the various flocs were established. From those data, assuming all the kaolin was entrapped in the floc, and that the coagulant was held in the floc as  $Fe_2O_3$ , the weight of floc was calculated and, because the per cent solids was generally small, it was expressed as volumes of floc per million, Floc volumes ranged from 1,930 to 7,300 vpm.

Gemmell and Lagvankar's tests of the effect of varying velocity gradients on floc density, using clear water, indicate floc volumes of about 2,500 vpm at a velocity gradient of 40, increasing to 4,000-7,000 vpm at a gradient of 11 fps/ft.



**Fig. 3. Change in Floc Penetration, Hydraulic Gradient, and Floc Volume During 1935 Filter Run**

*Key: A, hydraulic gradient; B, floc penetration; and C, floc volume.*

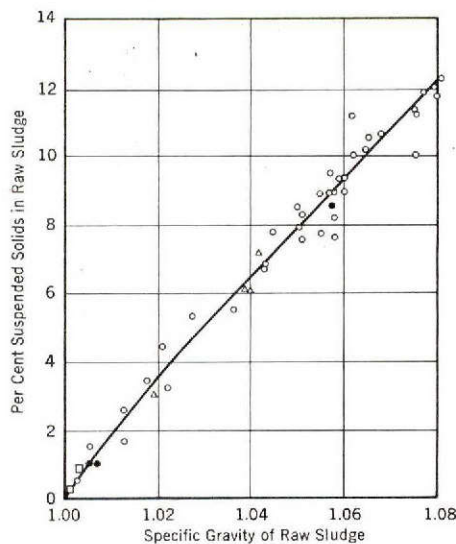


Fig. 5. Relation Between Sludge Density and Solids Content

For the Chicago data, the key is:  $\circ$ , alum; and  $\times$ , activated silica. For the Russian data, the key is:  $\Delta$ , clay suspensions; and  $\square$ , colored water.

Comparison of the floc volume data from various sources suggests that centrifuging substantially compacts the floc, for the centrifuged values are smaller than those determined by alternate methods. Further, if we assume the turbidities present in the applied waters for the runs shown in Fig. 3 and 4 are equivalent to gravimetric concentrations and divide these by the centrifuged floc volumes, solids content values of 20 and 16 per cent by weight result. These are impossibly high. It is concluded that determination of floc volumes by the centrifuging procedure used greatly compressed the floc.

The floc volume concentrations calculated from Minz's data appear too

large. Because they were determined by measuring the volume when unhindered settling ceased and compaction began, it concluded that they represent the floc water volume at the beginning of or early in the hindered-settling phase, and that they are too high.

Though the floc volumes determined from filter performance certainly represent compressed floc, they may still overestimate the actual volume of deposit, because the calculated volumes may include unoccupied blocked off pore space. The values calculated from flocculation theory are doubtless too low, because they made no allowance either for a "sticking ratio" less than 1, nor for floc breakup during the formation process. At present, therefore, the best estimate is from the data of Gemmill and Lagvanakar, of floc volumes in the range 2,000–7,000 vpm prior to settling. The author judges, from plant and laboratory observations, that these would reduce to 500–4,000 vpm after settling. Direct measurements are needed.

### Discussion

The conditions illustrated in Fig. 2 and 3, where the hydraulic gradient tends to level off although floc penetration continues, appear fairly typical of the kind of condition that leads into a terminal breakthrough. The condition illustrated in Fig. 4, on the other hand, indicates a too-strong floc that causes very short filter runs.

The use of multiple-media filters does little to protect against the weak-floc terminal breakthrough. It does, however, offer protection against too-short filter runs, and apparently the multimedia beds need to be conserva-

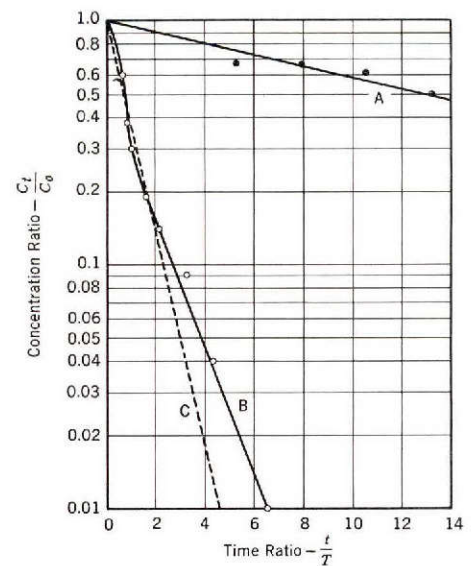


Fig. 6. Analysis of Initial Breakthrough Data

Key: A, 0.9 mm sand; B, 0.5 mm sand; C, calculated die-away curve for a single compartment mixer.

tively designed to meet that need. If we assume Fig. 4 to represent an extreme case, the protection offered by an overlying anthracite bed can be calculated.<sup>20</sup> Using a porosity of 52 per cent at a 2 gpm/sq ft filtration rate, the corresponding penetration into a coal bed can be found in Table 3. For

TABLE 3  
Coal Bed Penetration

Diameter of Coal Particles—mm	Depth of Penetration— <i>in</i>
0.5	4.76
0.75	16
1	38.2
1.25	74.5

such a condition, the 1.2 mm anthracite suggested by Dostal and Robeck<sup>21</sup> would allow a substantial part of the load to reach the sand bed when floc is strong, and conditions would be much worse when there is weak floc.

In most of the work done to date, little attention has been paid to the initial-breakthrough phase of filter operation. In each of the cases cited in this paper, there was a rapid early penetration of floc into the filter and a subsequent diminishment of the rate of penetration. This usually coincides with a short period during which the filtered water quality is deficient. Two examples of this are shown in Fig. 6: one for 0.5-mm sand; another for 0.9-mm sand. The curve for the finer

TABLE 2  
Floc Volumes, Calculated from Density Measurements

Items	Experimental Series				
	1	2	3	4	5
Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> added as mg/l FeO <sub>3</sub>	25.5	25.5	25.5	25.5	25.5
Kaolin added—mg/l	0	20	40	60	80
Total solids present—mg/l	25.5	45.5	65.5	85.5	105.5
Measured densities					
Minimum	1.002	1.0047	1.009	1.015	1.021
Maximum	1.004	1.006	1.017	1.0165	1.025
Solids concentration in floc—per cent by weight					
Minimum	0.35	0.92	1.61	2.8	3.5
Maximum	0.72	1.08	3.4	3.2	4.0
Calculated volume of floc—vpm					
Minimum	3,500	4,200	1,930	2,670	2,630
Maximum	7,300	4,950	4,070	3,050	3,000

sand matches the die-away curve for a single compartment mixer of the size of a filter and probably represents residual floc in the filter that had been broken up during backwashing, but not washed out.

The curve for coarser sand shows a continuation of turbid effluent for a much longer period, suggesting that a kind of ripening process is necessary. Presumably the filter must accumulate some flocculent matter before it begins to function effectively. This suggests that, later in the run, the accumulated floc plays a role in the removal of material later sent to the filter, until the shearing forces of the terminal breakthrough cause deterioration of the process.

The initial breakthrough process can be studied by pressure taps at various levels and by effluent sampling, but it requires observations much more frequently than are ordinarily made. Such studies may teach us much about filter behavior.

### Conclusions

Early in the filter run, removal of flocculated suspended matter takes place near the top of the bed. Later, removal occurs at greater depths, but this removal is by an attachment process, more than by shearing and transport of previously deposited material.

While floc removal is proceeding, the already removed floc becomes more compact. Despite this, the apparent volumes of compacted floc in the filter remain large—in the order of 300 to 1,000 vpm.

Within a bed of 0.5 mm sand, strong floc can tolerate hydraulic gradients of

50 or more feet of water per foot of bed depth, but weak flocs penetrate with gradients of 12 or less.

Data on sludge and floc characteristics indicate that the volume of floc produced in ordinary clarification processes is 500–4,000 vpm.

Care is still required in the design of multimedia beds. A size and thickness selection for the overlying coarse layer that always gives long filter runs may endanger water quality when floc is weak by overloading the deeper fine material. Studies of initial breakthrough behavior may help substantially in understanding how filters behave.

### Acknowledgment

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## Density Considerations in Sedimentation

H. E. Hudson Jr.

### A Metricized Article

Short-circuiting can be as much a detriment to water systems as electrical systems. Any alteration that changes the density of water entering sedimentation tanks can cause incoming water to bypass its normal route. Here is a description of short-circuit causes along with some corrective procedures.

Plant-operating difficulties have drawn the attention of many individual water-utility operators to density-current phenomena in their treatment plants. For example, in 1957 the operator of the water-treatment plant at Luke, Md., called the author's attention to what he called the "noon-day turnover."

Raw water for the plant is taken from the Potomac River through an intake immediately upstream of a low dam. The impoundment upstream is silted nearly full and its average depth is only a few feet. On warm sunny days, the water coming into the plant is heated by the sun at rates as great as 2F/hr, which upsets the settling basins by causing density currents.

#### Temperature Effects

When warmer water enters a settling basin of conventional design, it tends to race along the surface of the tank toward the outlet and may arrive there in a fraction of the nominal detention time. The result is impaired sedimentation and in-

creased loading on the filters. Similarly, when a slug of cold water comes in (as it happens at Luke owing to releases from an upstream impoundment) the temperature is known to drop as much as 15F (8C) in 3 hr. Under these circumstances, the incoming stream dives to the bottom of the basin, flows under the warmer water, and rises to the basin outlet, again traversing the tank in a fraction of the nominal detention time. Sunlight may cause similar effects directly on the water in the basin, particularly in solids-contact reactors.

The following list illustrates the magnitude of the change in density that may occur.

Temp. C	Density g/ml
4	1.00000
18	0.99862
20	0.99823

The density change caused by a 2C variation takes place in the fourth significant figure. This quantity may appear insignificant: the difference

in densities is only  $3.9 \times 10^{-4}$ . However, study the magnitude of this effect on 1 mil gal (4 million liter) of water, which weighs approximately  $8.3 \times 10^6$  lb ( $3.75 \times 10^6$  kg). One mil gal (4 million liter) at 18C weighs  $3.9 \times 10^4 \times 8.33 \times 10^6 = 3.2 \times 10^3$  lb ( $1.4 \times 10^3$  kg)—about 1.5 tons—more than 1 mil gal at 20C.

Assume a 10-ft (3-m) -deep settling basin operating at 20C. Assume that cooler water enters the basin at mid-depth. It then can drop about 5 ft (1.5 m). Thus 1 mil gal (4 million liter) at 18C has  $(5 \times 3.2 \times 10^3) = 1.6 \times 10^4$  ft-lb ( $2.2 \times 10^4$  N-m) more potential energy (promoting a diving-density current) than the same volume at 20C.

The same computation applies to the opposite condition—covering warmer water entering a basin full of cooler water. It therefore appears that shallow basins should be less susceptible to density currents.

#### Turbidity Effects

Density current problems also are caused by sudden rises in turbidity

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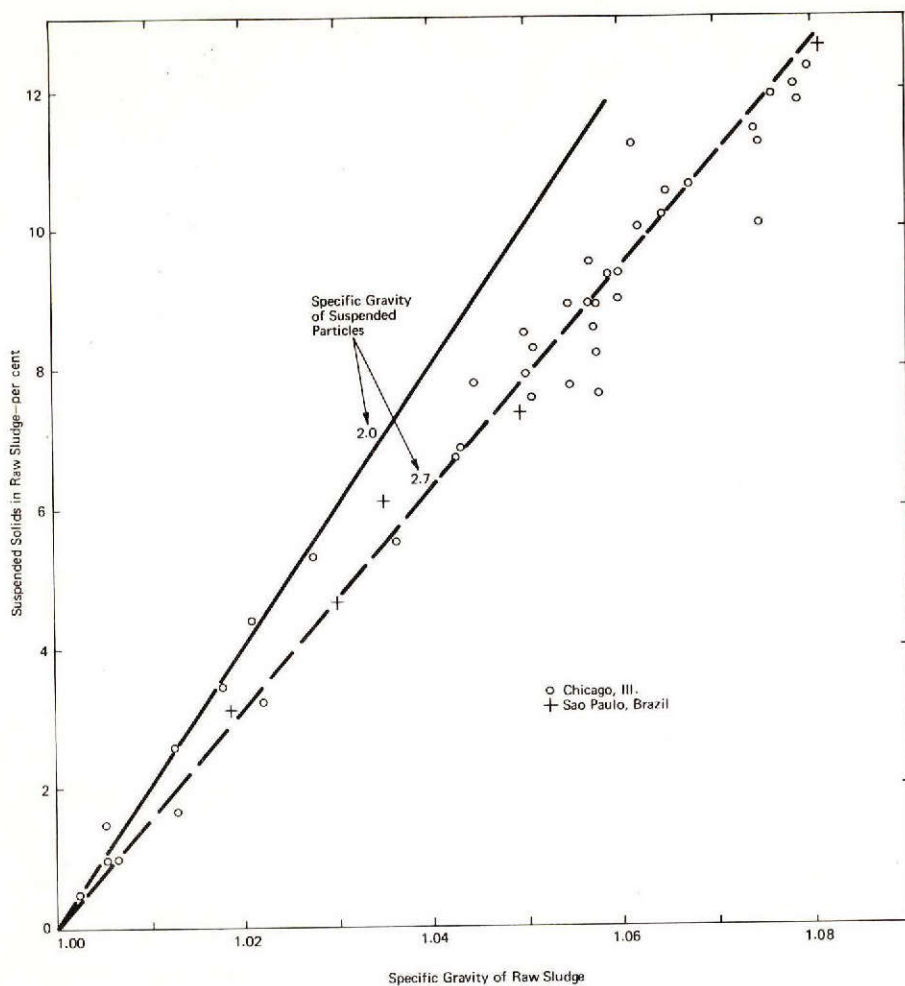


Fig. 1. Estimation of Density of Suspended Particles in Floc.

due to flash floods or storms on lakes. When a sharp turbidity rise occurs, the incoming flow dives under the water in a conventional basin, and the turbidity current flows beneath the basin contents and climbs to the outlet. Meanwhile, in the central part of the basin, the water will appear clear and may flow back toward the inlet.

To evaluate the energy involved in initiating these currents requires estimation of the density changes produced in water by various concentrations of suspended matter. Figure 1 contains data for this calculation. It shows the relation between the solids content and the density of sludges produced by alum flocculation of surface waters.

Solids were determined by evaporating to dryness overnight at 110C, and densities were measured by pycnometer at room temperature. The locations of two curves, for densities of suspended solids of 2.0 and 2.7, have been calculated (see Fig. 1).

The higher value occurred under high-turbidity conditions, when the ratio of turbidity to coagulant dosage was 5.0 or more. This value of 2.7 probably approximates the density of the suspended particles in the raw water. The lower value occurred when the raw water was relatively clear, and the ratio of turbidity to coagulant was 0.5 or less. These data suggest that the solids produced by alum coagulation have a density of 2.0 or less. Table 1 contains data for the specific gravity of minerals and hydrolysis products in water. Based on the fact that the specific gravity of  $Al_2O_3 \cdot 3H_2O$  is about 2.4, it appears that the aluminum precipitates produced by overnight evaporation to dryness at 110C, reported in Fig. 1, retained more than 3 molecules of water of hydration.

Assuming a 2.5 density for the mixture of suspended matter present in the water as produced by the alum, the densities of mixtures in water with various concentrations of

suspended matter, at 4C, would be as follows:

Solids Concentration mg/l	Density of Mixture g/ml
100	1.00006
1,000	1.0006
10,000	1.006

From these data, assuming a 10-ft-deep basin as previously discussed, an abrupt change from a raw-water suspended concentration of 10 to 1,000 Jtu would impart to the incoming water an increased energy of  $3 \times 10^4$  ft-lb/mil gal ( $1.1 \times 10^{-2}$  N-m/liter). Such a change is slightly greater than the thermal effect caused by a 2C change.

Whereas aluminum hydroxide precipitate has a specific gravity of 2.4, ferric hydroxide has a reported specific gravity of 3.4. This suggests that, other things being equal, ferric coagulants should produce heavier floc that should settle more rapidly. Since the solubility of ferric hydroxide is 2-6 orders of magnitude lower than that of aluminum hydroxide in the pH range 5-9,<sup>2</sup> reactions of ferric coagulants should produce residual dissolved coagulant levels much lower than aluminum coagulants.

Furthermore, reports in the literature indicate that the optimum Camp number<sup>3</sup> (velocity gradient times time) for flocculation with alum is less than 100,000 and sometimes as low as 40,000, whereas for ferric coagulants it ranges from 100,000 to 170,000,<sup>3,4</sup> suggesting that ferric flocs can tolerate more agitation without damage than can alum flocs.

#### Salinity Effects

Salinity pulses also cause density currents. An abrupt increase in salinity from 0 to 500 mg/liter (NaCl) would increase the upsetting energy of the water by about  $1 \times 10^4$  ft-lb/mil gal ( $3.6 \times 10^{-3}$  N-m/liter).<sup>1</sup> Such a pulse would have almost as much upsetting tendency as the temperature or turbidity pulses considered above.

#### Magnitude of Density Effects

Density current behavior may be computed from Harleman's equation:<sup>5</sup>

$$\bar{u} = \sqrt{\frac{\partial \rho}{\rho} \frac{h_2 S}{f(1+\alpha)}}$$



where

$\bar{u}$  is the velocity of the density current

$g$  is the gravity constant

$\partial\rho$  is the difference in density between the two fluids

$\rho$  is the density of one of the fluids

$h_z$  is the vertical thickness of the density current

$S$  is the channel slope (in this case, half the basin depth divided by basin length)

$f$  is the Darcy-Weisbach friction coefficient

$\alpha$  is a coefficient (value of zero in open channels, and 1.0 for flow in a channel with a wetted ceiling)

Computation of velocities and flow thicknesses for a quick rise in turbidity from 10 to 1,000 Jtu indicated that, in a conventional settling basin 10 ft (3m) deep, having a 3-hr nominal detention time, this quality change could cause the density current to move from inlet to outlet in about 0.3 hr, or one tenth the nominal time. Worse still, the tenfold higher velocity might scour previously deposited sludge.

This is no hypothetical matter, as illustrated by two sets of turbidity data for the 30-mgd (440 cum/sec) San Antonio plant in Cali, Colombia, (Fig. 2).

The data have been analyzed by the procedure developed by Wolf and Resnick<sup>6,7</sup> in which the logarithm of  $[1 - F(t)]$  (that portion of the tracer substance that has not yet reached the sampling point) is plotted against time. This graphical approach yields a quick estimate of the relative arrival time of the upsetting pulse in the basin outlet.

TABLE 1A  
Specific Gravity of Mineral Products of Coagulation

Formula	Sp G
Al <sub>2</sub> O <sub>3</sub>	3.97
Al(OH) <sub>3</sub>	3.3-3.5
Al <sub>2</sub> O <sub>3</sub> · 3H <sub>2</sub> O	2.4
Fe <sub>2</sub> O <sub>3</sub>	5.26
FeO(OH)	4.05-4.35
Fe <sub>2</sub> O <sub>3</sub> · xH <sub>2</sub> O	2.44-3.60
Fe(OH) <sub>3</sub>	3.4

TABLE 1B  
Specific Gravity of Minerals of Type Found Naturally Suspended In Water

Name or Formula	Sp G
CaCO <sub>3</sub>	2.7-2.9
Illite	2.65
SiO <sub>2</sub>	2.6-2.9
Kaolinite	2.6-2.7
Montmorillonite	2-3

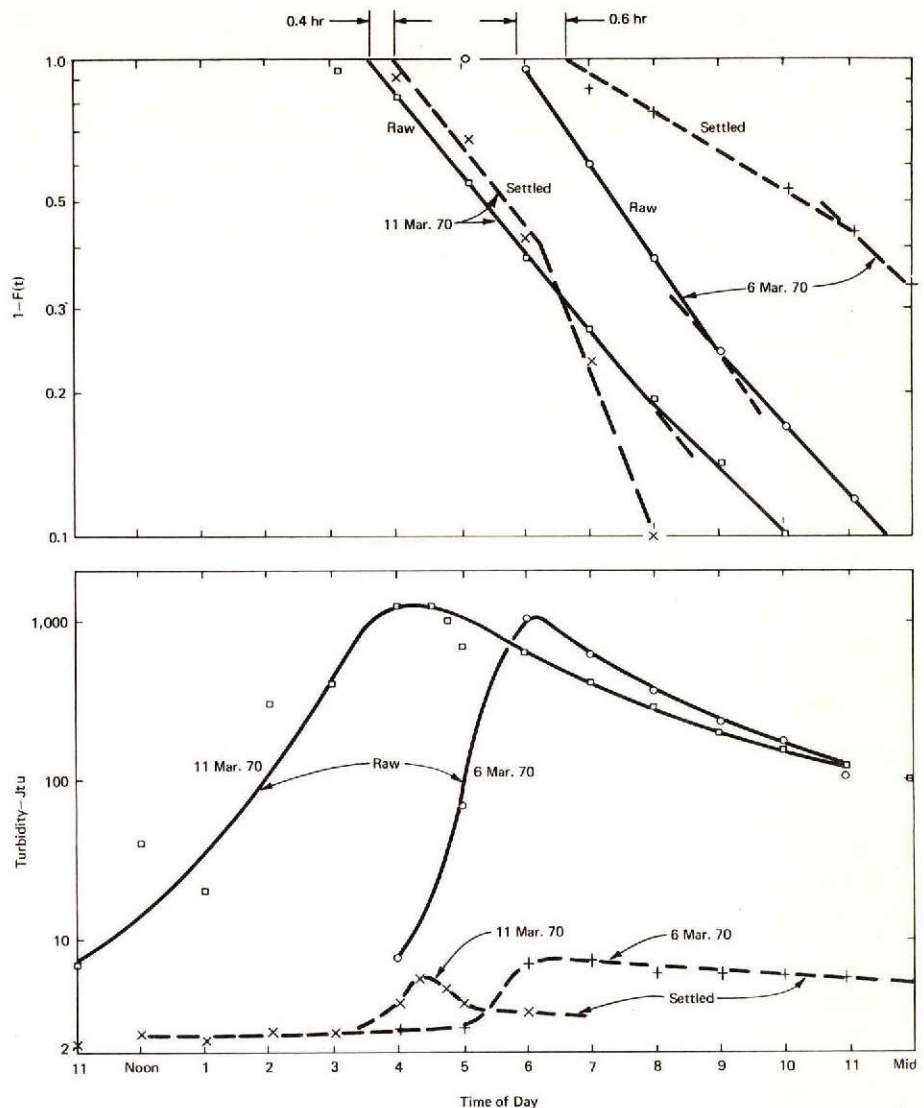


Fig. 2. Effect of Raw-Water Turbidity Pulses on Settled-Water Quality—Cali, Colombia.

Top—portion of tracer substance not yet reaching sampling point; bottom—turbidity monitoring.

The graphical analysis indicates that, in these 3-hr nominal detention basins, the upsetting pulse began to appear in the settling-basin effluent within 0.6 hr or 6 Mar., 1970, and within 0.4 hr on 11 Mar., 1970. These times include the residence time in the flocculating chamber of 0.2 hr. The flocculator has six completely mixed compartments in series, and tracer studies have shown little short-circuiting there. Hence the actual travel time of the turbidity current through the settling basins was of the order of 20 min.

At this plant, raw-water turbidity values at times have jumped from less than 10 to 8,000 Jtu in a few hours. These occasions have been aggravated by simultaneous water-temperature drops. At times these occurrences necessitate plant shutdowns.

The behavior of similar density currents in settling basins has been extensively documented in Great Britain.<sup>8-11</sup>

#### Settling Capability of Floc

It is of interest to compare the energy involved in the sedimentation of floc in water with some of the influences impairing sedimentation. From the volume and density of the floc, assuming it is to fall through a depth of 5 ft (1.5m), the energy can be calculated.

Data collected by Lagvankar and Gemmill<sup>12</sup> on floc densities are summarized in Table 2. Assuming a floc volume concentration of 0.005,<sup>13</sup> the energy in floc produced from 80ppm (mg/liter) kaolin is about  $5 \times 10^3$  ft-lb/mil gal ( $2.1 \times 10^3$  N-m/liter).

TABLE 2  
Floc Densities Using Ferric-Sulfate\*  
Coagulant

Kaolin Added mg/liter	Estimated Mean Measured Sp G
0	1.0027
20	1.0056
40	1.0100
60	1.0162
80	1.0225

\*Equivalent to 25.5 mg/liter Fe<sub>2</sub>O<sub>3</sub>

This energy is a fairly substantial quantity when compared with the density-current effects, and helps explain why some sedimentation continues to take place even during basin upsets. For ferric floc formed in the absence of kaolin, the energy is calculated at about  $5 \times 10^2$ , tenfold lower than with 80 ppm kaolin.

When floc-strengthening agents such as polyelectrolytes or activated silica are used, they cause further compaction of floc<sup>14</sup> and can increase the settling energy another order of magnitude.

#### Stabilizing Influences

The foregoing reviewed the natural phenomena favoring and upsetting sedimentation. There are some techniques open to aid sedimentation and to minimize or eliminate the effects of density currents. Control measures considered fall into several categories: (1) use of a surface weir or launder takeoff over a large part of the settling basin, (2) improved inlet arrangements, (3) schemes to provide increased basin drag and friction, and (4) slurry recirculation.

The use of weirs or launders protects well against down-riding flow, but they are ineffective against up-riding flow. Improved inlets help both conditions, but experience has shown that they are far from a cure for either. The third, increased basin friction, has much to offer. This category includes horizontal trays as recommended by Camp,<sup>15</sup> inclined trays,<sup>16</sup> tube settlers,<sup>17</sup> and intermediate redistributing baffles.<sup>8</sup> The first three of them have the advantage of reducing the surface loading, or required floc settling velocity, thus improving sedimentation capability. All these help restrain density currents. The intermediate baffles help redistribute density currents, but lack the advantage of reducing surface loading. In horizontal flow basins, none of them are completely effective controls for either type of density current.

At the settling basin inlet and out-

let, it is common practice to provide a head loss of about one velocity head at a velocity of 1 ft/sec. This corresponds to an energy use of about  $1 \times 10^3$  ft-lb/mil gal ( $3.6 \times 10^{-2}$  N-m/liter)—accepted as a means of getting uniform distribution of flow. However, once the water is in the basin and the inlet energy has dissipated, usually in a relatively small fraction of the flow distance, drag along floor and walls becomes the only controlling force. In a typical basin this energy amounts to only about 10 ft-lb/mil gal ( $3.6 \times 10^{-6}$  N-m/liter)—a small value in comparison with the density forces. Neither inlet design nor drag in a conventional basin can control strong density currents.

With shallow trays or tube settlers, drag is considerably increased—to approximately  $2 \times 10^3$  ft-lb/mil gal ( $7.2 \times 10^{-4}$  N-m/liter)—and is much greater than in conventional basins, but not enough to overcome severe density currents.

It is of interest to check the stability of traditional flocculators against density currents. Assuming two flocculators designed with different characteristics, energy involved is as follows:

Vel. Grad. sec <sup>-1</sup>	Detention Time		Camp Number	Energy ft-lb/ mil gal
	min	sec		
27.8	30	1,800	50,000	$7 \times 10^6$
7.4	45	2,700	20,000	$7 \times 10^5$

These energy levels are sufficiently high to offset density currents caused by natural changes in the raw water.

During filtration, the energy level commonly reaches about  $6 \times 10^7$  ft-lb/mil gal (2.2 N-m/liter), and density currents pose no direct problem. However, the stress applied to the floc is sometimes more than it can stand, and floc shears and passes through the filter beds.

#### Slurry Recirculation Reactors

To date, the only hydraulic arrangement offering positive density-current control appears to be the combination of surface weirs or launders and slurry recirculation. With this combination, the surface weirs protect against diving currents and, in fact, the slurry recirculation flow is directed downward into the separation zone. If the slurry pool is maintained at a sufficiently high concen-

tration of solids (say 2,000 mg/liter), and the coagulant dosage is properly regulated, the slurry pool will contain a subsiding energy of about  $5 \times 10^4$  ft-lb/mil gal ( $1.8 \times 10^{-3}$  N-m/liter). Experience indicates that this is enough to offset temperature rise rates of 2C per hr. Since slurry-recirculation units are designed for diving currents, they are virtually immune to forces that tend to increase them.

Solids-contact reactors do not function as well when treating clear water as when treating turbid water because of the low-density floc produced in clear water when using iron or aluminum coagulants. In some cases, heavy insoluble material is added to make the floc heavier. Unless such material is reclaimed and reused, it has the disadvantage of increasing the sludge-disposal problem. Another alternative, currently gaining acceptance, is the use of cationic polyelectrolytes in lieu of the metallic coagulant. When these are effective, floc density may be greatly increased over that produced with metallic coagulants, partly because the coagulant dosage is lower by at least one order of magnitude, contributing to reduced sludge quantities.

If one assumes a floc particle specific gravity of 1.02, it would be necessary to maintain a recirculating floc volume concentration of about 1 per cent in order to obtain a water-slurry mixture of 1.0012 specific gravity, a value high enough to counteract an instantaneous 2C temperature rise. In the operation of slurry-recirculation units, it is customary to maintain a slurry concentration of 10–20 per cent by volume, as measured visually in a graduated cylinder. The

TABLE 3A  
Process Energies in Water Treatment—  
Upsetting Pulses

Description	Energy ft-lb/mil gal
Temperature rise, 2C	$2 \times 10^4$
Turbidity rise from 10 to 1,000 Jtu	$3 \times 10^4$
Salinity rise from 0 to 500 mg/liter	$1 \times 10^4$

TABLE 3B  
Process Energies in Water Treatment—  
Steady-State Sedimentation

Process Parameter	Energy ft-lb/mil gal
Weight of floc	
Formed in clear water	$5 \times 10^2$
Formed with 80 mg/liter kaolin	$5 \times 10^3$
Conventional basin inlet	$1 \times 10^3$
Drag in conventional basin	10
Drag in tube settlers	$2 \times 10^3$
Slurry recirculation reactors	
Weight of slurry	$5 \times 10^4$
Mixing-power input	$5 \times 10^6$

true value of floc volume is less than the observed value, but it is probably well in excess of the 1 per cent needed for control of density currents.

In addition to the gravitational control exerted by the excess weight of the floc in the recirculation slurry pool, a substantial power input is provided by the reactor impeller. In some units this is sufficient to lift the entire flow 1-3 in. Since the recirculating flow may be as much as five times the throughput, this controlling energy may approximate  $5 \times 10^6$  ft-lb/mil gal (1.8 N-m/liter).

#### Summary and Conclusions

The energies implicit in water-quality changes are sufficient to cause severe upsets in conventional settling basins. These energies and those of offsetting stabilizing forces are summarized in Table 3. The stabilizing forces in conventional basins are not adequate to control density currents. On the other hand, slurry-recirculation units function at an energy level and a design configuration that can

effectively control density currents, when the floc formed is sufficiently dense.

#### Acknowledgement

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EVALUATION  
of  
PLANT OPERATING AND JAR TEST DATA

by

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# EVALUATION OF PLANT OPERATING

## AND JAR TEST DATA

by

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Many water treatment specialists have the idea that laboratory jar-test data yield interesting and useful results, but not information that can be transferred directly into plant design criteria or into plant operation appraisal. In recent years, however, a great deal of work has been done with jar test and bench-scale procedures to improve techniques by such investigators as Black<sup>(1)</sup>, Cohen<sup>(2)</sup>, Camp<sup>(3)(4)(5)(6)</sup>, Argaman<sup>(7)</sup>, TeKippe and Ham<sup>(8)</sup>, and many others including Vrale and Jorden<sup>(9)</sup>, Kaufman and Stenquist<sup>(10)</sup>, and Harris, Kaufman and Krone<sup>(11)</sup>. Their work has delved into much more than the conduct of jar tests; it has included investigation of the processes of flocculation, rapid mixing, and their effects on sedimentation, and has provided increased insights into the mechanisms of mixing, flocculation, and sedimentation. This paper uses these insights to find ways to combine the appraisal of laboratory and plant operating data so as to strengthen the basis of design of treatment facilities.

Treatment plant operating results are affected by many factors, among which are (1) amenability of the raw water to coagulation and flocculation, (2) the design of the plant facilities for coagulant dispersion, flocculation, and sedimentation, including the short-circuiting characteristics of the basins provided, (3) surface loading of settling basins, (4) the tightness of the control of the coagulation process by the operating personnel, and (5) the water quality goals of those responsible for the plant operation.

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Plant operators and others sometimes assume that a water treatment plant, once designed and built, is immutable, that the designer or regulation writer knew all that was ever to be learned about treatment design, and that the operator has no right to make modifications of the plant. These assumptions have been responsible for the preservation of obsolete design features in plants as much as fifty years old and for their repetition in many newer plants. These features have often led to plant performance less satisfactory than would be obtained using some of the design techniques developed in the last several decades.

In evaluating cases that exemplify some of the foregoing, this paper first analyzed and correlated plant operating data, after which a quantitative jar test procedure is described, and jar test data are then correlated with plant operating results to evaluate ways in which plants may be improved.

#### Treatment Plant Operating Data.

To illustrate the effect of design features on plant behavior, a comparison has been made of the performance of 24 water treatment plants, all using coagulation with commercial aluminum sulfate, followed by flocculation and sedimentation. Data for all these plants are included in this paper, with detailed information on twelve of them. To evaluate the results of plant operation, the analytical data have been sorted into class groups in accordance with the magnitude of the raw water turbidity as illustrated in Table 1. Within each class group, corresponding daily raw, settled and filtered water turbidities were tallied, together with the coagulant dose used in the plant, usually using data for a year or more of plant operation. This Table summarizes the operating data for a 22.8 mgd (1 cu m/sec) plant treating water from mountain streams, (Plant A), most of which had been impounded in an upland reservoir. In this plant, it was



TABLE 1  
SUMMARY OF FILTRATION PLANT OPERATING DATA  
Plant A

Raw Water Turbidity Class*	Number of Days	Average Turbidity			Alum Applied, mg/l
		Raw**	Settled	Filtered	
0-4	109	2.6	--	--	0
5-50	187	14.3	3.7	0.43	42
51-100	24	58	4.6	0.44	50
101-300	26	131	6.1	0.63	55
301+	4	295	11.1	0.53	59

\* Determined by maximum during day  
\*\* Average daily averages

the practise not to use coagulant when the raw water turbidity was less than 5 j.u. The table shows the number of days when the maximum-hour raw water turbidity fell within each class group and the average raw water turbidity for those days, together with the averages of the settled water and filtered water turbidities and the alum doses used on those days. Let us first consider the relation between raw and settled water turbidities and, later on, other relations.

Figure 1 shows the relationship between the raw water turbidity and the settled water turbidity for this plant. Similar correlations of data from 23 other plants revealed that semilogarithmic relations generally appeared to hold reasonably well, as is shown by Figures 1-4. The placement and slope of each curve depends on the coagulant dosage criteria selected by the operator, on the characteristics of the raw water, and on the character of the mixing and flocculating facilities.

Two additional curves shown in Figure 1 are for settled water values from a 12 mgd plant (0.525 cu m/sec) plant that uses solids-contact reactors instead of flocculators, followed by a four-hour period of plain sedimentation (Plant B). The characteristic curve for the plain sedimentation basin sloped toward the origin, as did those for all other conventional basins studied. The data for the solids-contact units indicated a contrary slope, supporting the generally-accepted conclusion that solids-contacts units do not function well as liquid-solid separators when treating raw water of low turbidities.

Similar data are shown in Figure 2 for four plants treating Great Lakes water, all treating raw water from the same intake. The design features of the plants, built over a 35-year period, were considerably different. Capacities of these plants range from 150 to 300 mgd (6.6-13.2 cu m/sec). The year of completion of the plant is shown in Figure 2 for the performance curve of each

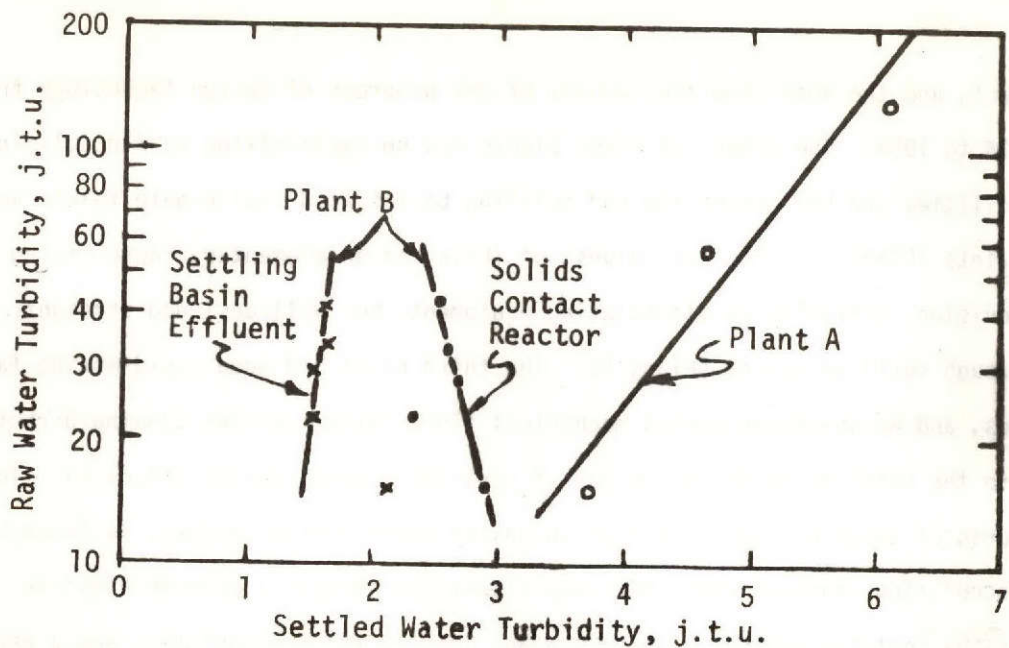


FIGURE 1. RELATION BETWEEN RAW AND SETTLED WATER TURBIDITIES

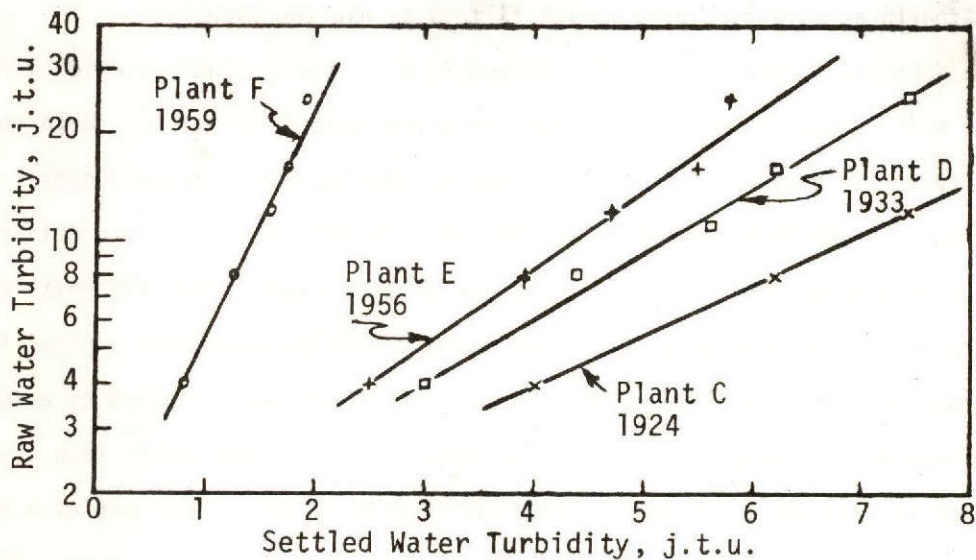


FIGURE 2. RELATION BETWEEN RAW AND SETTLED WATER TURBIDITY FOR FOUR PLANTS TREATING THE SAME RAW WATER

plant, and the data show the results of the progress of design technology from 1924 to 1959. The oldest of these plants had no rapid-mixing or flocculating facilities and had around-the-end settling basins with sluice-gate inlets and outlets (Plant C). The next-oldest of these had an elementary rapid mixing provision, virtually no flocculating equipment, but well-designed straight-through settling basins (Plant D). The third plant had good rapid-mixing facilities, and an un-compartmented mechanical flocculating chamber opening directly into the settling basin, which was of straight-through design (Plant E). The fourth of these plants had a high-intensity rapid-mixing chamber, followed by flocculating chambers with four compartments in series, a permeable-baffle inlet for the settling basins, a lower surface loading for sedimentation and a reasonably good submerged weir outlet (Plant F). The newest of these plants sent only one-fourth as much turbidity to the filters as did the oldest.

Figure 3 shows data from a 57 mgd (2.5 cu m/sec) plant at which jar tests were made frequently during each day for plant control (Plant G). With so much jar test data available, it was possible to develop similar relationships between raw and settled water turbidity in the jars, as well as for the two different types of treatment plant units in service at this plant. The 1956 units were circular pretreatment units each containing a single-compartment central flocculating zone where the alum-treated raw water entered and was mixed by a turbine, followed by discharge below a circular hanging baffle, and radial flow to a peripheral launder. The units installed in 1970 in this plant were of a slurry recirculation type, using a venturi effect without a mechanical mixer. The outlet system consisted of radial launders. In comparison with these plant data, the jar test data indicates that results approximately three times better could be obtained by mixing and flocculation in units free of short-circuiting. In

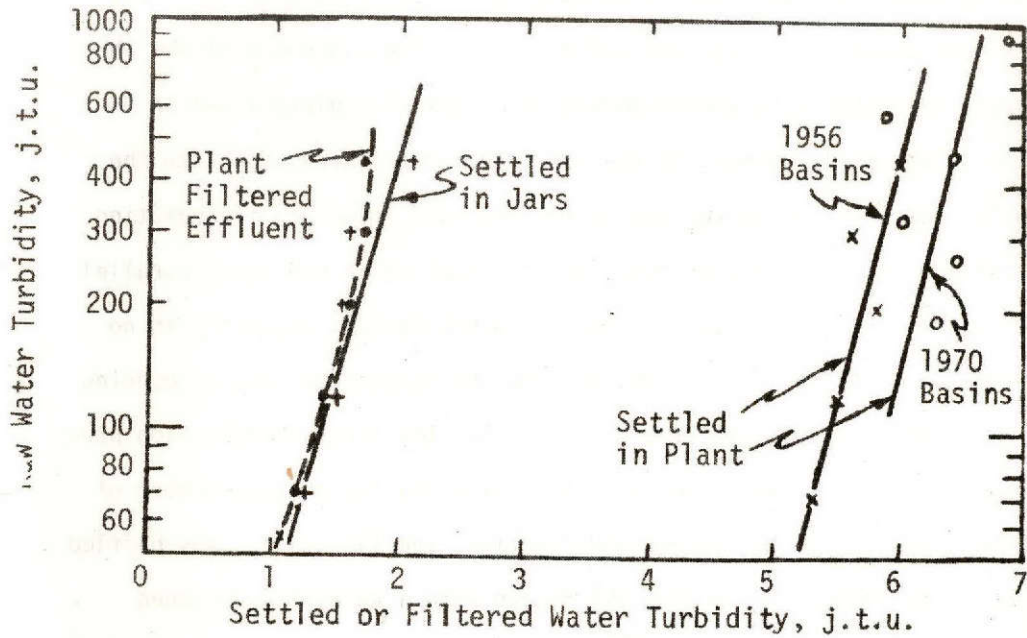


FIGURE 3. RELATION OF RAW TO SETTLED AND FILTERED WATER TURBIDITIES. Comparison of Plant and Jar Test results. Plant G.

fact, as Figure 3 shows, the filtered water produced by treatment in the 1956 units and filtration through 0.9 mm sand beds averaged about 1.6 j.u., or about the same as water produced by sedimentation in jars, suggesting that short-circuiting in the flocculation process was severe, and that much of the water passed through the plant without the influence of adequate pretreatment. The data further indicate that the 1956 pretreatment units performed better than those added in 1970.

Figure 4 shows settled water turbidity data from three parallel settling basins treating water in a 28.5 mgd (1.25 cu m/sec) plant (Plant H)<sup>(12)</sup>. All received the same coagulant dosage and rapid mixing. The placement of the three curves reflects differences in compartmentation of the flocculators and in the design of the inlet baffle conducting the water from the flocculator into the settling basin. Each of the basins had nearly the same volume of flocculating space and settling area. In the original design, each basin had three parallel flocculation channels with two turbine-type agitators in each channel with no baffle between the mixer pairs. The outlet from the flocculator was an opening under a hanging baffle at the settling basin inlet. The first modification provided a permeable baffle inlet to the settling basin, having a large number of relatively small ports. In the second modification, the flocculator was baffled to provide six compartments in series, and fitted with a carefully-designed permeable-baffle settling basin inlet<sup>(12)</sup> having a velocity gradient of  $20 \text{ sec}^{-1}$ . The results in Figure 4 show that the multi-compartment flocculator produced the best effluent.

Figure 5 shows the raw water turbidity (logarithmic scale) against the coagulant dosage used for the data from Table 1, again indicating that a semi-logarithmic relationship appears to hold. This figure also shows similar data

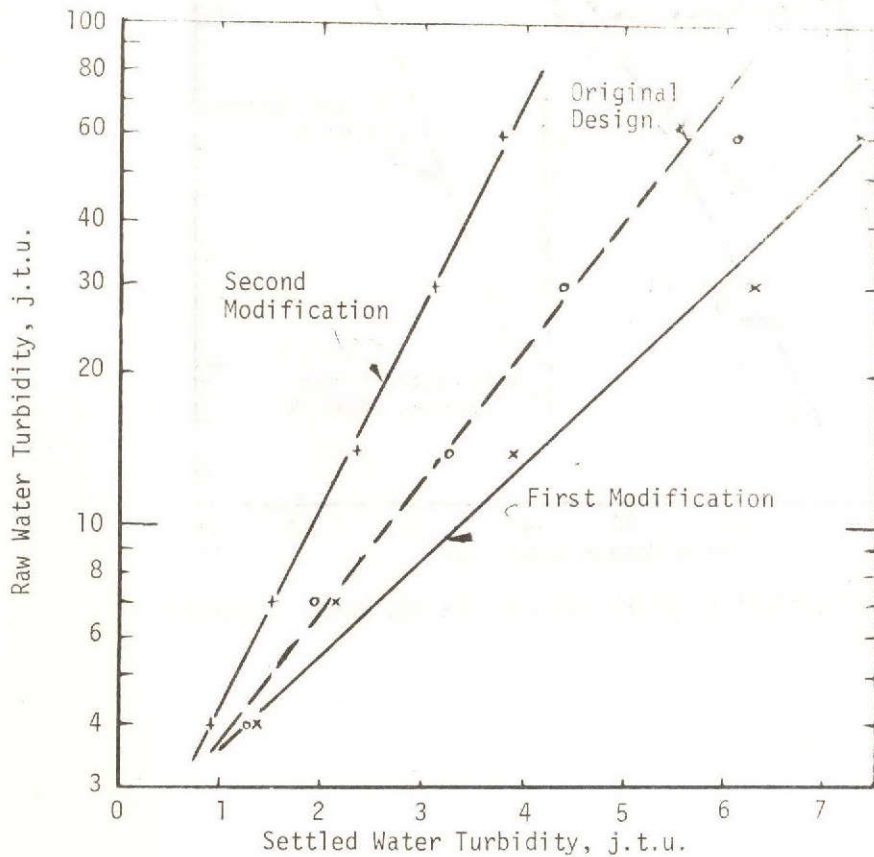


FIGURE 4. RELATION OF RAW TO SETTLED WATER TURBIDITY FOR THREE BASINS IN PLANT H.

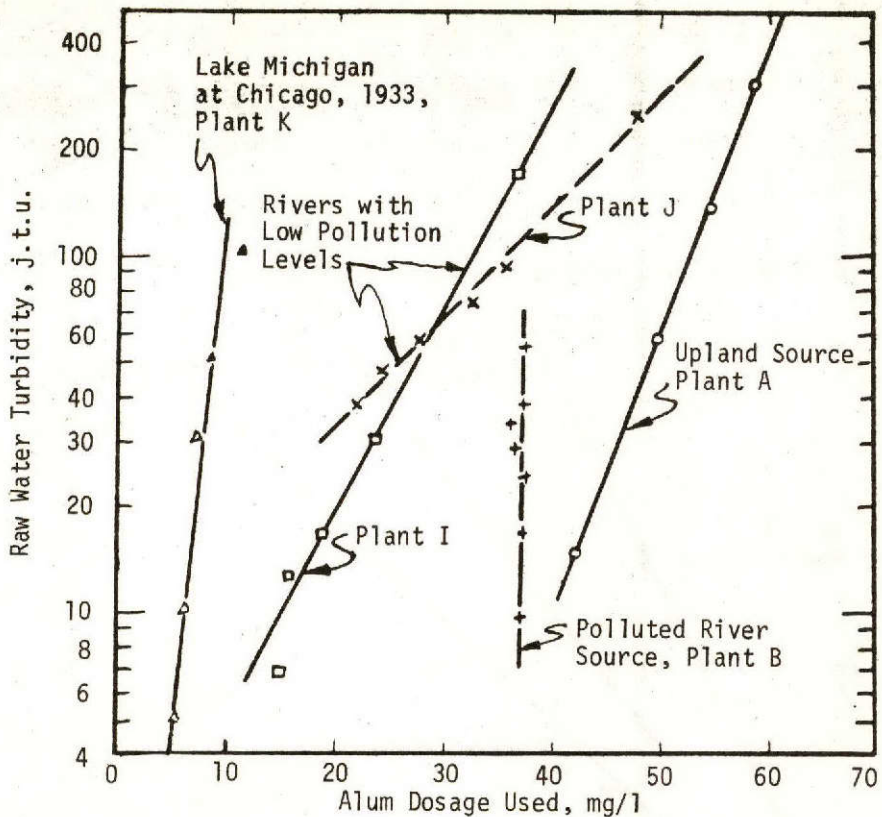


FIGURE 5. ALUM DOSAGES REQUIRED FOR VARIOUS RAW WATER TURBIDITY LEVELS.



from several other plants to demonstrate the range of dosages found useful. The dosages used were those found by the plant operators by jar testing and by observation to be required to obtain good sedimentation and an acceptable level of filtered water quality. Some waters and some plants require very little coagulant, while other require much more. One of the curves shows a nearly-vertical line (Plant B). This was for a heavily-polluted river water. While the data used in preparing this curve were from plant operating records, an extended series of jar tests by consultants confirmed that this dosage relationship was in fact required to obtain good results.

The plant operating data in Figures 1-5 are averages of operating results and do not show the day-to-day deviations that occur because of changes in raw water character or rates of flow, or because of operating errors. It was observed that when raw water turbidity is rising, the alum dosage for a given turbidity is frequently smaller than at the same turbidity level when turbidity is diminishing, apparently because of differences in suspended particle size. Similar day-to-day deviations in settled water turbidities occur due to such factors, including density current effects.

While Table 1 and Figure 3 show filtered water quality data, the writer has not assembled enough tabulations of such data to support any general conclusions. The principal reason for the absence of such data was the rather general lack of turbidimeters capable of reading reliably in the range below 1.0 j.t.u. This situation is improving through the increased acceptance of precise laboratory light-scattering equipment with photo-electric readout. In the three plants for which trustworthy filtered water quality data were available, filtered water turbidity tended to increase as raw water turbidity increased, suggesting possible short-circuiting in the rapid mixing and flocculating process.

Filter run data have not been studied in detail, but it was observed that, except when density currents upset the settling basins, filter runs tended to be longer when raw water turbidities were higher. Two possible causes for such a relation are: (1) production of a more compact floc when raw water turbidities are high; and (2) lower incidence of and higher percentage removal of algae when turbidities are high.

#### Settling Velocity Distribution Curves.

For many years, the most widely-accepted criterion for settling basin design was retention time, even though as long as seventy years ago the concept of settling velocity had been advanced as a basis for design<sup>(13)</sup>. About four decades ago, principally in the treatment of wastewaters, the concept of surface loading, usually expressed as gallons per square foot per day of basin area, was brought into more common use. To obtain this figure, the flow through a given basin or plant was divided by the settling area of the basin or plant. As standard reference books point out<sup>(14)(15)</sup> this is equivalent to a settling velocity measured in units of length per unit of time, and the meaning of a stated surface loading (or equivalent settling velocity) is that a well-designed basin should be able to remove all particles that will settle at such a velocity or faster.

Sometimes these loadings have been expressed in terms of inches per minute or gallons per square foot per minute. Some authors have preferred to express settling velocities in centimeters per second, which usually leads to units smaller than 0.1 centimeters per second. Others have used feet per second or meters per day. British engineers use feet per hour. The unit of centimeters per minute yields values of 1 to 10 units in the normal design range. Four

centimeters per minute is approximately equal to one gpm/sf, or 1440 gpd/sf. One centimeter per minute is almost exactly equal to one furlong per fortnight, or 1.32 cubits per hour.

In this paper, settling velocities are expressed in centimeters per minute because the time and distance spans are such that one can readily visualize what is taking place. It is customary<sup>(14)(15)</sup> for settling velocity data to be plotted against the per cent of the initial concentration which settles at a rate equal to or greater than the stated settled velocity. Most of the literature presents these data as arithmetic plots of velocity against per cent remaining, and the values have often been experimentally determined by analysis of results in settling columns, measuring the reduction in suspended matter at various depths in the column after various time intervals.

Similar data can be produced from actual operating results using the removal of turbidity during sedimentation, expressing the result as percent of raw water turbidity remaining, plotted against the settling velocity, as determined for a given plant by dividing the rate of flow by the settling basin area. The data for each plant produce one point on the settling velocity distribution curve. If it is possible to regularly sample the settled water at a number of points along the settling basin, several points on the curve can be obtained.

The effects of differences in raw water turbidity levels from plant to plant can be eliminated by standardizing on turbidity values that occur fairly commonly. This may be done by interpolating from data treated as in Figures 1-4. Figure 6 is a logarithmic-normal plotting of such settling velocity values for a number of plants treating raw water of 15 j.u., and Figure 7 shows similar values for plants treating raw water having turbidity of 100 j.u. The data show that sedimentation proceeded much better with highly-turbid raw water than with

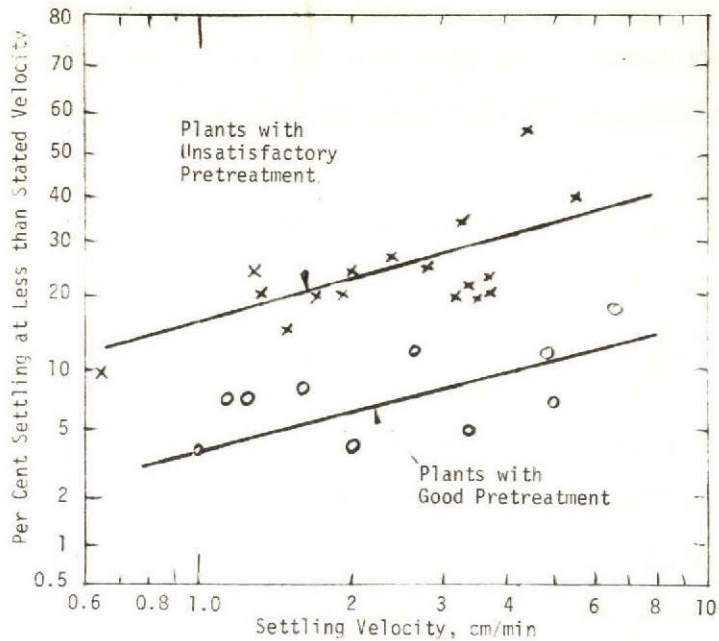


FIGURE 6. SETTLING VELOCITY DISTRIBUTION CURVES. Raw Water Turbidity 15 j.t.u.

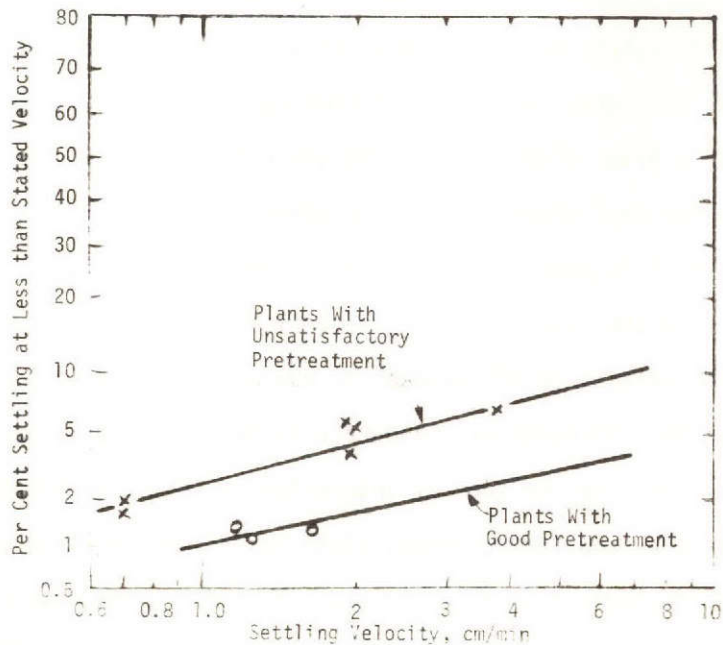


FIGURE 7. SETTLING VELOCITY DISTRIBUTION CURVES. Raw Water Turbidity 100 j.t.u.

relatively clear water. The data have been further segregated into two categories: (a) those for plants having good rapid mixing and flocculation and effective settling basin design, treating water that is not difficult to flocculate; and (b) those for plants having defective mixing, flocculation, or sedimentation facilities, or water very difficult to flocculate. For each of these figures, one curve represents excellent pretreatment; and the other unsatisfactory pretreatment. All of these data are for plants that are not using coagulant aids. Where the character of the raw water has an adverse effect on treatment characteristics, flocculation aids such as clay weighting agents, polyelectrolytes, or activated silica can shift the plants with unsatisfactory treatment into the other category. These data represent different plants where operating data have been tabulated and compiled as in Table 1, and they are for plants the writer has examined in order to judge whether their treatment facilities should be classified excellent or deficient.

#### Jar Testing.

It is not easy to produce the complete settling velocity distribution curve for a plant from its own records, but is relatively simple to derive it from jar testing. The laboratory data obtained by the writer indicate that settling velocity distribution curves tend to follow a logarithmic-normal distribution, producing straight lines on logarithmic-probability paper.

In the jar test procedure, short-circuiting is not possible. Thus the results from jar test trials of flocculation may be superior to those in plants where short-circuiting is substantial (see Figure 3). On the other hand, there are a number of water treatment plants of good design in which short-circuiting in the mixing and flocculating process has been minimized by compartmenting the

the units into series of chambers. Jar test results parallel the performance of these units quite well.

If, after mixing and flocculation, the settled water turbidity values are measured on samples drawn from a fixed depth of ten centimeters below the liquid surface in two-liter beakers, and if the times of sampling after halting flocculation are 2.5, 5, and 10 minutes, the samples withdrawn at these times represent settling velocities of 4.0, 2.0, and 1.0 centimeters per minute respectively. The turbidity of the settled water samples drawn at these stated times, divided by the raw water turbidity, represents the ratio of raw water turbidity remaining, which is expressed as a percentage. These values may then be plotted directly against the corresponding settling velocities to produce a settling velocity distribution curve for each jar of the jar-test series. The "per cent remaining" defines the proportion of the raw water turbidity that settles at a rate equal to or less than the corresponding settling velocity, which has been shortened in labelling the settling velocity distribution curves in this paper to "per cent settling at less than stated settling velocity".

One of the difficulties in comparing such data with plant results is the large scale-up in time. For a given settling velocity, time of sedimentation in the jar test procedure is about one one-hundredth of that in the conventional plant, where detention time is commonly measured in hours. This may not be true of plants using tube or tray settlers with short settling time. Usually the settling obtained in a plant having well-designed mixing and flocculating and settling facilities will be superior to that obtained in jars. Apparently this is due to continued flocculation taking place under gravitational influence in the large plant settling basin, a phenomenon sometimes called "sweep" flocculation.

Another difficulty comes about as the result of continuing movement of the water in the jar-testing equipment after the flocculating paddles are stopped:

this goes on for at least one minute after the paddles stop, the period of time depending upon the jar-testing system being used. To reduce the rotation of the water in the jars during the settling period, the writer has adopted the system proposed by Camp<sup>(6)</sup>, using stators. Camp's system also has the advantage of enabling the jar-testing equipment to operate at a higher velocity gradient for the same rotary speed than when no stators are used. There is no doubt that the computed settling velocity values, particularly for short times of settling, are somewhat too low because of interference with sedimentation caused by continuing rotation of the water in the jars.

The equipment used by the writer for jar test work has usually been similar to that shown by Camp<sup>(6)</sup>, but more recently as shown in Figure 8. Besides the paddles and stators, the equipment also includes a system for applying the coagulant dose at or close to the hub of the impeller during brief rapid mixing at high speed. The coagulant solution is applied under controlled rates of flow rather than dumped on the water surface. Where necessary, flushing is used to purge the coagulant dosage tube. The system also includes a permanently-fixed sampling point for withdrawal of the settled water samples from a fixed location in the beaker by means of a 3 mm glass tube, controlled by a pinch clamp. These siphons are built so as to give nearly equal rates of flow in each beaker. Prior to withdrawing each sample, approximately 10 ml of water is drawn through the tube in order to flush it, and then a sample of a little more than 30 ml is withdrawn for determination of turbidity. With some practise, and with the assistance of a timekeeper, accurate control of times is obtained. Precise settling velocity values may be determined by making allowance for changes in depth in the beaker due to the withdrawal of samples. A settling velocity distribution curve is produced for each jar.

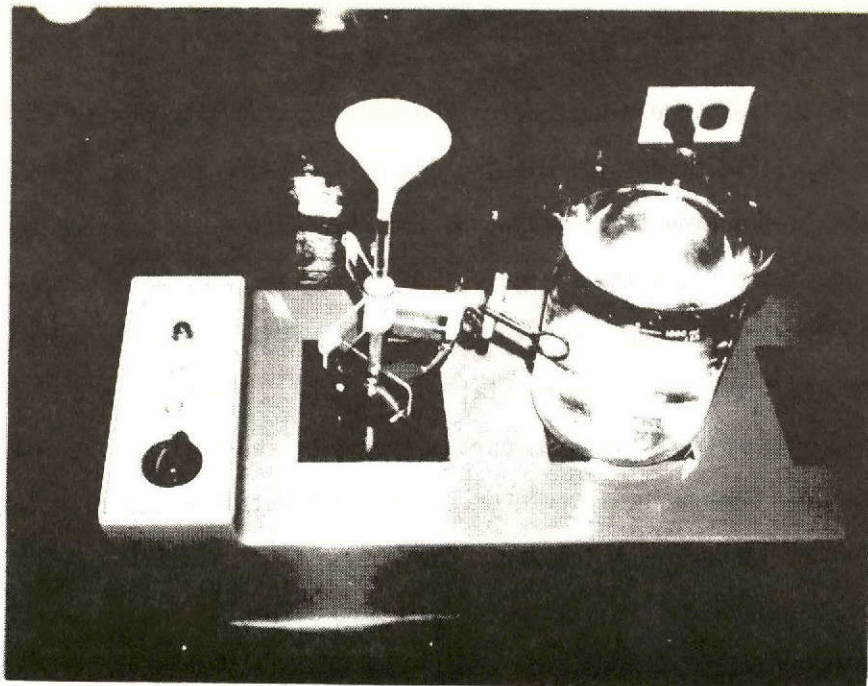


FIGURE 8. JAR TESTING EQUIPMENT

Table 2

TYPICAL JAR TEST RESULTS

Raw Water Turbidity 26 j.t.u. Gt in all Jars - 60,000.

Jar Number	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Rapid Mix				
RPM	160	160	160	160
Seconds	70	55	15	5
Aluminum Sulfate				
Dosage, mg/l	15	15	15	15
Duration of application, sec.	2	2	2	2
Flocculation				
RPM	50	50	50	50
Minutes	15	17	23	26
Settling	Settled Water Turbidities, jtu.			
2.5 min	13	12	9.9	8.0
4.0 "	13	12	8.2	6.8
7.0 "	11	9	6.6	5.7
15.0 "	8.0	7.6	4.0	4.0



Using equipment of this type, two persons are needed to conduct one jar test series, which requires no more than one hour, except for any special analytical determinations that may be required. Table 2 shows the results for a jar test series evaluating rapid mixing. As Griffiths discovered, the shortest rapid-mix time gave the best results<sup>(16)</sup>.

In contrast to traditional jar test procedures, the procedure outlined produces an orderly and consistent matrix of data, superior to the usually erratic results obtained when the coagulant solution is dumped into the top of the beaker and samples are withdrawn by pipette. With this controlled procedure, many of the variables involved in pretreatment have been evaluated, such as optimization of velocity gradients and agitation times for rapid mixing and flocculation, lapse of time between rapid mixing and flocculation, pH, coagulant dosage, solution strength, etc.

Figure 9 shows results of a typical jar test series during which the duration of flocculation was varied. In this series, rapid mixing was at 165 rpm for one minute, and flocculation was at 40 rpm. No stators were used. The data show that results were impaired when time of agitation exceeded 40 minutes. Studies such as this, or studies in which the velocity gradient is varied, with time fixed, might yield information on floc strength which could be correlated with filter behavior<sup>(18)</sup>.

For comparison of jar tests with plant results, it is of course desirable that the jar tests be conducted in a way that simulate as nearly as possible plant conditions with regard to times and mixing intensities. This requires the computation of plant velocity gradients<sup>(3)(4)(17)</sup> which, when mechanical agitators are used, are usually smaller than those determined from metering the power requirements of the drive motors due to losses in speed reducing equipment,

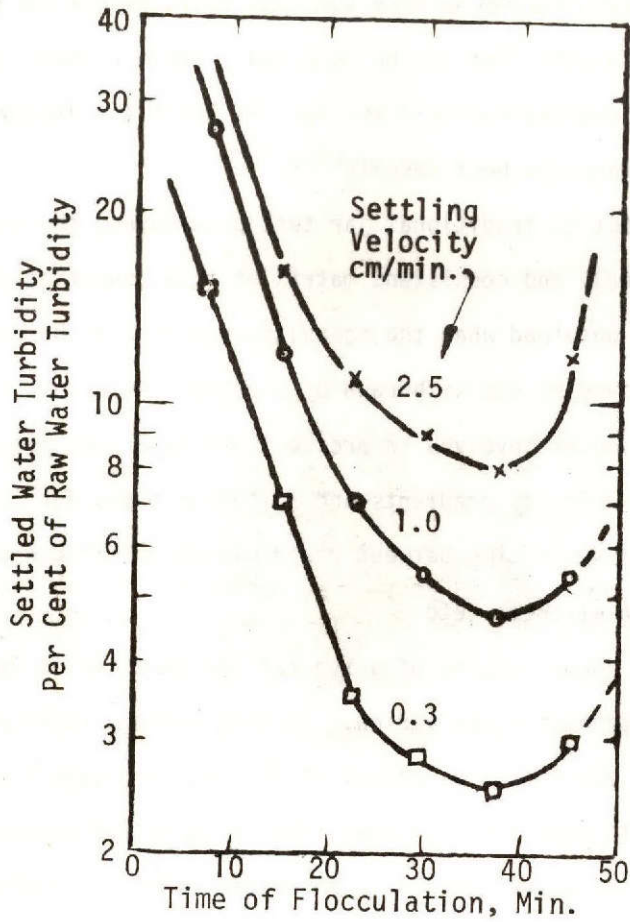


FIGURE 9. EFFECT OF FLOCCULATING TIME ON SEDIMENTATION

bearings, etc. In one 57 mgd (2.5 cu m/sec) plant where the writer has worked, the rapid mixing chamber was located several hundred feet (about 100 m) from the flocculating basins, and water flowed from one to the other tranquilly in a large channel with a time of flow of about 100 seconds. This was simulated in jars by high speed rapid mix, a 100 second period of low speed agitation, then flocculation at a normal speed. The same process in the laboratory, without the 100 second slow mix, yielded higher settling velocities than when the delay occurred. Partly because of this, and to increase the plant's hydraulic capacity, the rapid mix is now being moved to a location close to the flocculators.

Figure 10 shows a settling velocity distribution curve derived from turbidity-removal data in the 12 mgd (0.525 cu m/sec) plant mentioned earlier (Plant B) in which there were two settling basins in series, one requiring a relatively high settling velocity, the other larger one having a much lower value. A straight line has been drawn through these two points to obtain the plant settling-velocity distribution curve. Also shown are jar test data with the same raw water during a similar period. These jar test data indicate that plant improvements could be made that would enable better removal by sedimentation prior to filtration.

In Figure 11 is shown the settling-velocity distribution curve for a plant having a poorly compartmented flocculating basin, with a settling basin inlet beneath a hanging baffle at the flocculator outlet (Plant L. Capacity 307 mgd, or 7 cu m/sec). The settling velocity value on the "plant" curve was obtained from turbidity removal data. Compared with this curve is a settling velocity curve obtained in the laboratory, which shows better removal of suspended matter by sedimentation.

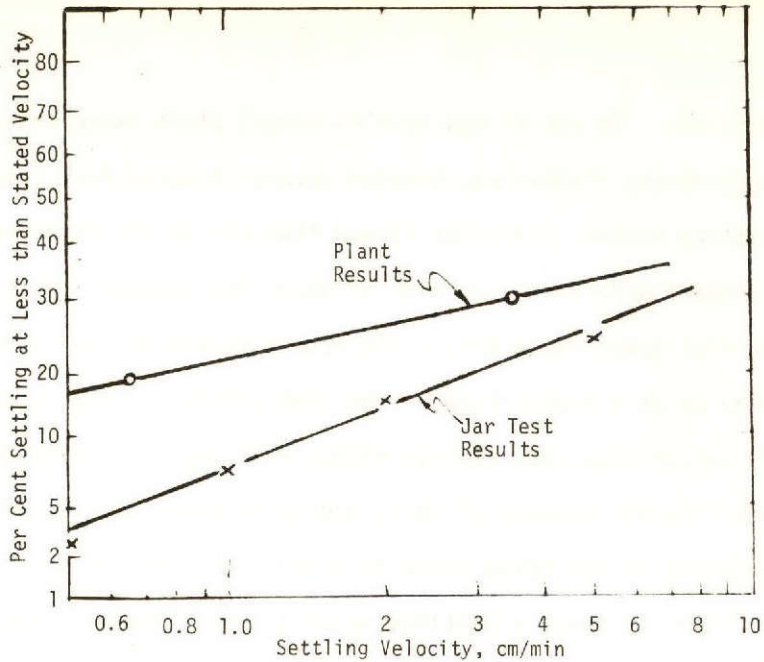


FIGURE 10. COMPARISON OF PLANT AND JAR TEST SETTLING VELOCITY DISTRIBUTION CURVES FOR PLANT B. Raw water turbidity 15 j.t.u.

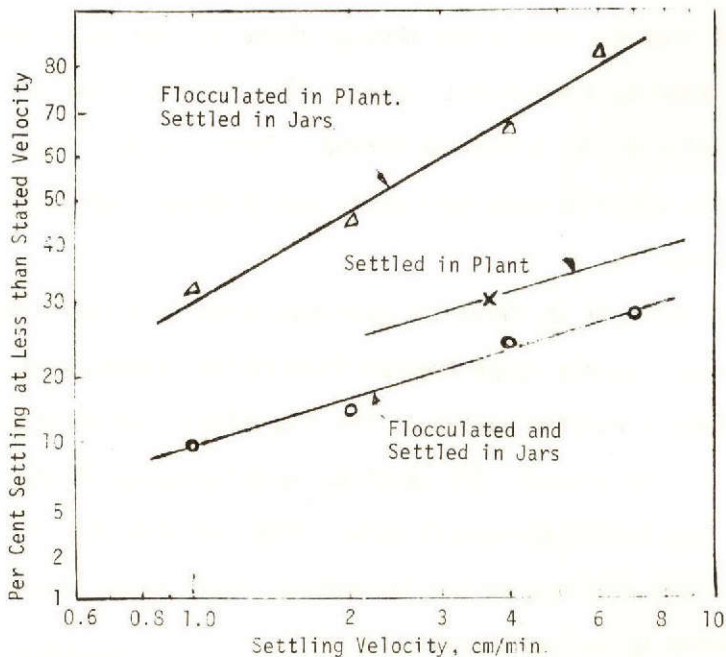


FIGURE 11. COMPARISON OF PLANT AND JAR TEST SETTLING VELOCITY DISTRIBUTION CURVES FOR PLANT L.

Samples were dipped with 2-liter jars from the flocculator outlet in this plant, and portions were siphoned from each jar after stated periods of time to obtain a settling velocity distribution curve, which represents the settling characteristic of the flocculated water entering the settling basin in this plant. The data show (Figure 11) that the flocculator was producing poor results. This had been expected owing to its configuration, which was such as to encourage short circuiting. That the plant was producing better results was attributed to the 3-hour detention time in the settling basins and the effect of "sweep" flocculation.

A note of caution should be stated about sampling in the plant: in dipping samples from the flocculator outlet, it is important that this be done very carefully, with the mouth of the jar inclined downward, so that water enters the jar gently, gradually expelling air from the jar, as is indicated in Figure 12, in order that conditions be as quiescent as possible in the jar and so that floc is not broken. Care is required to prevent undue thermal or other effects from adversely affecting sedimentation in the jar.

#### Anomalies.

Some anomalies have been observed in the course of this study. Anomalies sometimes provide useful beginning points for research, and it is hoped that the following observations may stimulate further investigations into fields in which understanding is imperfect.

In numerous clarification plants, excellent turbidity removal is obtained by sedimentation, yet large volumes of nearly-transparent flocculated material may be seen passing to the filters, rapidly clogging them. Is this phenomenon associated with inadequate rapid mixing, short-circuiting in flocculators, sweep flocculation, or other factors?



FIGURE 12. DIPPING FLOCCULATED WATER SAMPLE

Where alum is the coagulant, the percentage of aluminum in sludge taken from settling basins has been found to be lower than in the solids discharged during filter washing. In flocculated water, the ratio of suspended solids to turbidity is usually close to unity, but in waste filter wash water the suspended solids value commonly runs five to ten times higher than the turbidity. It appears that some of the floc does not entrap turbidity while it is forming. Determination of the cause of these phenomena should be useful.

#### Summary.

A method of processing and summarizing pretreatment operating data for water clarification plants has been described which yields graphical relationships by which the behavior of different plants can be compared to evaluate the performance of mixing, flocculating, and settling basins, and to characterize the amenability of the raw water to coagulation and flocculation. The operating data for 24 plants have been examined, and from them have been developed standardized settling-velocity distribution curves for two levels of raw water turbidity.

A jar test system and procedure that yields consistent and orderly results leading to the production of settling-velocity distribution curves is also described. These curves are found to correlate well with plant operating data, and yield information useful in the revision of existing plants to improve their performance, and useful in establishing criteria for design of new plants.

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## Chapter 3

## RESIDENCE TIMES IN PRETREATMENT

Many water treatment plants do not perform as well as might be expected because of two types of deficiencies: (1) inappropriate selection of basic process characteristics; and (2) basic weaknesses in flow distribution, hydraulic inadequacies, incorrect baffling of basins, lack of consideration of mixing intensity criteria, etc. This chapter is concerned with the second category of deficiencies, which comes about because standard reference sources generally do not provide all of the necessary basic process testing and design information. This chapter deals with <sup>residence time</sup> ~~process~~ characteristics of pretreatment units and the testing and evaluation of these characteristics. Chapter III-A will discuss some of the basic hydraulic and design procedures that commonly influence adversely the performance of pretreatment units. Chapter IV will deal with the complex case of density current problems and design to control them.

Factors Affecting Residence Times

Designers traditionally select residence times for rapid mixing, flocculation, and settling basins and provide appropriate volumes for these functions. These selections may be based on successful nearby experience, comparable experience elsewhere, and on jar testing conducted at the plant site. These procedures are further discussed in Chapter \_\_\_\_\_ .

There are a number of residence time characteristics of basins that have been well worked out in the field of chemical engineering. The most important of these characteristics are plug flow, mixed flow, and dead space. Others that enter the analyses are back mixing, delay in sampling time, process recirculation, etc. These latter may upset any

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analyses to evaluate the first and more important characteristics.

### Mixed Flow

→ In a single-compartment continuous-flow completely-stirred reactor, the fraction of the water retained in the reactor,  $1-F(t)$ , longer than time  $t$ , is:

$$1 - F(t) = e^{-\frac{t}{T}} \quad [\text{Eqn. 3-1}]$$

in which  $e$  is the naperian logarithm base 2.303, and  $T$  is the nominal, or computed residence time, determined from the expression

$$T = \frac{V}{Q} \quad [\text{Eqn 3-2}]$$

in which  $Q$  is the rate of flow, and  $V$  is the basin volume. Figure 3-1

shows the relation between  $1-F(t)$  and  $\frac{t}{T}$  for such a basin. It will be

seen that about <sup>39</sup>40 per cent of the incoming water passes out of the basin before  $\frac{t}{T}$  reaches 0.5 (one half of the nominal residence time),

63 per cent passes through prior to the nominal time ( $\frac{t}{T} = 1.0$ ),

and 22 per cent remains in the reactor more than  $\frac{t}{T} = 1.5$ .

To keep residence time within narrower limits, chemical engineers commonly use a number of continuously-stirred reactors in series. When this is done, <sup>in terms of tracer concentrations in the effluent</sup> the residence time characteristics are defined by the expression:

$$C_t = \left(\frac{nW}{V}\right) \left(\frac{nt}{T}\right)^{n-1} \left(\frac{1}{(n-1)!}\right) e^{-\left(\frac{nt}{T}\right)} \quad [\text{Eqn. 3-3}]$$

$n$  = number of tanks in series

$C_t$  = concentration in exit stream at time,  $t$ .

$\frac{W}{V}$  = weight of tracer injected divided by total volume of system

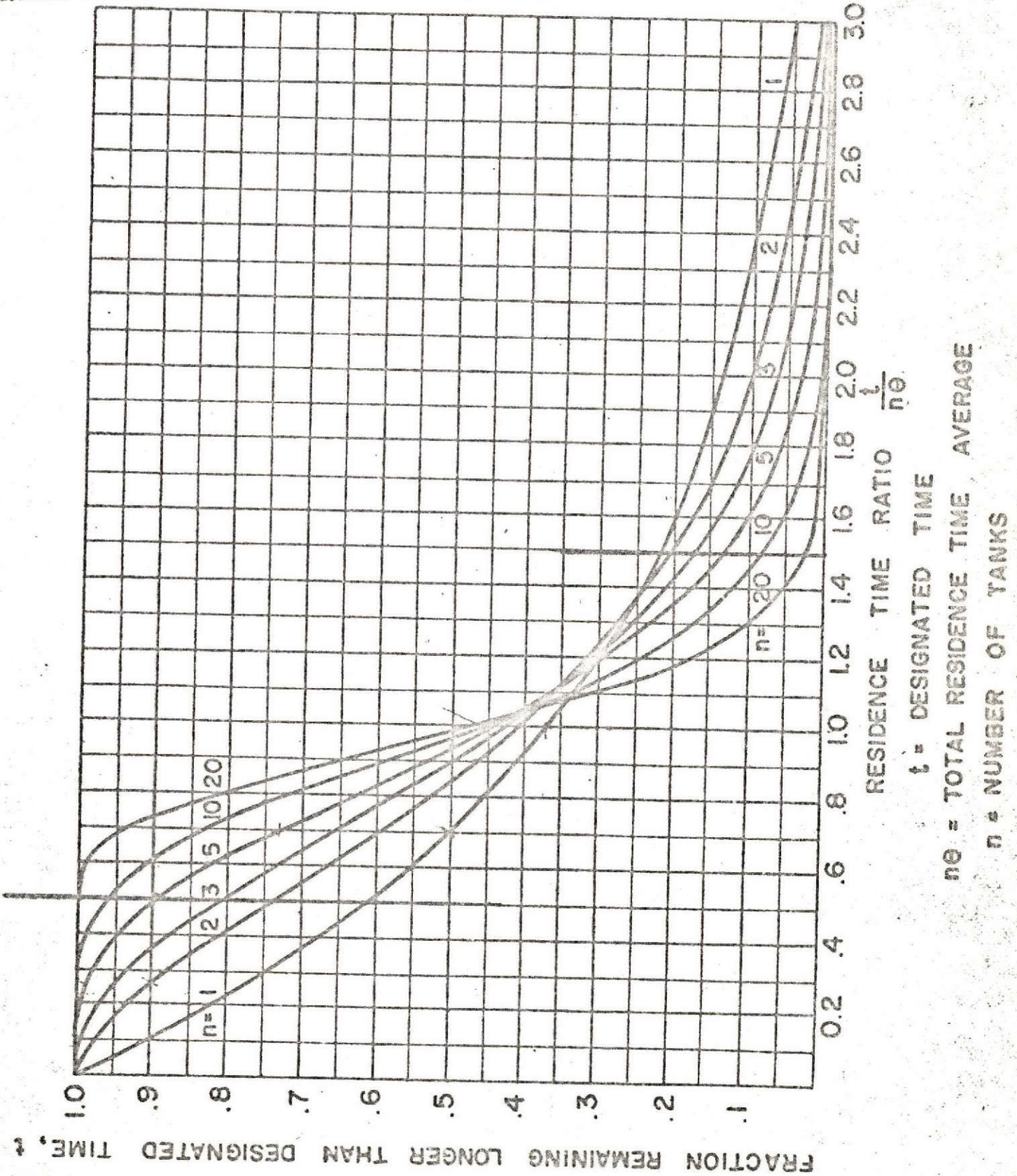
Plotted on rectangular coordinates. Figure 3-2 shows similar information on a semi-logarithmic plot

after sky dosing a tracer at the inlet at  $t=0$

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FRACTION REMAINING LONGER THAN DESIGNATED TIME,  $f$

$t$  = DESIGNATED TIME  
 $n\theta$  = TOTAL RESIDENCE TIME AVERAGE  
 $n$  = NUMBER OF TANKS

FIG 3-1

Fig

EP-546

12 18 2

$1 - f(x)$

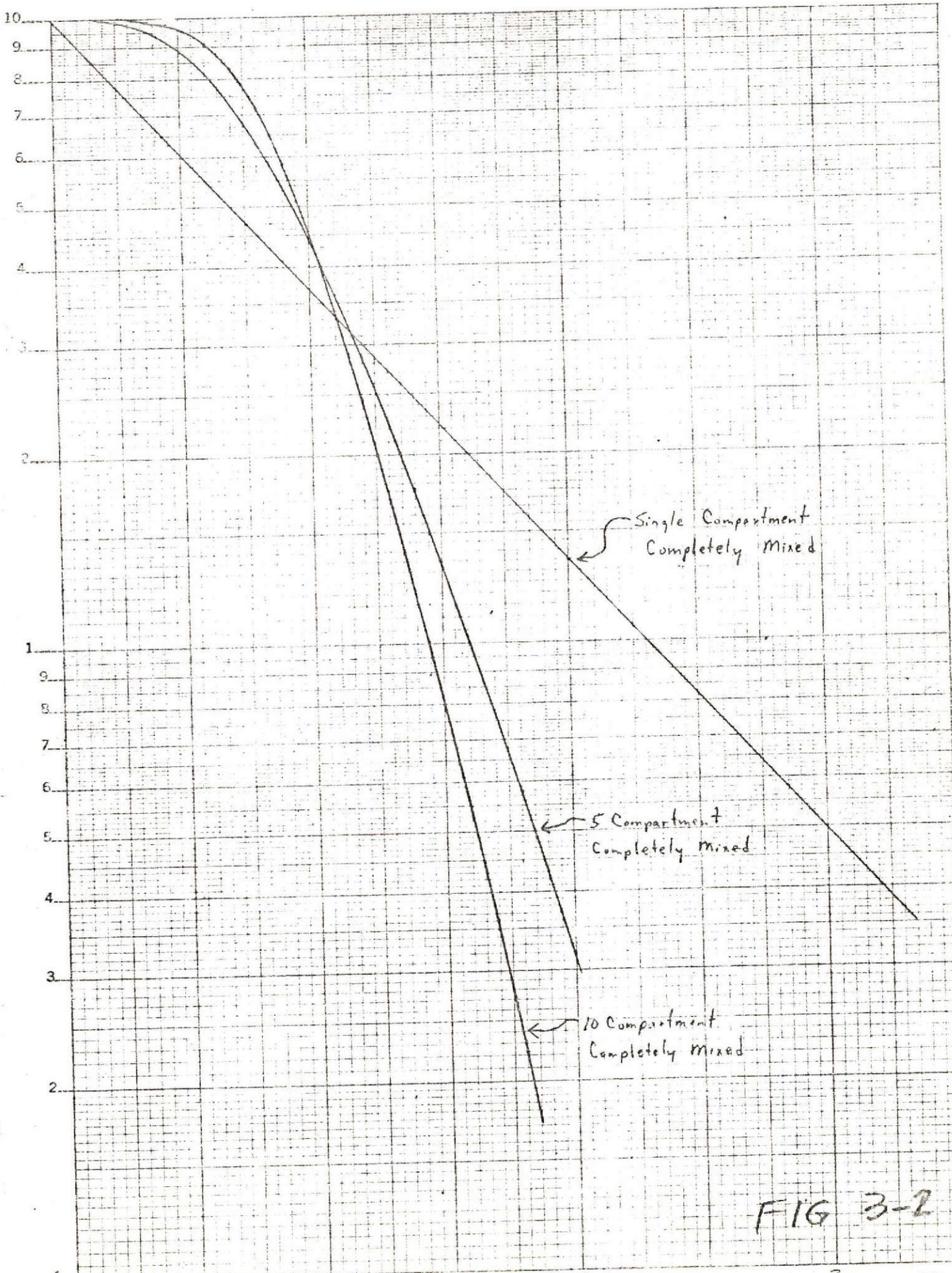


FIG 3-2

*4-F(t) curves*

From Eqn 3-3, <sup>degrees of compartmentation</sup> have been computed for 5 and 10 compartments of continuously-stirred reactors in series. In this completely-mixed regime, the three ~~systems~~ may be compared as follows:

*These are shown in Figures 3-1 and 3-2*

<u>Time of Residence as per cent of Nominal</u>	<u>Percent of Incoming Water Discharged</u>		
	<u>1 Compartment</u>	<u>5 Compartments</u>	<u>10 Compartments</u>
In less than 50%	<sup>39</sup> 38	11	4
In more than 150%	22	13	8
Held between 50 and 150%	<sup>39</sup> 40	76	88

The striking characteristic of these data is the large proportion of the flow (60%) for a one-compartment reactor which is retained in the basin for times either less than or more than  $\pm 50$  per cent of the nominal residence time whereas, in a 5-compartment series reactor, only 24 per cent is retained less or more than  $\pm 50$  per cent of the nominal time.

One unsatisfactory approach to this problem has been to put a number of mixers in a single compartment flocculator. This fails because the unit remains a single compartment reactor with the resultant residence time characteristics described above. Another approach, still fairly widely used with reel-type horizontal-shaft agitators transverse to the direction of flow, has been to install curtain walls from above the water surface to about one-third of the depth above the floor. In these units, the tops of the mixers customarily rotate in the nominal direction of flow. As a result, flow is swept in a reverse direction along the floor of the mixer, a great deal of back flow occurs, and some of the incoming water passes rapidly out of the reactor.

Plug Flow is highly desired in a settling basin, where tranquil conditions are needed to promote sedimentation. In an ideal plug flow

basin all of the water entering at time zero will arrive at the outlet at time  $\frac{t}{T} = 1.0$ . In reality this does not happen but, in some plants, it may be closely approached. There is inevitably some turbulence and mixing near the basin inlet, so that part of the space in the basin is a mixed flow zone. In addition, flow conditions may be upset by density current effects described in chapter , and frequently the nominal  $t$  is reduced by the presence of substantial sludge volumes. Short-circuiting and back-flow characteristics caused by inlet design may also adversely affect plug flow performance.

Dead Space, in a settling basin may be produced by inlet design characteristics, causing the flow to fail to use part of the available volume. It may also be caused by the actual presence of accumulated sludge. In a flocculating basin, dead space may (but rarely does) result from insufficient mixing intensity. In some instances, the flocculator outlet design may be such that part of the flow passes out of the basin and then returns to it. In such instances dead space may be negative: the flocculator is borrowing part of the settling basin space for flocculation. In this case, the settling basin dead space is increased by the amount of the borrowing.

Evaluation of Basin Characteristics was subjected to ~~mathematical~~ mathematical and experimental analyses by Rebhun and Argamon<sup>a</sup> (3). They assumed that, in settling basins, part of the flow moved as a plug and the balance as though completely mixed. They further assumed that a fraction of the tank volume was dead space. For these assumptions, they found that  $\xi$  the fraction portion of the water remaining in the basin longer than time

$$1 - F(t) = e^{-\left[\frac{1}{(1-\rho)(1-m)}\right] \left[\frac{t}{T} - \rho(1-m)\right]} \quad (\text{Eqa. 3-4})$$

"xi" could be described by:

in which:

$p$  = fraction of active flow volume acting as plug flow

$1-p$  = fraction of active flow volume acting as mixed flow

$m$  = fraction of total <sup>basin</sup> volume which is dead space

While this relationship was not intended for application to mixers or flocculators, its utilization in evaluation of tracer tests in both mixing and settling processes provides useful information.

When tracer test data are converted into a plot of  $\frac{t}{T}$  versus the logarithm of  $1-F(t)$ , producing graphs similar in appearance to Figure 3-2, the several flow and space parameters can be approximated by a graphic solution. A straight line is drawn through the data points for the lower values of  $1-F(t)$ , as indicated in Figure 3-3c. The value of  $\frac{t}{T}$  on this straight line where it intersects  $1-F(t) = 1.0$  is then  $p(1-m)$ , and the change in  $\frac{t}{T}$  for one logarithmic cycle is  $\frac{e}{(1-M)(1-p)}$ . The two resulting simultaneous equations are then solved to determine the deadspace ratio and the plug flow and mixed flow fractions.



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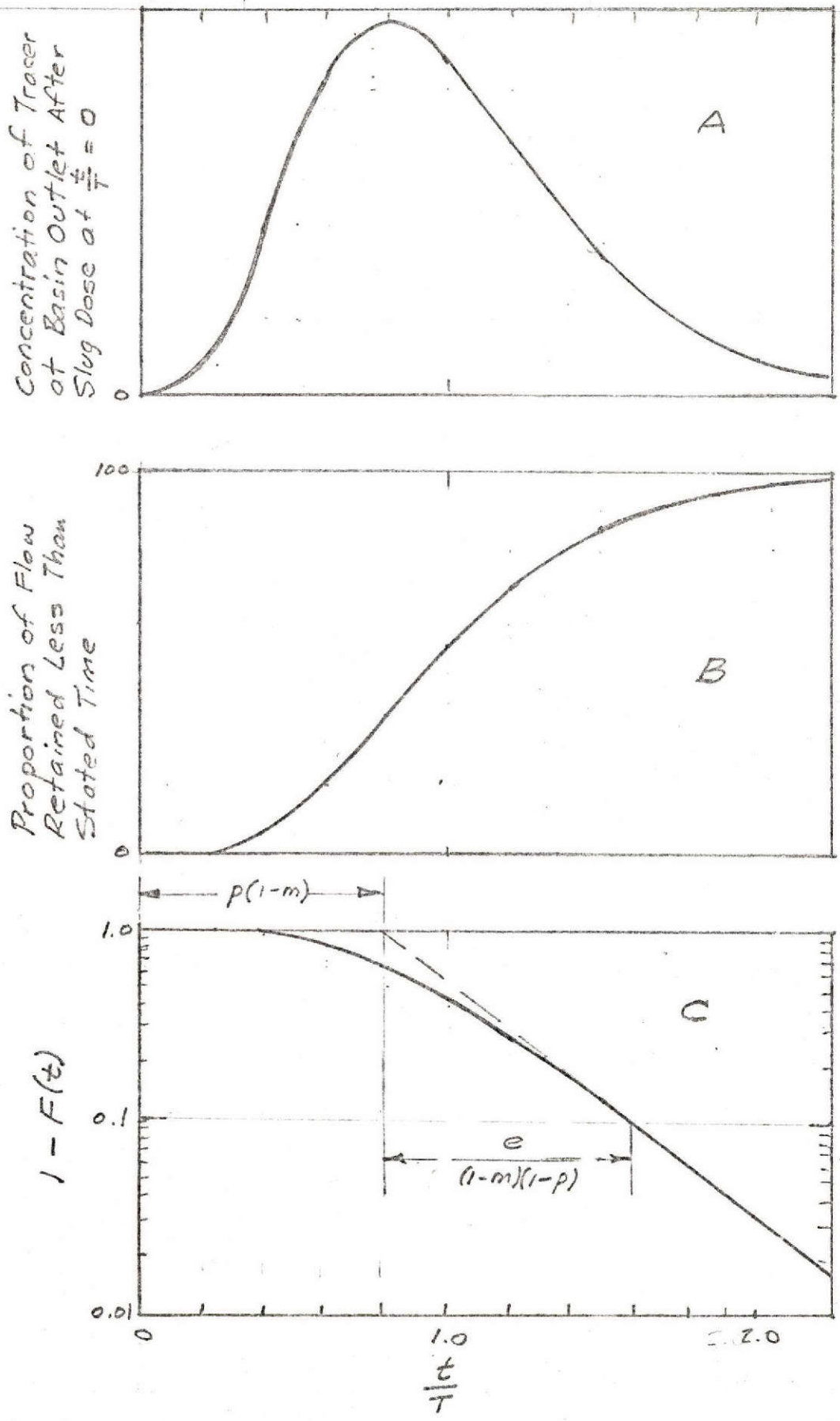


FIGURE 3-3. ANALYSIS OF TRACER TEST DATA

### The Use of Tracer Tests

Tracer tests have been used for many decades as a means of evaluating modes of flow in channels, rivers and fluid handling basins. In water treatment plants they are particularly useful as a means of measuring the distribution of flow between parallel basins, and for evaluating the hydraulic efficiency of basin inlets and basin configurations. They enable appraisal <sup>of</sup> ~~to~~ the effects of modifications to basins through before-and-after comparisons. They may be applied to mixing, flocculating, sedimentation or other ~~of~~ process units in which residence time needs to be evaluated or controlled.

There are two methods of applying tracer substances to determine residence times in treatment plants: the "slug dose", in which the tracer is added all at one time; and the "step dose" procedure in which the feed of a tracer is abruptly initiated, continued at a <sup>fixed</sup> ~~set~~ rate for an extended period, and then cut off.

Traditionally, <sup>410</sup> ~~A~~ tracer tests have been conducted through the use of "slug" doses of a tracer substance such as a radioactive material, sodium chloride or ammonium chloride, or dyes of fluorescent materials. Such tracer tests then yield data such as are shown in Fig. <sup>3A</sup> ~~3-1a~~, which then must be integrated to produce the information shown in Fig. <sup>3B</sup> ~~3-1b~~ and restated in Fig. <sup>-3C</sup> ~~3-4c~~.

In some instances, the writer has used fluoride compounds, and in other instances sodium chloride as a tracer. Some of the fluoride is absorbed in floc and settles out of the water. Allowance must be made for this. When fluoride is used as the tracer, presuming no appreciable fluoride background in the raw water, doses as low as 1-1.5 mg/l are

useful. Use of the alkalinity change caused by a step change in coagulant dosage as a tracing technique was unsatisfactory because of the inexactness of the stoichiometry of the reaction. Slug doses of chlorine have also been used but did not give <sup>reliable</sup> quantitative results because of dissipation due to chlorine demand or sunlight.

Working on a laboratory basis, Taras showed the advantage of "step" dosages over slug dosage of a tracer substance. (A)

The "step" dosage procedure has distinct advantages over "slug" dosage in places where the necessary feeding equipment is available to provide a constant rate of application of a tracer substance. Where chloride levels in the incoming raw water are below 10 mg/l, sodium chloride is a useful tracer applied at levels in the order of 20 mg/l.

One disadvantage of the slug dose, particularly when sodium chloride is used, is that the solution of salt used must necessarily be quite concentrated. It therefore has much greater density than the water to which it is applied and frequently will find low spots in the plant into which it will fall, and subsequently diffuse slowly, giving grossly misleading results. If the slug dose is used, intensive mixing is essential to minimize density current effects. The step dose procedure avoids this difficulty.

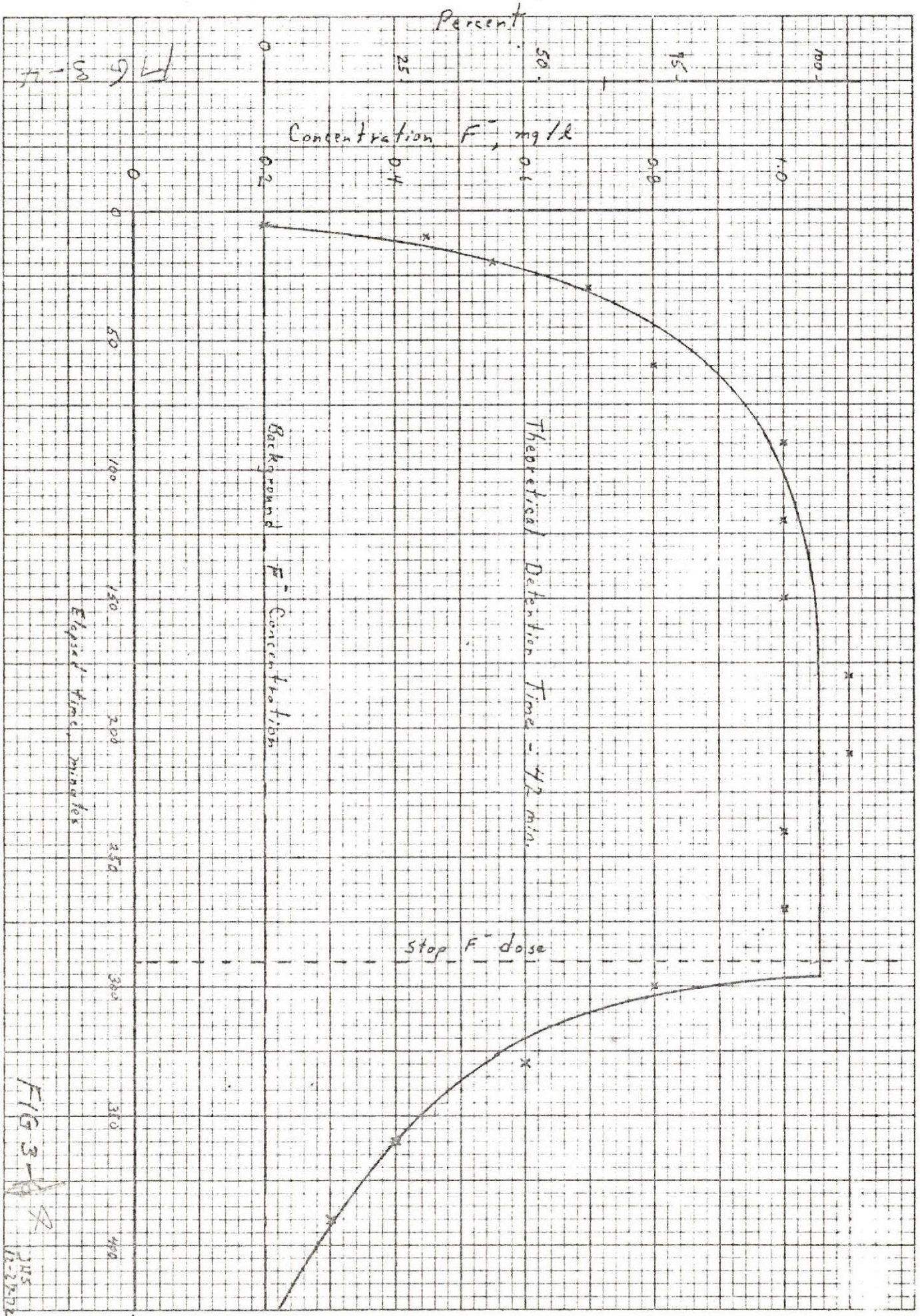
The quantity of tracer substance is approximately the same whichever dosing system is used, ~~although when~~ <sup>if</sup> the step dose is long continued, it may require a larger quantity. With the slug dose, a high quantity, suddenly applied, may cause density current problems, which do not occur with step dosing. If, for example, a 20 mg/l step dose is required, in order to obtain meaningful data from a slug dose will require a quantity of tracer that is sufficient to produce a concentration of about 20 mg/l if uniformly mixed in the entire contents of the basin or basins being

being tested. This will produce a much higher peak concentration than occurs with the step dose, but that higher concentration is needed to define accurately the rising and recession limbs of the tracer concentration curves.

Step dosage yields, directly after its start-up, analytical values which be directly converted into values of  $F(t)$ , where  $F(t)$  is equal to the fraction of the applied dosage measured on samples at the basin outlet, for each value of  $t$ . Further, on discontinuance of the step dosage, the analytical data directly yield values, expressed as fraction of the dosage applied, of  $1-F(t)$ . Thus, each step dosage application produces two sets of  $1-F(t)$  data, and those collected at the start of dosage can be verified against or compared with the shut-down results.

In using the step dosage procedure it is desirable to continue the dose for a period two or three times longer than the nominal residence time in the basins being tested, in order that equilibrium conditions may be approached. As will be seen from Figure 3-4, a tracer test of a 42 minute residence time flocculator using fluoride as a tracer, the equilibrium is not approached until after a residence time of 2 or 3  $\frac{t}{T}$ , particularly when there is short-circuiting in the basins. The chemical tracer test data may be used then according to the method of Rebhun and Argaman<sup>(3)</sup> to compute the mixed flow, plug flow, and dead space fractions. Note that, as shown in Figure 3-4, background concentration must be taken into account.

The validity of the slug-dose procedure in testing should be checked by a material balance computation to determine whether all



F-3-4

FIG 3-4

215  
12-22-72

3-8  
(Con't.)

the tracer fed was recovered. The step dose procedure nearly always automatically provides a material balance check in that the measured concentration of the tracer should rise by the amount of the dose and, after shut down, should recede to the background level.

Flocculators can be evaluated by analysis of tracer tests using the methods previously described. Data from the smoothed curves in Figure 3-4 have been reworked and plotted in Figure 3-5, together with the computed curve for a single-compartment completely-mixed reactor. The layout plan of this plant is sketched in Figure 3-~~5~~<sup>6</sup> (Plant J). The plant has a single-compartment flocculator for each settling basin, which contains five vertical-shaft paddle agitators. The permeable baffle outlet is relatively open, and currents induced by the paddles sally out into the settling basin at relatively high velocities. Actual return flow from the settling basin into the flocculator can be seen at certain locations. As a result, in some of the tracer tests, negative dead space is found by analysis of the tracer test data. Data from a number of locations, in Table 3-1, show that this phenomenon is fairly common for flocculators. The flocculator is borrowing space from the settling basin; this, in turn, causes an increase in the dead space and mixed-flow fraction in the settling basin.

# Flocculator

x - Start-up  
 o - Shut Down  
 o - Completely Mixed Single Compartment Reactor

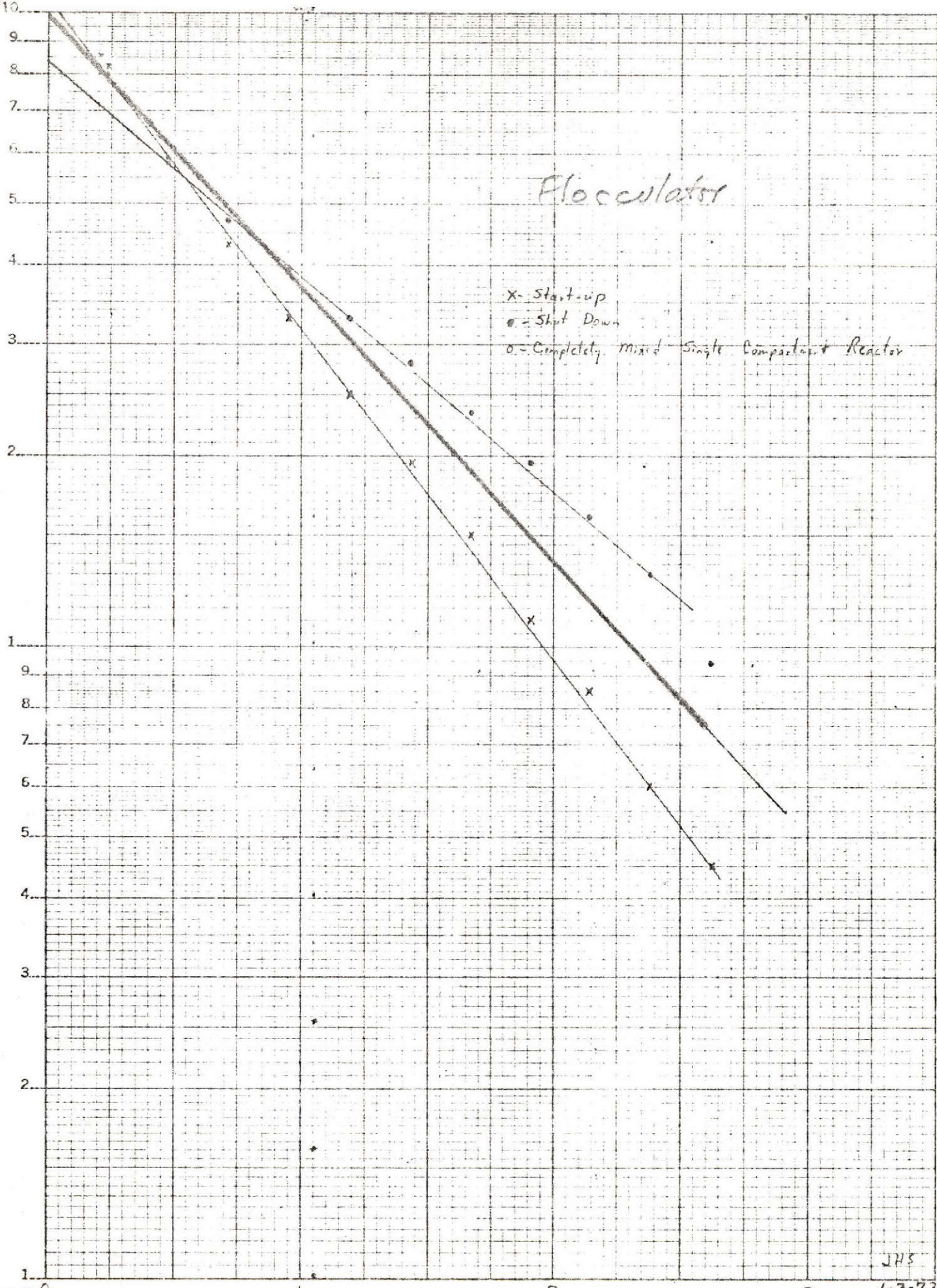
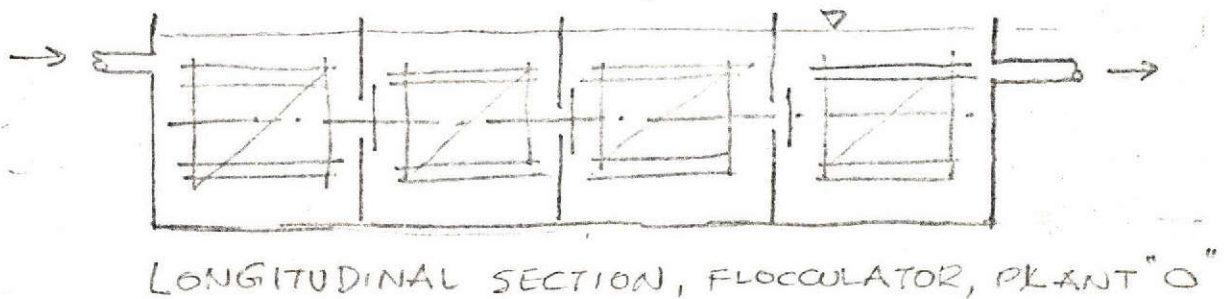
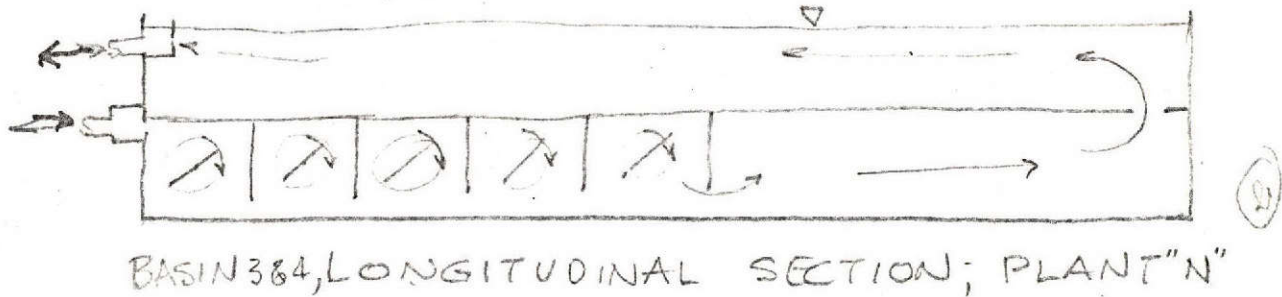
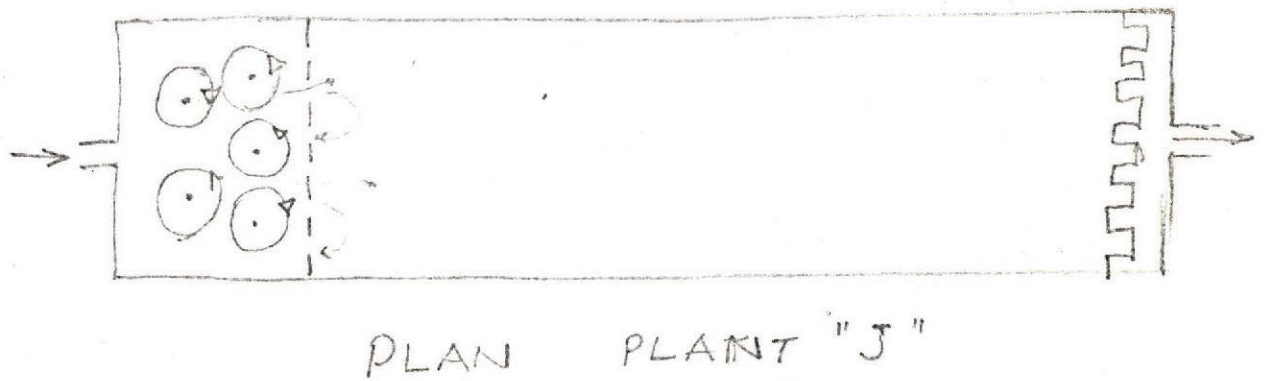
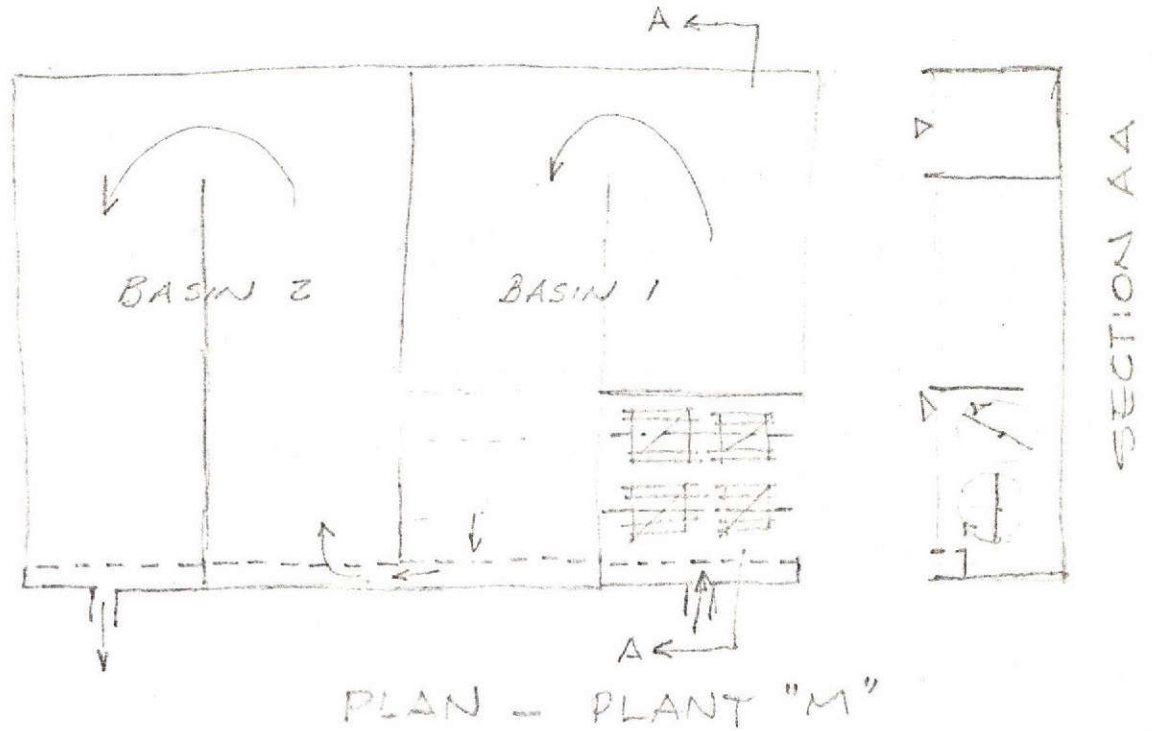


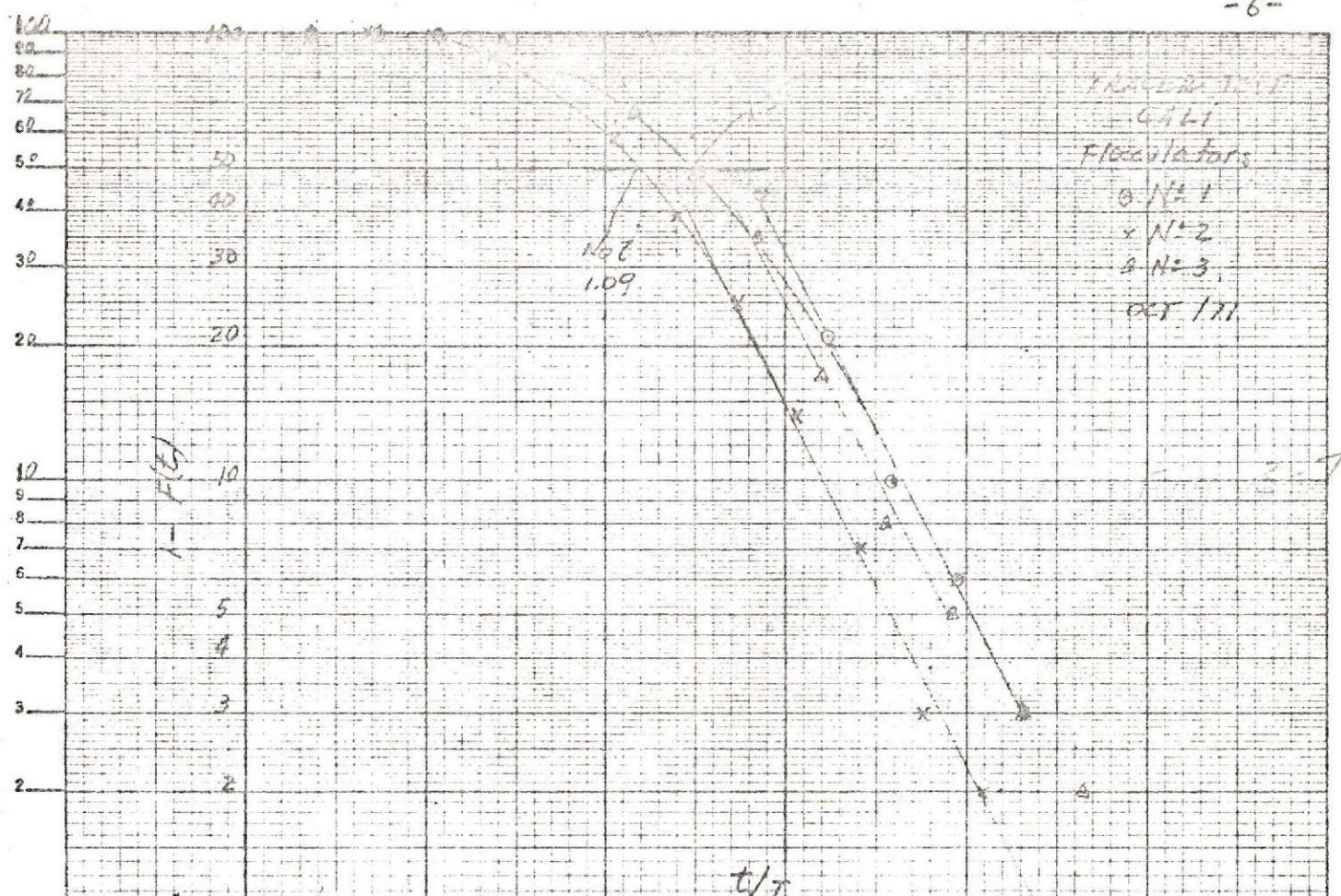


FIG 3-6. SCHEMATIC LAYOUTS OF PLANTS USED FOR TRACER TESTS

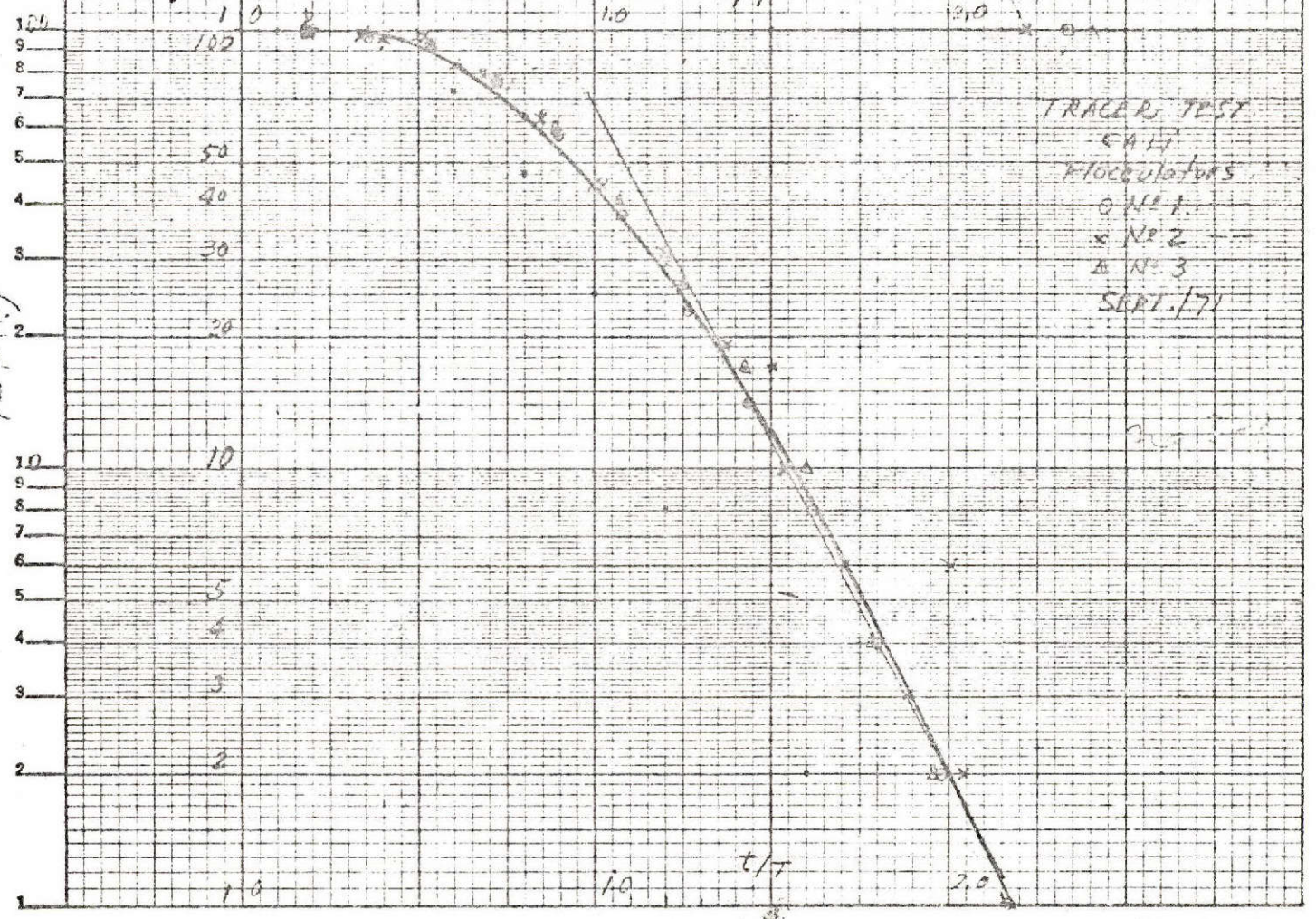


Another set of data for three six-compartment flocculating basins tested in parallel is shown in Figure 3-7. These data show the unequal division in flow between the basins. In another tracer test in the same plant, (Figure 3-8) when the flows were equally balanced, results for all three basins were identical with each other and with the computed values of  $1-F(t)$  for a 6-compartment series mixer. The exact correspondance between measured and calculated values indicates that the flow was 100 per cent mixed and that there was no dead space. These flocculators had only 11 minutes residence time, but had exceptionally intense vertical turbine mixing with a velocity gradient of  $68 \text{ sec}^{-1}$ .

TRACER TEST  
SALT  
Floculators  
O N<sup>o</sup> 1  
x N<sup>o</sup> 2  
Δ N<sup>o</sup> 3  
OCT. 1/71



TRACER TEST  
SALT  
Floculators  
O N<sup>o</sup> 1  
x N<sup>o</sup> 2  
Δ N<sup>o</sup> 3  
SEPT. 1/71

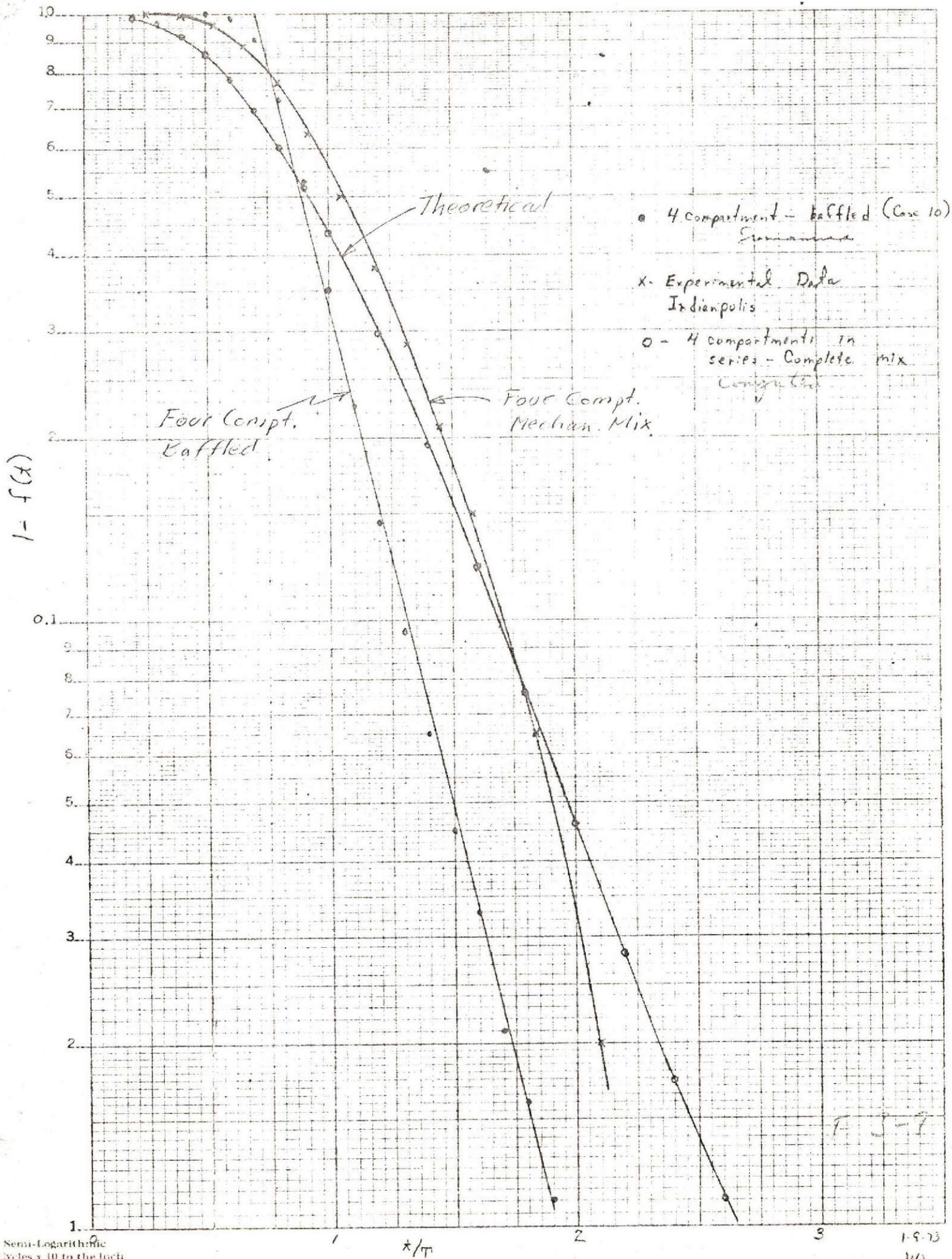


KEUPEL & ESSER CO.  
 46 6012  
 SEMI-LOGARITHMIC  
 4 CYCLES X 70 DIVISIONS  
 MADE IN U.S.A.

*tracer tests of*

Data for two four-compartment flocculators are shown in Figure 3-9. The Figure also includes the ~~calculated~~ *theoretically computed* curve for a 4-compartment flocculator. One of the units was the mechanically-agitated system shown in Figure 3-5, Plant 0<sup>(5)</sup>. It showed some plug flow and gave even better detention characteristics than the calculated curve in spite of the fact that it appeared to be completely mixed. The other curve shown<sup>(6)</sup> is for a 4-compartment baffled flocculator, for which the calculated characteristics were:

Plug flow, % : 73  
Mixed flow, % : 27  
Dead space, % : 2.7



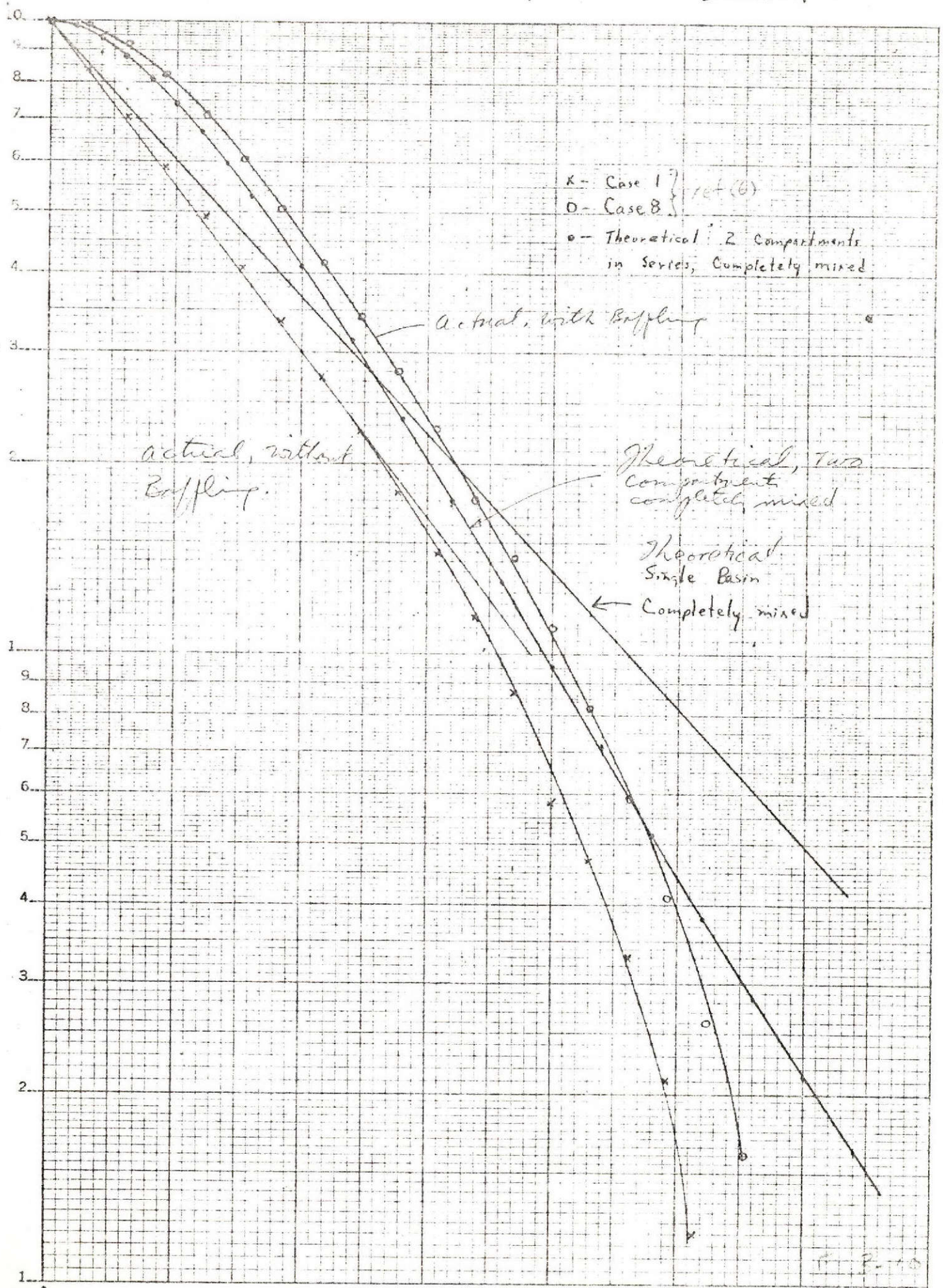
To illustrate the effect of flocculator compartmentation the data in Figure 3-10 are of interest<sup>(6)</sup>. Calculated curves for one- and two-compartment flocculators are shown. Two tracer tests were run with the same basin model which contained two reel-type horizontal-shaft agitators with shaft transverse to direction of flow, and rotation of the top of the agitators in the same direction as the flow. In one instance, there was no baffle between the two agitators, and discharge left the flocculator over a submerged weir. In the other case, identical baffles were installed between the two agitators and at the outlet from the flocculators. These baffles had perforations near their bottoms occupying 3 per cent of the wall area.

Figure 3-10 shows that well defined compartmentation had a marked effect on the residence time characteristics of this two compartment basin as shown by the following figures.

<u>Residence Time as per cent of nominal</u>	<u>Per Cent of Incoming Water Discharged</u>	
	<u>No Compartmenting</u>	<u>Compartmented</u>
In less than 50%	45	20
In more than 150%	15	23
Held between 50 and 150%	40	57

The compartmented flocculator, despite fairly complete mixing, showed some plug flow performance, as is indicated by the better detention characteristic than that calculated for two completely-mixed compartments. On the other hand, the uncomparted basin gave a poorer performance than that calculated for a completely mixed single compartment reactor.

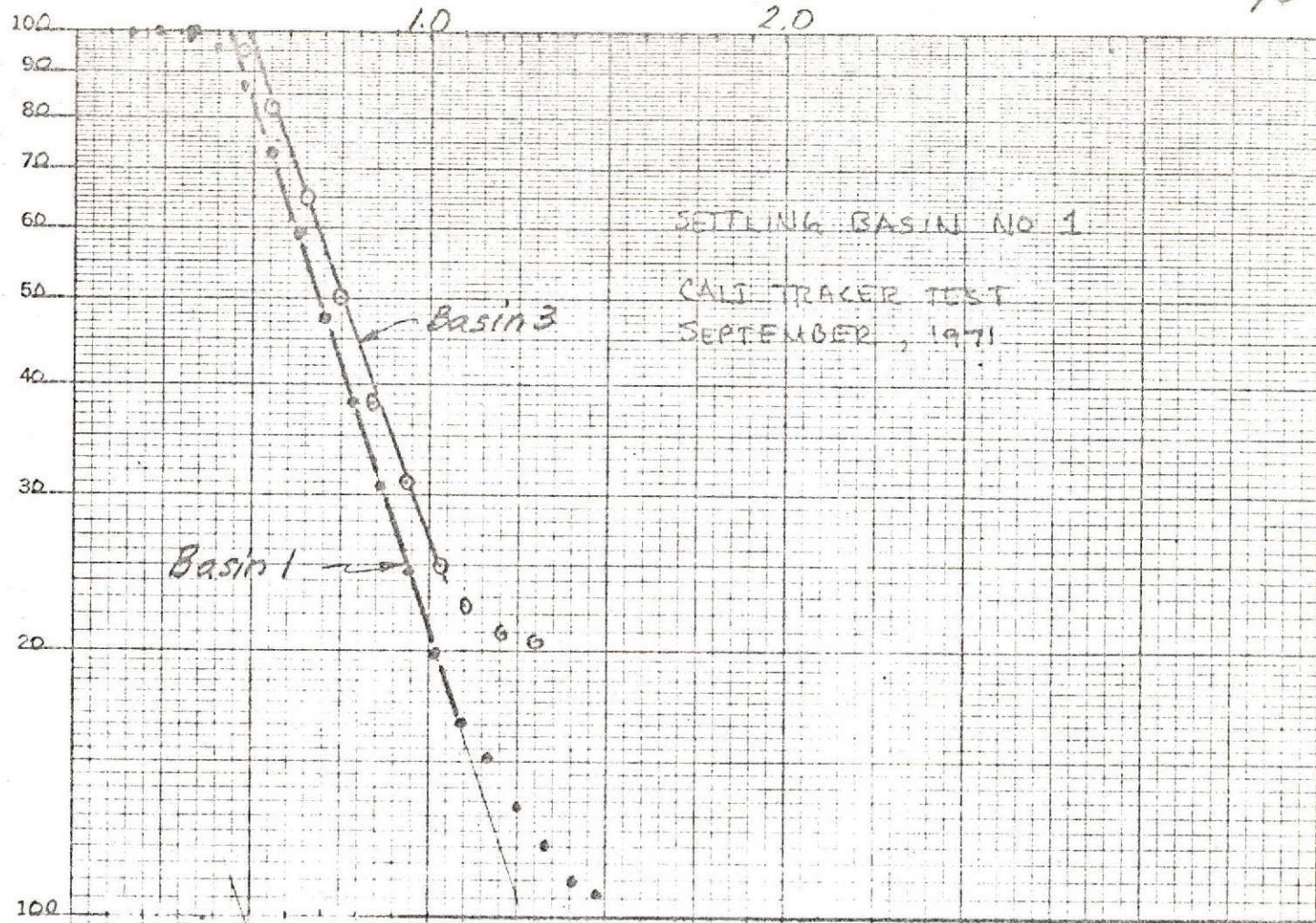
1 - f(x)



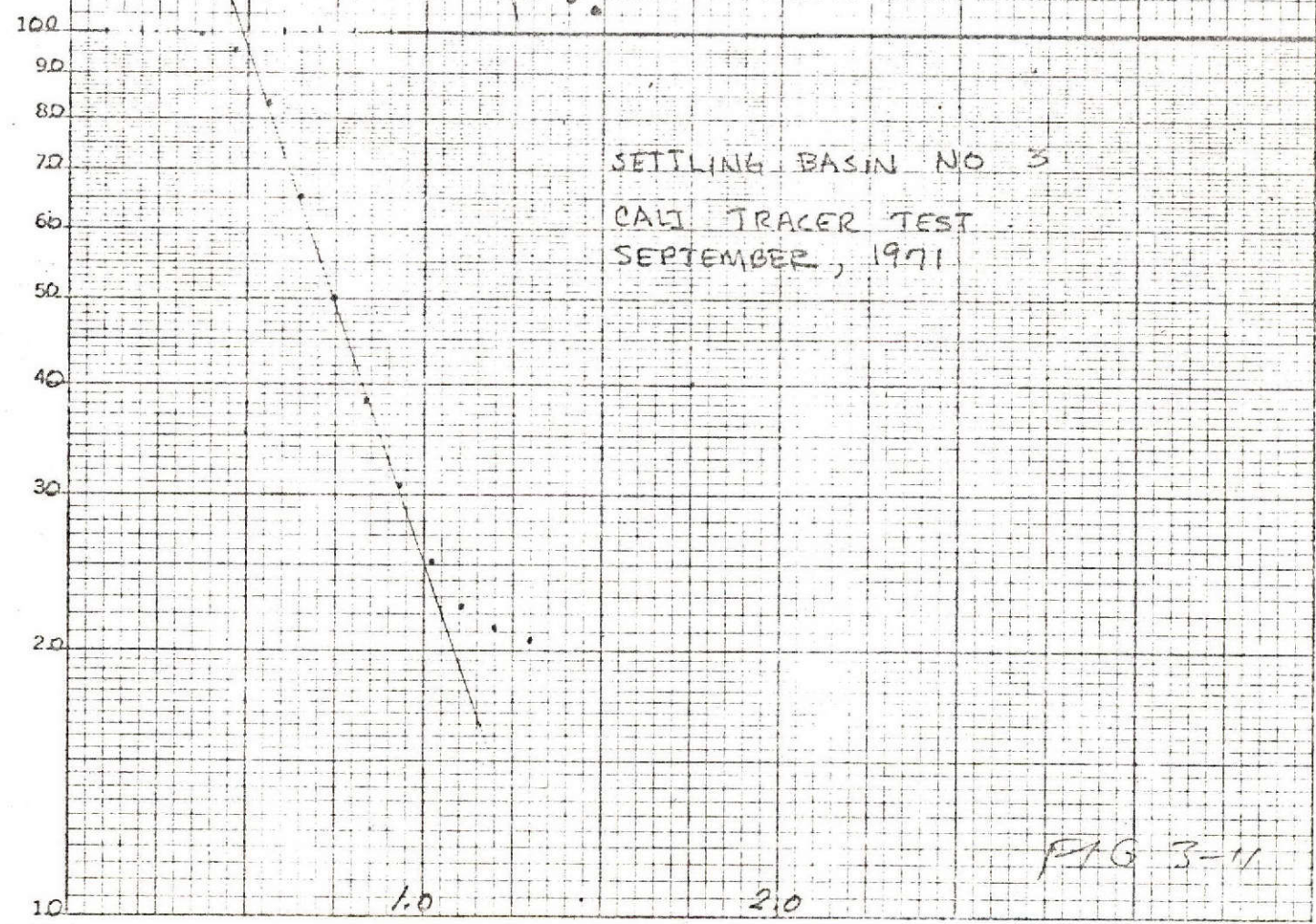
Settling Basins may be evaluated by the method of Rebhun and Argaman<sup>(3)</sup> using data from tracer tests although, since ordinarily the tracer is added to the rapid mix, the results of tracer samples at the settling basin outlet represent the combined effects of the mixer, conduits, flocculator and basins. Figure 3-11 shows two fairly typical curves for two basins tested in parallel under such circumstances.

Data for a step-dosage tracer test from samples collected at the flocculator outlet and the settling basin outlet are shown in Figure 3-12. They show reasonable agreement for the startup and shutdown of the dosage at the flocculator outlet, but very divergent results for the overall basin outlet. This commonly happens in sedimentation basins as a result of thermal density currents. Figure 3-12 shows an example of such an instance. In this Figure, absolute time has been plotted, rather than relative time. There is a natural tendency to start the step dosing and sampling in the morning, and to cut it off in the afternoon, as was done in this case. When the source of supply is a shallow river, the water may be much cooler in the morning, with a warming trend during the day. This is particularly true when the skies are clear so that the stream may rapidly lose heat at night and gain it by day. An hourly or continuous temperature record is therefore an important adjunct of a tracer test. Slug doses applied in the morning and in the afternoon would be similarly affected. In the situation described by Figure 3-12, the quicker arrival of the tracer at the settling basin outlet in the afternoon was verified by observations of surface current velocities, which were accelerated by the warm water, as is discussed in Chapter IV.





1-F(t) %

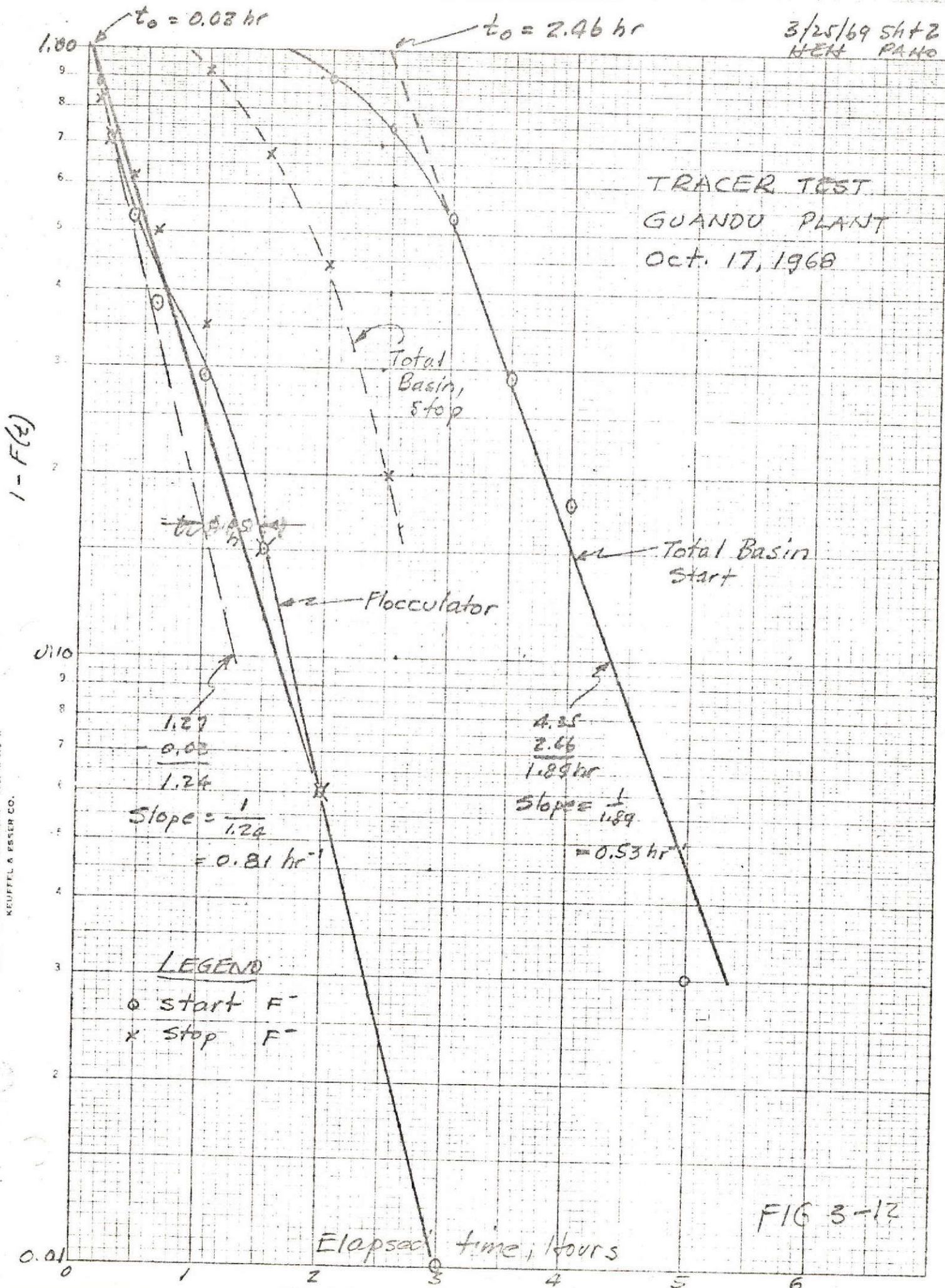


1-F(t) %

FIG 3-11

3/25/69 SH+2  
HEH PANO

TRACER TEST  
GUANDU PLANT  
Oct. 17, 1968



IN 1/62 2 CYCLES X 70 DIVISIONS MADE IN U.S.A.  
NEUFEL & BISSER CO.

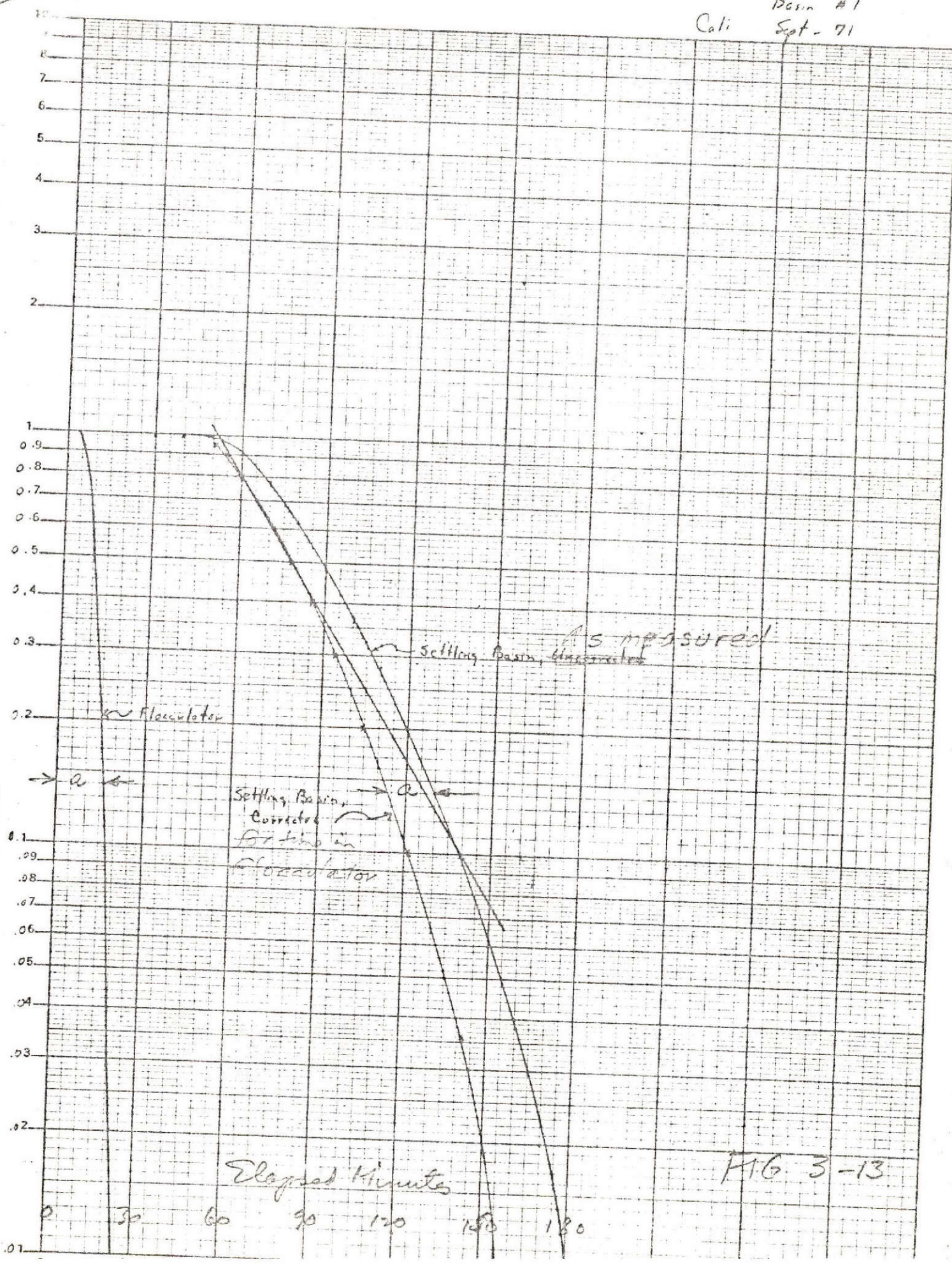
The effects of behavior of a combined flocculating-settling basin system can be separated to give the behavior of the flocculator alone and of the settling basin alone by a graphic solution as shown in Figure 3-13. In this figure the time of passage through the flocculator for each level of tracer concentration has been subtracted from the time of passage through the combined system to obtain a computed curve for the settling basin alone. In this case, calculation using the straight line drawn through the settling basin data gave:

Dead Space, %	31
Per Cent of Flow Plug	53
Mixed	42.

In this case, a great deal of turbulence was transmitted from the flocculator into the settling basin, accounting in part for the very high mixed flow percentage.

Basin #1  
Cali Sept - 71

KE SEMI-LOGARITHMIC 46 5370  
3 CYCLES X 60 DIVISIONS  
KEUFFEL & ESSER CO.



Elapsed Minutes

FIG 3-13

A very peculiar set of tracer data resulted from a test of a flocculator in a very large filtration plant. Samples collected inside the settling basin a short distance from the flocculator showed recurrence of successive tracer peaks (Tracer used was a slug dose of chlorine). The observed data are shown in Figure 3-14 and the computed values of  $1-F(t)$  are shown in Figure 3-15. The results were replicated on several successive tests on other dates. Subsequent examination of sludge deposits in this settling basin prior to cleaning showed well-defined scour patterns around column bases showing the direction of flow. The discharge from the flocculator was entering the settling basin in such a way as to create a slowly-rotating permanent vortex about 130 feet in diameter rotating on a vertical axis. This was corrected by revision of the flocculator outlet baffling, which had been designed to facilitate rearrangement by addition or removal of wooden bulkheads in concrete slots.

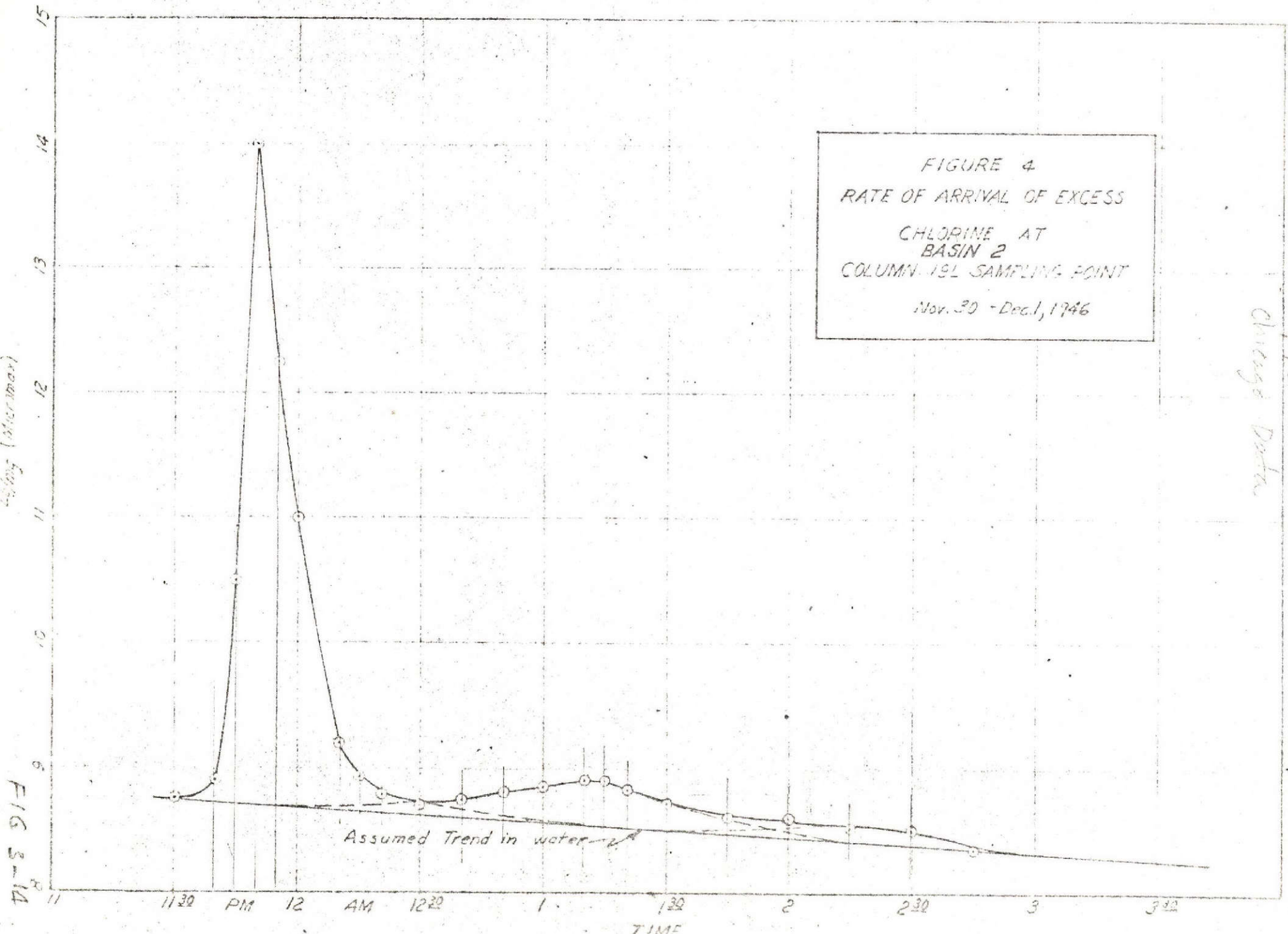


FIGURE 4  
 RATE OF ARRIVAL OF EXCESS  
 CHLORINE AT  
 BASIN 2  
 COLUMN 191 SAMPLING POINT  
 Nov. 30 - Dec. 1, 1946

Chicago Data  
 FIG 2-1

FIG 3-18

11:50 PM 12 M 12:30 A 1 A 1:30 2:00 A 2:50 A

$1-F(t)$

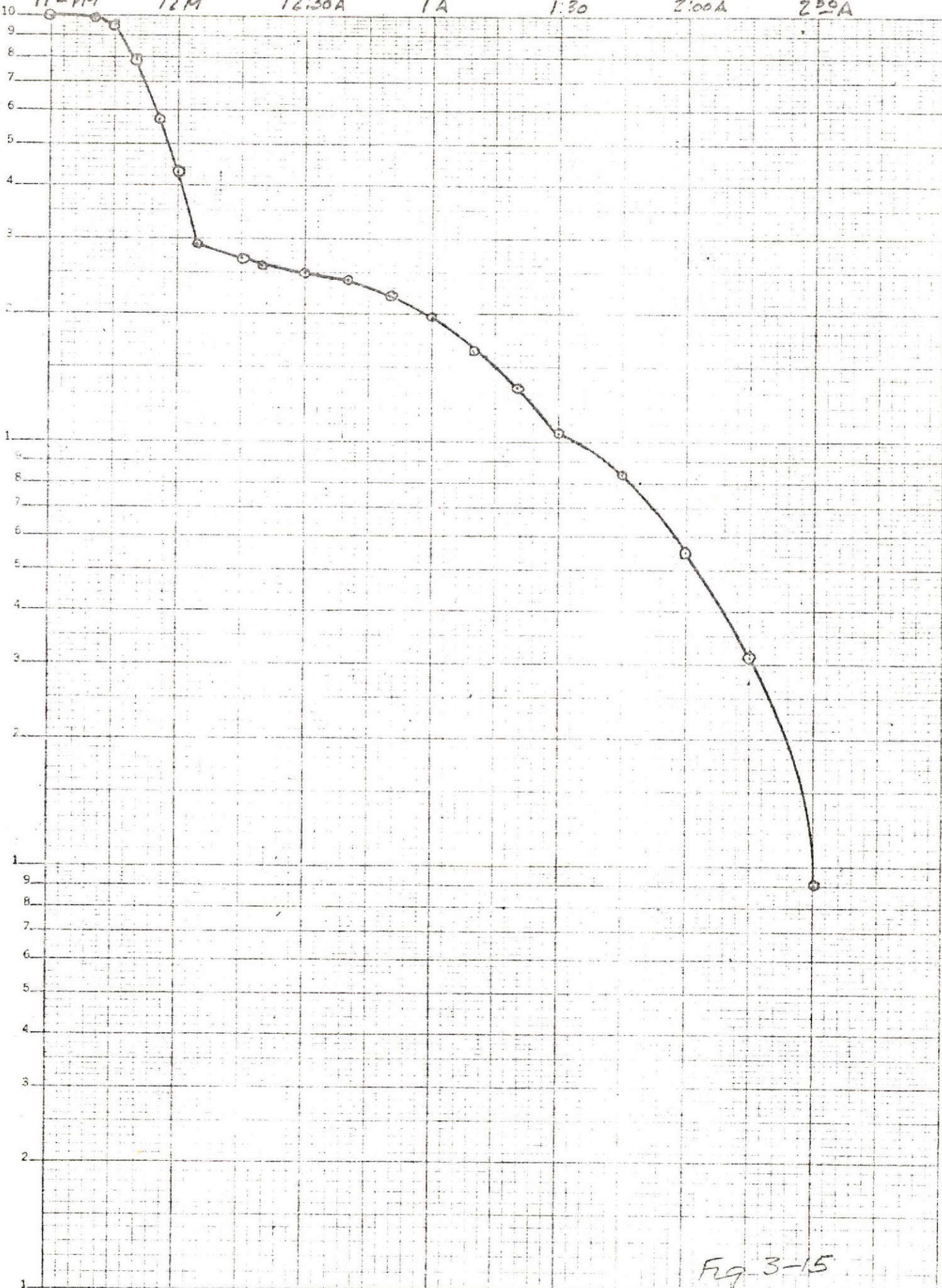


Fig 3-15

A similar standing roller in the upper level of a two-story settling basin was observed in tracer tests of Plant N, whose configuration is shown in Figure 3-6. The  $1-F(t)$  plots of this test, given in Figure 3-16, show the characteristic way that such rollers distort the  $1-F(t)$  plots.



201 SA  
6 Sep 68

0.47

KE SEMI-LOGARITHMIC 46 4973  
2 CYCLES X 70 DIVISIONS  
MADE IN U.S.A.  
KEUFFEL & ESSER CO.

$1 - F(t)$

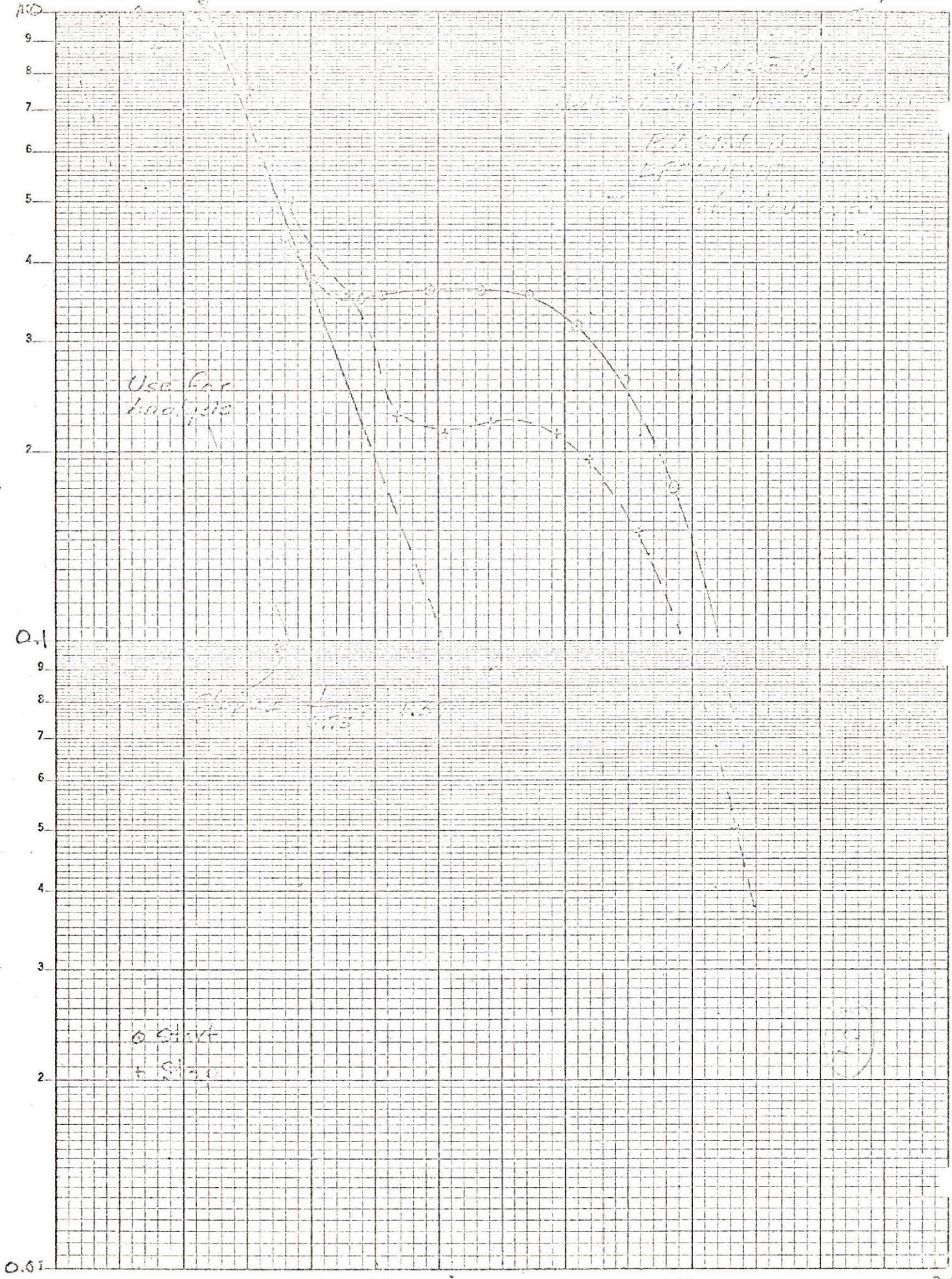


FIG 3-16 28

Discussion of Residence Time Characteristics

Table 3-1 lists the basin characteristics from tracer tests in four different plants.

In interpreting the figures, it is important to remember several points. First, the theory applied was developed for settling basins rather than for flocculators. A well-compartmented flocculator will normally yield a high value of what computes to be "plug" flow, while a poorly compartmented one will give a high value of mixed flow and relatively low values of plug flow. Sketches of the configurations of the plants studied have been given in Figure 3-6.

Flocculators: Plants J, M, and N showed poor residence time characteristics. These three plants had poorly-compartmented flocculating systems, either with hanging baffles between horizontal reels and large passage spaces below baffles, or no baffles at all. On the other hand, Plant O had reel-type paddles on a horizontal shaft with its axis parallel to the direction of flow. Between each of the reel agitators was a baffle that completely prevented flow except through a port at the center line of the axis. The axle was fitted with circular target baffles to prevent coring of the flow along the axle. This unit showed excellent detention characteristics in comparison to the others tested.

TABLE 3-1-

## BASIN CHARACTERISTICS DETERMINED BY TRACER

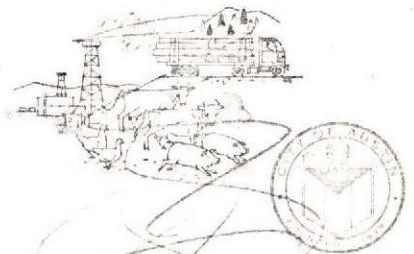
Plant Designation	Basin N <sup>o</sup>	Plant Capacity MGD	Test Series N <sup>o</sup>	Per Cent Dead Space	PERCENT of FLOW	
					Mixed Flow	Plug Flow
<u>Tests of Flocculating Basins</u>						
M	1	20	1	36	77	23
J	-	250	1	20	95	5
J	-		2	43	65	35
N	1	160	1	28	61	39
N	3	-	1	30	63	37
N	4	-	1	9	57	43
O	-		1	0	35	60
<u>Tests of Settling Basins</u>						
M	1	20	1	14	72	28
M	2	-	1	27	71	29
J	-	250	1	35	14	86
J	-		2	60	25	75
N	1	160	1	66	6	94
N	3	-	1	26	19	81
N	4	-	1	24	15	85

Wana L  
(Don't forget)

(10)

Settling. The settling basin data gave values that were consistent with the configurations of the plants. Plant M. had around-the-end settling basins, which were unusually short and deep. Measured dead space was relatively low, but an extraordinarily high mixed-flow percentage was observed as compared to the plug flow fractions. This basin had visible standing slow-moving vortices in it, apparently contributing to the high mixed flow percentage. Plant J had straight-through settling basins with an unsatisfactory inlet arrangement, producing a substantial quantity of dead space in the basin. Plug flow percentages on both tracer trials were high, but on the second test series in this plant, further review revealed that a density current was operating, causing a much higher dead space fraction than under test series No. 1. At Plant N, Basin 1 (not shown) was an around-the-end type arranged somewhat like Basin 1 in Plant M, and the test results showed very high dead space. Through the functioning part (live space) of the basin, plug flow was high and mixed flow low. Basins No. 3 and 4 were unusually long two-story basins, with a flocculator and the first pass of sedimentation at the lower level and return flow in a reverse direction in the upper deck. On some tests, these basins showed a fairly satisfactory plug flow condition, and moderate dead space. On other tracer tests of these basins such as show in Figure 3-16, the presence of a roller in the upper level of the basin became visible.

General Comments. Tracer tests such as the foregoing often reveal unsuspected deficiencies in plant design, and enable the design of modifications to improve plant performance. Such tests should also be accompanied by visual observations of surface currents in the basins, and should also include observations of floc behavior. For example, a settling basin with a poorly-designed inlet, may display localized clouds of floc, generally standing in the same locations, indicating something is wrong with the inlet design (See Figure 3-17). Similarly, close observation of basin outlets will frequently reveal deficiencies in design. Submerged float devices, buoyed from floating balls can reveal velocities and direction at various depths in a tank. It has been the writer's experience that many water treatment plants need improved compartmentation of flocculators, basin inlet designs, and basin outlet systems. The tracer tests can be of considerable help in identifying such deficiencies, and evaluating the effectiveness of corrective procedures.



**Austin Texas...  
city on the move**

Austin, Texas is fast becoming the educational, cultural and economic hub, not only of the great state of Texas, but indeed the entire Southwest. Boasting five colleges and numerous industries, the capital of Texas is on the move. Far-sighted planning has provided adequate facilities to meet this challenge. Typical of this is the recently expanded Water Treatment Plant #2 on Lake Austin. Capacity was doubled from 20 MGD to 40 MGD with the installation of six additional D-O Clarifiers.

**D-O EQUIPMENT:**  
Squarex Clarifiers

Consulting Engineer: Montgomery, Williams & Levander  
Austin, Texas

Contractor: J. C. Evans Construction Co.  
Austin, Texas

JUNE							AUGUST						
S	M	T	W	T	F	S	S	M	T	W	T	F	S
	1	2	3	4	5		1	2	3	4	5	6	7
6	7	8	9	10	11	12	8	9	10	11	12	13	14
13	14	15	16	17	18	19	15	16	17	18	19	20	21
20	21	22	23	24	25	26	22	23	24	25	26	27	28
27	28	29											

**JULY 1965**

FIG 3-12

~~gradients and agitation times for rapid mixing and flocculation, lapse of time between rapid mixing and flocculation, coagulant dosage, solution strength, etc.~~

Figure <sup>3-16</sup>~~6-7~~ shows results of a typical jar test series during which the duration of flocculation was varied. In this series, rapid mixing was at 165 rpm for one minute, and flocculation was at 40 rpm. No stators were used. The data show that results were impaired when time of agitation exceeded 40 minutes. Studies such as this, or studies in which the velocity gradient is varied, with time fixed, might yield information of floc strength which could be correlated with filter behavior (7).

A similar effect was noted <sup>in jar tests</sup> by Sindelar and Soucek in 196\_ (8), and more recently by Argaman (9). Argaman's data, collected by pilot plant studies using flocculating equipment with and without compartmentation are presented in Figure <sup>3-19</sup>~~6-8~~. The results <sup>also</sup> show that a 4-compartment flocculator produced much more efficient sedimentation than a single-compartment unit. The optimum conditions established by his data for 75 per cent removal of turbidity during sedimentation are as follows:

<u>Number of Flocculator Compartments</u>	<u>G (Sec-1)</u>	<u>t (Sec)</u>	<u>Gt</u>
1	55	2000	110,000
4	78	780	61,000

These data demonstrate that the Camp Number (Gt) that was required to attain a stated degree of purification was reduced 45 per cent by compartmentation. This corresponds to a 30 per cent reduction in horsepower requirement for a given plant, or to a capability to provide equally good treatment to about 50 per cent more water.

By <sup>combining</sup> ~~combining~~ the data from Figures 3-4c and <sup>3-18</sup>~~6-7~~, it is possible to use

PERCENT OF RAW WATER TURBIDITY REMAINING

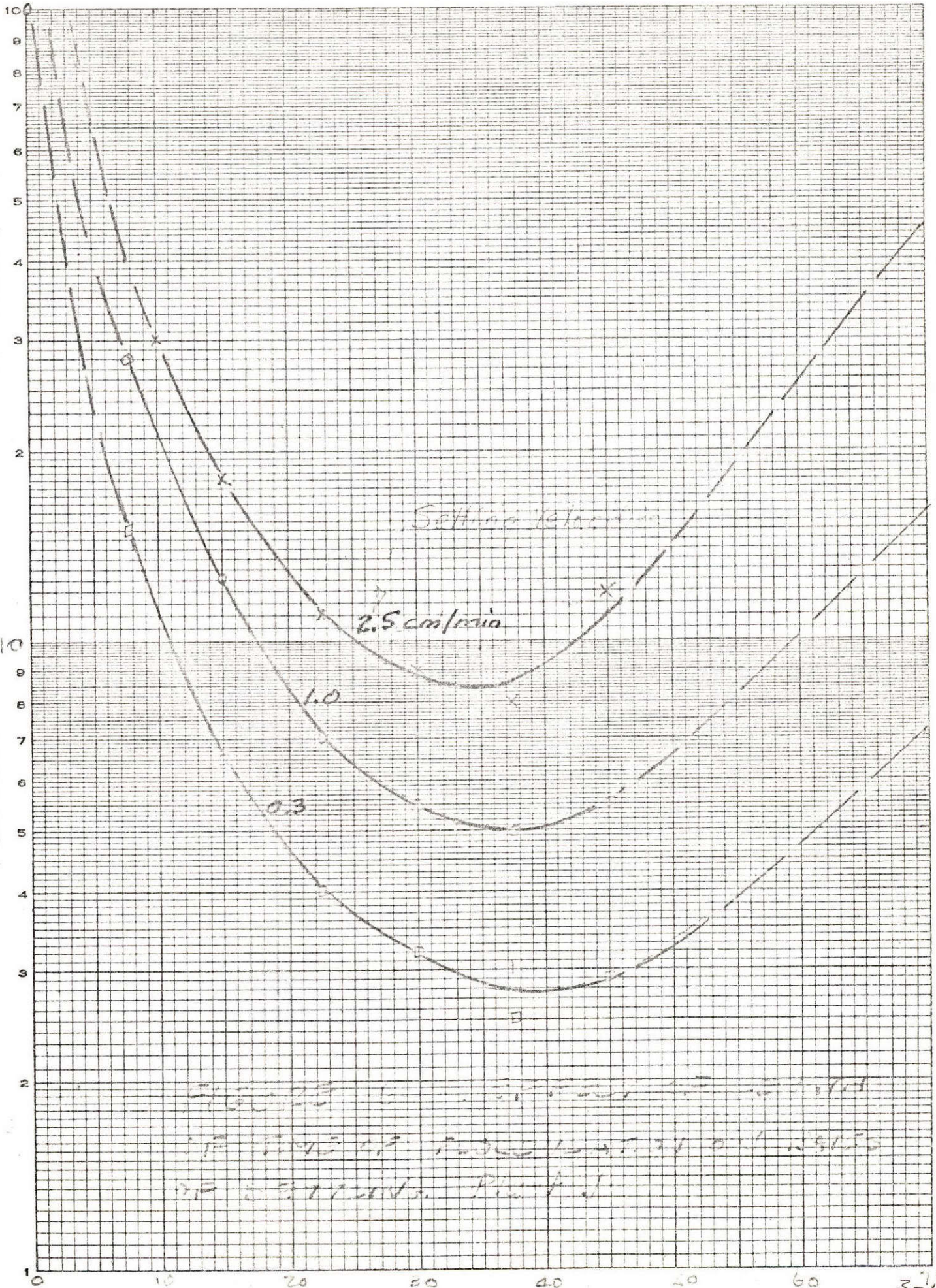


FIGURE 1. EFFECT OF FLOCCULATION TIME ON PERCENT OF RAW WATER TURBIDITY REMAINING AT DIFFERENT SETTLING RATES. PLANT J.



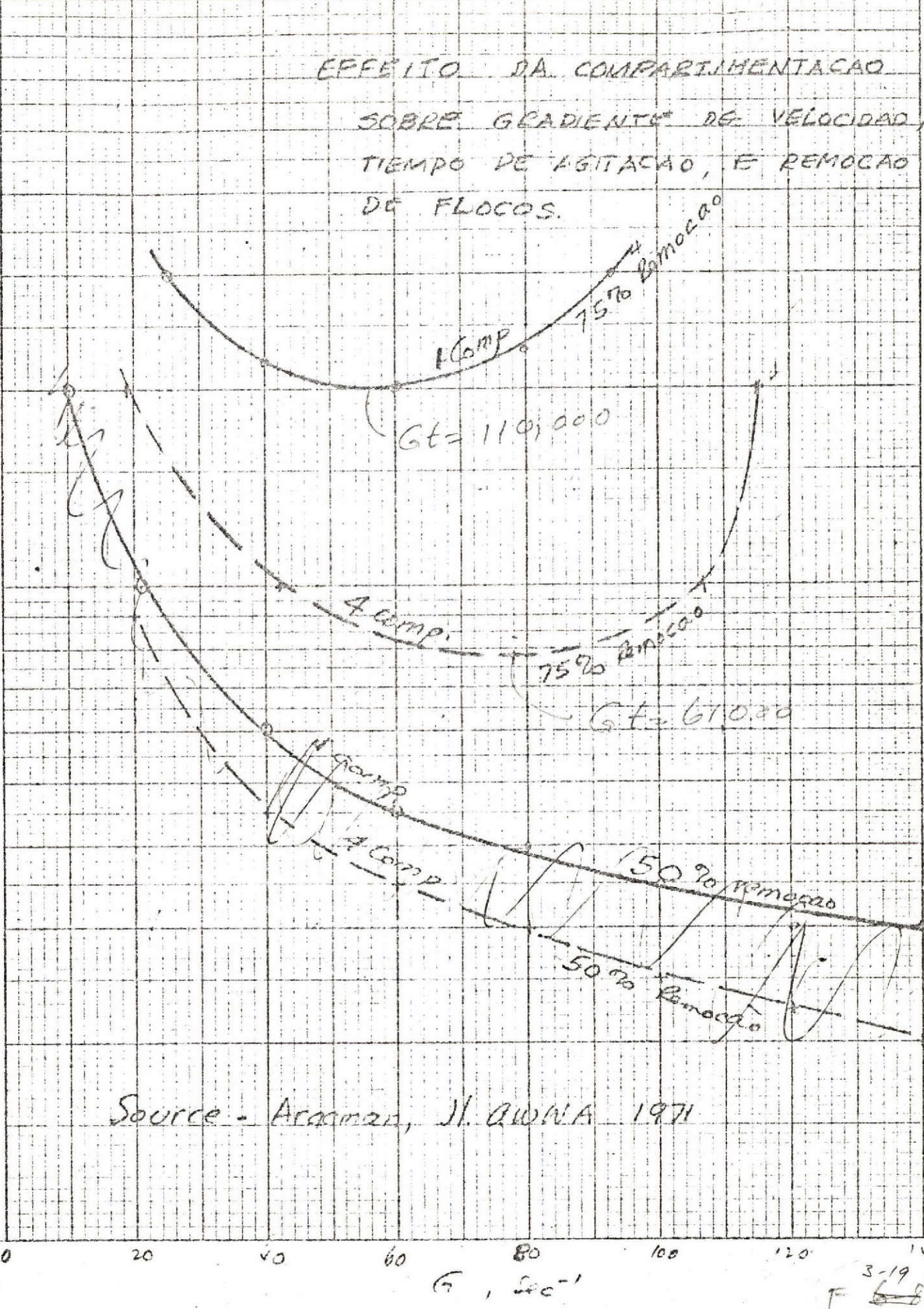
EFECTO DA COMPARTIMENTACAO  
SOBRE GRADIENTE DE VELOCIDAD,  
TIEMPO DE AGITACAO, E REMOCION  
DE FLOCOS.

Tempo, Seg.

1000

100

7  
6  
5  
4  
3  
2  
1  
0



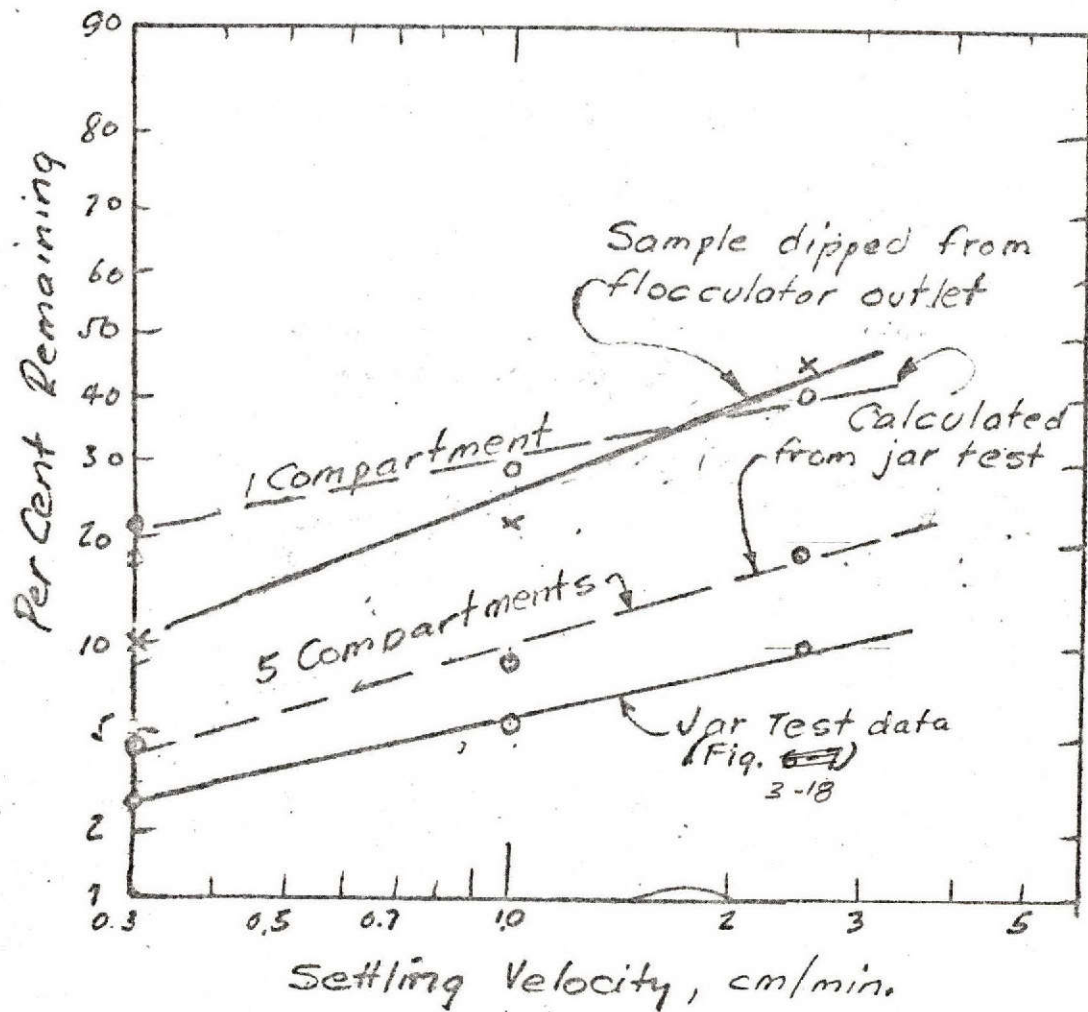
Source - Aradman, J. J. WWA 1971

G, sec<sup>-1</sup>

3-19  
F 68

the jar test data to compute an approximation of the settling velocity distribution curves for compartmented flocculators. This has been done for one-and five-compartment flocculators as shown in Figure ~~6-9~~<sup>3-24</sup>. The computational procedure used was a type of arithmetic integration. First column shows the ten deciles<sup>used</sup>. The value of  $\bar{T}$  for the midpoint of each decile was then interpolated from Figure 3-2, as shown in Column (2) of Tables ~~6-4~~<sup>3-</sup>. The nominal detention time of the flocculator basin in this plant at the rate of flow in use during the collection of the data used for the comparisons in Figure 6-9 was 42 minutes. Using the values of  $\bar{T}$  in column (2) of Table ~~6-4~~<sup>3-</sup>, values of  $t$  were then computed for each decile. From Figure ~~6-7~~<sup>3-18</sup>, for each of the values of  $t$ , values of per cent remaining turbidity were interpolated or estimated. These values were determined for samples withdrawn from the beakers at a depth of 10 cm below the surface after settling times of 4, 10 & 30 minutes and, as is indicated in Figure ~~6-7~~<sup>3-18</sup>, correspond to settling velocities of 2.5, 1.0, and 0.3 cm/min. They are shown in columns (4)-(6) in Table ~~6-4~~<sup>3-</sup>. The columns were then summed and the averages determined. It will be noted that it was necessary to extrapolate the curves in Fig. ~~6-7~~<sup>3-18</sup> in order to complete the computations. Future work along these lines would require testing to cover a wider time span.

Figure ~~6-9~~<sup>3-21</sup> shows that the computed single-compartment curve is in reasonable agreement with the curve obtained by dipping samples from the plant flocculator outlet. This plant had single compartment flocculators, each with 5 paddle mixers. The computations indicate that, for a settling basin designed for 2 cm/min, turbidity remaining after sedimentation would be reduced from 37 to 18 per cent if the existing un-compartmented flocculator were fitted with baffling to provide a compartment for each of the 5 mixers in the basin. This would cut the load on the filters by half.



3-21  
 FIGURE ~~6-9~~ . OBSERVED AND CALCULATED  
 SETTLING VELOCITY DISTRIBUTION CURVES.  
 Plant J

3-  
Table ~~6-4~~

COMPUTATION OF EFFECT OF COMPARTMENTATION  
OF FLOCCULATOR ON SETTLING BASIN PERFORMANCE

Percentile (1)	$\frac{t}{T}$ (2)	t min (3)	Per Cent Remaining for Various Stated Settling Velocities		
			0.3 cm/min. (4)	1.0 cm/min (5)	2.5 cm/min (6)
<u>One Compartment</u>					
<del>0-10</del> 0-10	0.05	2	50	80	100
<del>10-20</del> 10-20	0.15	6	19	35	55
20-30	0.28	12	9	17	24
30-40	0.43	18	5	10	15
40-50	0.60	25	4	6	10
50-60	0.80	34	3	5	8
60-70	1.05	44	3	5	11
70-80	1.38	58	4	9	23
80-90	1.90	80	11	30	70
90-100	3.00	125	100	100	100
Average			20.8	29.7	41.6

Five Compartments

0-10	<sup>37</sup> 0.50	15	7	12	18
10-20	0.655	23	4	7	11
20-30	0.87	28	3	6	9
30-40	0.78	33	3	5	9
40-50	0.88	37	3	5	8
50-60	1.00	42	3	5	10
60-70	1.12	47	3	6	12
70-80	1.25	53	4	8	17
80-90	1.45	61	5	11	26
90-100	1.85	78	9	23	60
Average			4.4	8.8	18.0

42,381 50 SHEETS 5 SQUARE  
 42,382 100 SHEETS 5 SQUARE  
 42,383 200 SHEETS 5 SQUARE  
 NATIONAL

References

1. WOLF, D. and RESNICK, N. Residence Time Distribution in Real Systems. 1, and E.C. Fundamentals, Vol. 2, No. 4, Nov., 1963, p 287.
2. McMULLEN, R. and WEBER, M. Determining Efficiencies of Continuous Mixers and Reactors. Chem. and Met. Engrg. 42:254 (May 1935)
3. REBHUN, M. and ARGAMAN, Y. Evaluation of Hydraulic Efficiency of Sedimentation Basins. JL. SED., ASCE, October 1965, p 37.
4. TARAS, M. Estimation of Flow-Through Time by the Continuous-Dose Method. JL. AWWA 1956, p 700.
5. CALVERT, C.K. Raw Water Preparation for Filtration. Water Works and Sewerage, Vol 86, No. 6. June 1939.
6. KAWAMURA, S. Coagulation Considerations. Paper presented to Calif. Sect. AWWA, Oct. 1, 1970.

(7) Kaufman

(8) Sindelar and Soucek

(9) Argamon

Not Included in  
this transmittal

Previously forwarded to

IBRD and Binnie an Ptnrs.

Mar. 21, 1973

ENCL C

## IMPORTANCE OF ADDITIONAL PILOT PLANT WORK

The following comments are intended to clarify and collate the information contained in the attached nine sheets of graphs, computations, notes, and design sketches, which are numbered sheets 0 through 8.

Filter Runs

On the first attached sheet (sheet 0) is shown the calculated effect of lengths of filter runs on plant productive capacity, for filtration rates of 2, 3, and 4 US gpm/sf. At a 4 gpm/sf rate, for various lengths of filter runs, plant capacity is affected as follows:

<u>Length of Filter Run, Hours</u>	<u>Plant Productive Capacity as per cent of rate that would obtain with infinitely long filter runs</u>
40	94
20	92
10	88
5	82
2.5	70

These values are based on a water backwash duration schedule related to the length of filter run, assuming 2 minute washes for short runs, ranging up to 5 minute washes for longer runs. It was further assumed that 3.2 per cent of the filters were out of service for repairs, maintenance, etc., at all times. Backwash



rate is 15 gpm/sf, and it is assumed that each filter is out of production for 45 minutes each time it is washed.

Based on these relations, at best the plant will have about 95 per cent of nominal capacity. To bring it up to 100 per cent, in practise either: filters are run at a rate about 5 per cent above nominal filtering rate; or an additional 5 per cent of filter area is provided. Capacity of plant gets substantially impaired when runs drop to 10 hours, and at 5 hours or less it becomes extremely difficult for operating personnel to go through the necessary physical manipulations to backwash filters often enough.

Instead, operators begin to resort to undesirable alternatives such as dumping the settled water in the top of the filters, or "bumping" the filters by closing the effluent valve and briefly turning on the backwash to agitate the bed, and then immediately placing the filter back in service. The former of these two practises is wasteful, and the latter impairs filtered water quality.

Computations on sheet 1 show that, at Chicago, using flocculation followed immediately by direct filtration through 0.5 mm sand at 2 US gpm/sf, filter runs as short as 3.3 hours occurred when the turbidity of the flocculated water was 6.5 j.u. For the month when the 3.3 hour run occurred, average filter runs were only 7.2 hours. Commonly at Chicago, treating Lake Michigan water,

and in many other places the shortest runs occur with very clear water, and are caused by the development of diatoms in the lake. For this reason, I am not in accord with the system used for calculation of filter runs for the Bhandup plant, which was based on suspended solids computations.

These same computations indicate that, if a dual-media coal-sand bed had been used, with 1.1 mm coal at a filtration rate of 3 US gpm/sf, filter runs would have been changed from an assumed 4 hours to 22 hours. With 0.85 mm sand at the same rate runs would have been 13 hours.

Similar computations, based on the sand filter run data from the 1971 sand filter pilot plant data from Pogaon which indicated filter runs of about 6 hours, indicate that the dual media filter should have yielded runs of about 23 hours (Sheet 2). Actually, the dual-bed runs were only slightly longer than the sand filter. This discrepancy casts doubt over the validity of the 1971 test program. The most likely cause of the discrepancy was the presence of a layer of fines on top of the coal. Such material has to be removed whenever it occurs, in both pilot plant and prototype.

In sum, the most critical operating criterion for a direct filtration plant is the length of filter run. Unless it can be demonstrated by actual test that the runs will surely exceed 10 hours at all times, the plant will be difficult to operate.

It is difficult to extrapolate plant performance data from one climatic zone to another. Water temperatures in temperate zones commonly range from 0<sup>o</sup> to 25<sup>o</sup> C. At Bombay, water temperatures range from 22<sup>o</sup> to 33<sup>o</sup> C. The importance of this is shown in the following floc volume data determined by T. R. Camp (Jl. NEWWA, Sept. 1970) in tests of flocculation conducted on Boston tap water using 15 mg/l of ferric sulfate as the coagulant:

<u>Water Temperature °C</u>	<u>Floc Volume Concentration, Volumes per million</u>
5	100
20	200
30	700

Floc volumes produced by aluminum sulfate were found to fall in a similar range but to be somewhat lower than for equivalent dosages of ferric coagulant.

Floc strength is usually greater in warm water than in cold. Combining this observation with the data tabulated above, should cause special concern over the filter runs to be anticipated at Bombay. It is proposed to operate the pilot plant only during the monsoon season when the water may be most turbid. The writer recommends that intermittent operation be continued for a year, to ascertain whether there are any special problems that occur during the dry season.

The predominant algae reported present at Vaitarna are Anabaena, Oscillatoria and Ulothrix. The writer's colleague, Dr. J. B. Lackey, states that these organisms do not have siliceous shells as do the diatoms causing short filter runs at Chicago. There is therefore some reason to hope that short filter runs caused by algae may not become a problem at Bhandup.

#### Filter Coal

A preliminary estimate of cost of filter coal in the U. S. was obtained from a supplier who quoted \$70 per ton at the port of embarkation, bagged for export. Based on a rough estimate of need of 6,000 tons, cost, including contingencies and freight, would total about \$500,000 for the Bhandup plant (Sheet 3).

This estimate is based on the Consultant's selected filtration rate of 2.5 l gpm/sf, and on sizes and thicknesses of media recommended below for the initial pilot plant work, based on experience in plants and pilot plants in Colombia, Brazil, and in the U. S.

As is mentioned in the opening summary report, the use of filter coal will most probably be essential to the success of the Bhandup plant. Intensive efforts should be made to develop a supply of coal within India. Experience in pilot plants in Brazil has indicated that the coal need not necessarily be anthracite; some bituminous materials behave well in filters. Usually the coal is sized by wet screening. If several different coals offer possibilities, they should probably be pilot tested in parallel filters.

The characteristics and thicknesses of filter media that I judge may be most appropriate for Bhandup are as follows:

	<u>Filter Coal</u>	<u>Sand</u>
Effective size, mm	1.1	0.45
Uniformity Coefficient	< 1.5	< 1.6
Bed Thickness, cm.	70.	30.

There is very considerable advantage in having a thick coal bed. Also, the lower the uniformity coefficient, the better.

Finally, both in pilot plant and prototype, after backwashing, fines should be skimmed off the top of the sand bed--nothing finer than 0.4 mm sand should be allowed to remain. After the coal is added, all material finer than 0.9 mm should be removed. This process may need to be repeated at intervals, for several months. After that the need for removal will be reduced, according to U. S. experience.

#### Filter Design

Sheets 4-6 attached to this enclosure contain computations and layout sketches for the Bhandup filters. In my experience, filter design is often dominated by the upwash requirement, and I have learned to use it as a starting point for filter design computations. Also, if the velocity in the upwash pipe into each filter is 8 fps or more, the velocity head exceeds one foot, which I have found causes unevennesses in upwash rate at various ports

of the individual bed. A 30 inch pipe gives 6 fps, which I consider satisfactory. This works out if the filters are built as dual units, with the two halves washed in succession, and leads to a layout such as is indicated on sheets 5 and 6.

#### Pilot Plant Program

Sheets 7 and 8 contain outline notes concerning the purpose and plan of direction of the 1973 pilot plant program. Additionally a plan of attack is outlined, together with notes on the number of test elements that would be desired. Variables to be monitored are also outlined. These notes are further amplified in Enclosure D.

## ENCLOSURE C

### Notes

	<u>Page</u>
Effect of Filter run length on plant Capacity	0
Short Runs at Chicago	1
Bombay Experience	2
Cost of Anthracite	3
Filter design notes - Bhandup	4-6
Need for Pilot Plant Work	7-8

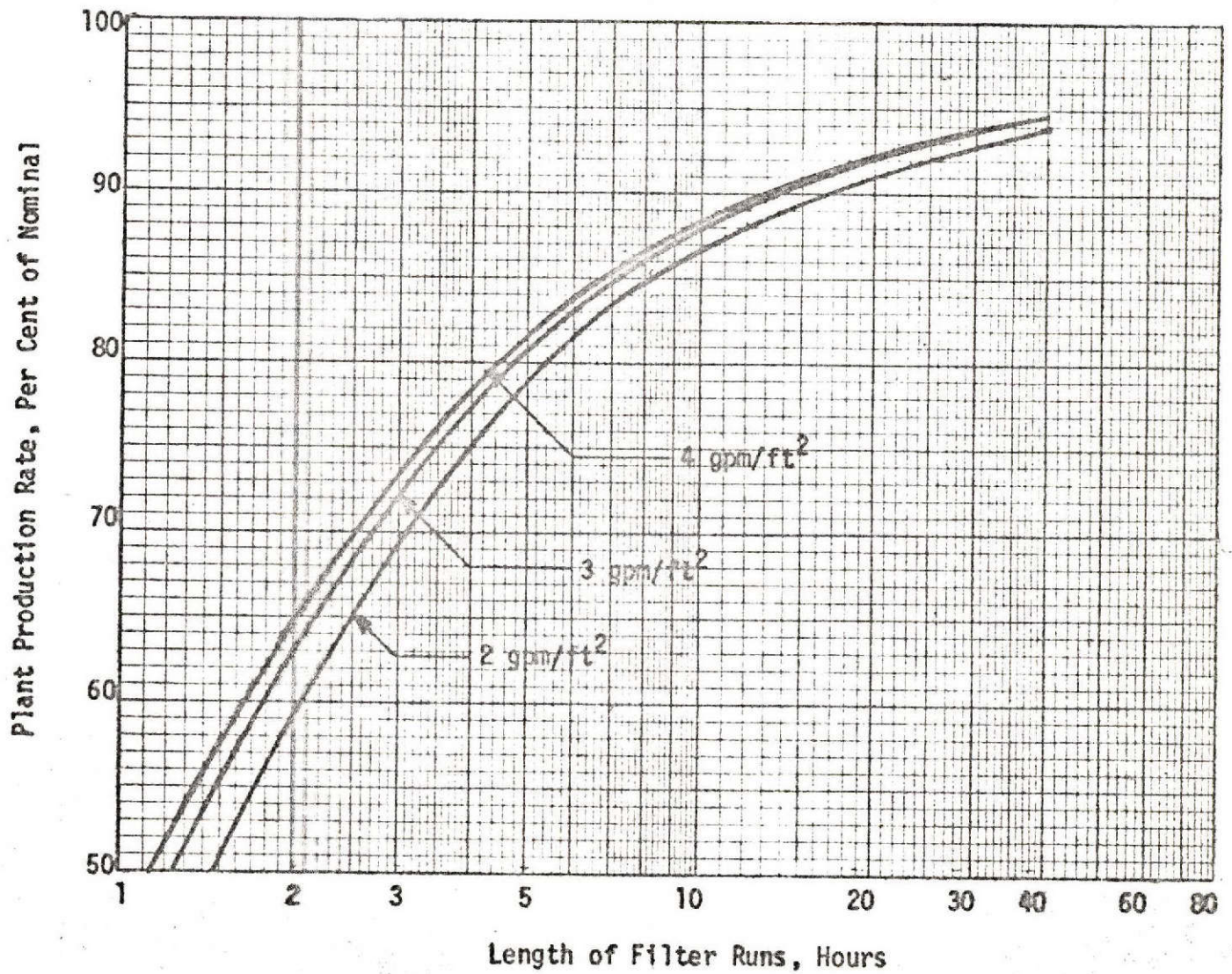


FIGURE EFFECT OF FILTER RUN LENGTH ON PLANT PRODUCTIVE CAPABILITY

Assumptions: Wash rate = 15 gpm/ft<sup>2</sup>, 2-5 min. wash  
 Total out of service wash time = 45 min/wash  
 Filter area ineffective due to repairs, etc. = 3.2%



## Chicago Experience with filtering unsettled water

Lengths of runs on minimum days:

Date	Mixed Turbidity	Filter Runs, hrs	Filt Runs for Mo., avg
Sept 14-15, '33	20.0	4.5	7.8
Oct 18, '33	6.5	3.3	7.2
Nov 14, '33	30	4.0	11.7

This filter operated at US 29pm/sf, E.S. = 0.5mm

Ref. "Water Quality and Treatment", AWWA 1971  
p. 251

$$\text{Length of run, } T \cong \frac{d^2 p^4 H S L}{v^{1.5} C_0}$$

If coarse sand were used:  $d = 0.85 \text{ mm}$

And higher filtration rate:  $v = 3 \text{ US } 9 \text{ pm/sf}$

$$T = \frac{(0.85)^2}{(0.50)^2} \times \frac{(2)^{1.5}}{(3)^{1.5}} \times 4.0$$

$$T = \frac{0.72}{0.25} \times \frac{2.83}{5.20} \times 4.0 = 6.2 \text{ hrs}$$

If 0.85 mm coal were used, calculated T would be computed same way, but with addition of porosity correction

$$T = 6.2 \times \frac{0.52^4}{0.83^4}$$

$$= 6.2 \times \frac{0.075}{0.0345} = 13.1 \text{ hrs.}$$

However coal should be coarser than 0.85 mm, say 1.1 mm

$$\text{Hence } T = 13.1 \times \frac{(1.1)^2}{(0.85)^2} = 13.1 \times \frac{1.21}{0.72} = \underline{\underline{22.0 \text{ hrs}}}$$

Computed from Chicago records.

42 SHEETS 3 SQUARE  
42 SHEETS 100 SHEETS 3 SQUARE  
42 SHEETS 200 SHEETS 3 SQUARE  
NATIONAL

Bombay Experience - Single Stage tests

Based on summary transmitted by Prof Arceivala  
30 Aug, 71

Raw Water Turbidity range	100-130	70-90	90-130	40-90
Filtration rate Gph/sf	150	100	125	160
Filt A (capped)	3 1/4-5	7 1/2-13	7-11	9.5-11.5
Filt. B Sand	3 1/4-5	6 1/2-10	5-6	7.5-9

Assume sand filter runs were 6 hrs.

B. " " " rate will be ~~3.0~~ 9 gpm/sf, was 2.5 gpm/sf

B. ES sand was 0.80 mm

A. ES ~~Coal~~ was 1.1 mm, ES Sand 0.65 mm

$$\begin{aligned} \text{Anthr-Runs, } T &= \frac{6}{X} \times \frac{(1.1)^Y}{(0.8)^Y} \times \frac{(150)^{1.5}}{(100)^{1.5}} \times \frac{(0.52)^4}{(0.42)^4} \\ &= \frac{6}{X} \times \frac{1.21}{0.64} \times \frac{3.94}{5.20} = \frac{17 \pm}{10} \text{ hrs (projected)} \end{aligned}$$

For comparison with test, elim rate effect,

$$T = 6 \times \frac{1.21}{0.64} \times \frac{0.073}{0.054} = \frac{23}{17.8} \text{ hrs}$$

When runs on 0.8 mm sand were 6 hrs, on coal units runs should have been ~~23~~ 23 hrs

Actually were observed to be about 7 hours. Reason?

1. Alum dose probably excessive?
2. Short circuiting in flocculators?
3. Fines at top of anthracite?
4. Floc penetration through coal, clogging sand?

Quantity and Cost of Anthracite or Coal.

Recommend: <sup>70</sup>~~75~~ cm Coal, 1.1mm ES, UC < 1.50  
30 cm Sand, 0.45mm, UC < 1.6

Plant capacity 420 imqd = 505 us mqd

Filtration rate 2.5 iqpm/sf = 3 us qpm/sf  
= 4320 us qpd/sf

Filter Area =  $\frac{5.05 \times 10^8}{4.32 \times 10^3} = 1.17 \times 10^5$  sf

Coal volume =  $\frac{2.33}{1.5} \times 1.17 \times 10^5 = \frac{3}{1.75} \times 10^5$  cf

Anthracite weighs 52 lb/cf  $\therefore \frac{3}{1.75} \times 5.2 \times 10^6$   
=  $\frac{15}{9.1} \times 10^6$  lb.  
=  $\frac{6}{4.55} \times 10^3$  tons

Cost per ton at P.O.E. in US  $\pm$  \$70.00, export bagged

Total cost at P.O.E. =  $\frac{6}{4.55} \times 70 \times 10^3 = \frac{\$420,000}{3.18} =$

Add contingency + freight, 25%. Say  $\frac{500,000}{400,000} =$

Probably cheaper from Germany.

In view of total plant cost at Bhandup estimated at US \$ 14.68 million, Anthracite could add no more than 4% to the investment cost. It is regarded as absolutely essential to insure successful performance of the Bhandup plant.

Consider mix of 2 coals + Sand

ES	S
1.3mm	1.4
1.1	1.55
0.45	2.65

Filter area calculated at  $1.17 \times 10^5$  sf.

80 filters (Now proposed by Binnie et al.)

$$\frac{1.17 \times 10^5}{0.8 \times 10^2} = 1.46 \times 10^3 \text{ sf/filt.}, \text{ 20/gallery}$$

Binnie report shows 5 streams, 120 filters,  
24/gallery

Check feasibility. Upwash controls sizing of pipe.  
F. Crowley wants 15 iqpm/sf backwash (vs 18 qpm/sf)

Assume entire filter is washed, Then

$$Q = 18 \times 1.46 \times 10^3 = 2.63 \times 10^4 \text{ qpm}$$

$$(2.63 \times 10^4) \times [2.23 \times 10^{-3}] = \underline{58.7 \text{ cfs}}$$

If wash pipe is 36" diam,  $V = 8.3$  fps. This is too high.  
Wash filters in halves.  $Q = 29.35$  cfs. 30" pipe has  
velocity of  $\pm 6$  fps. giving a much more manageable  
velocity head ( $\pm 0.55'$ ). Valve easier to operate, too.

Assume looped washwater header.  $Q$  is furnished from  
two directions in header.  $Q$  each = 14.7 cfs, and  
header needs be only 20 inch diameter.

$$\text{Max } Q \text{ filtering} = 4 \text{ qpm/sf} \times 1.46 \times 10^3 = 5.85 \times 10^3 \text{ qpm}$$

$$\text{Average Max} = 13 \text{ cfs}$$

$$\text{Declining rate max } Q = 1.25 \times 13 = \text{Say } 17 \text{ cfs}$$

Use 18" at 9.6 fps.

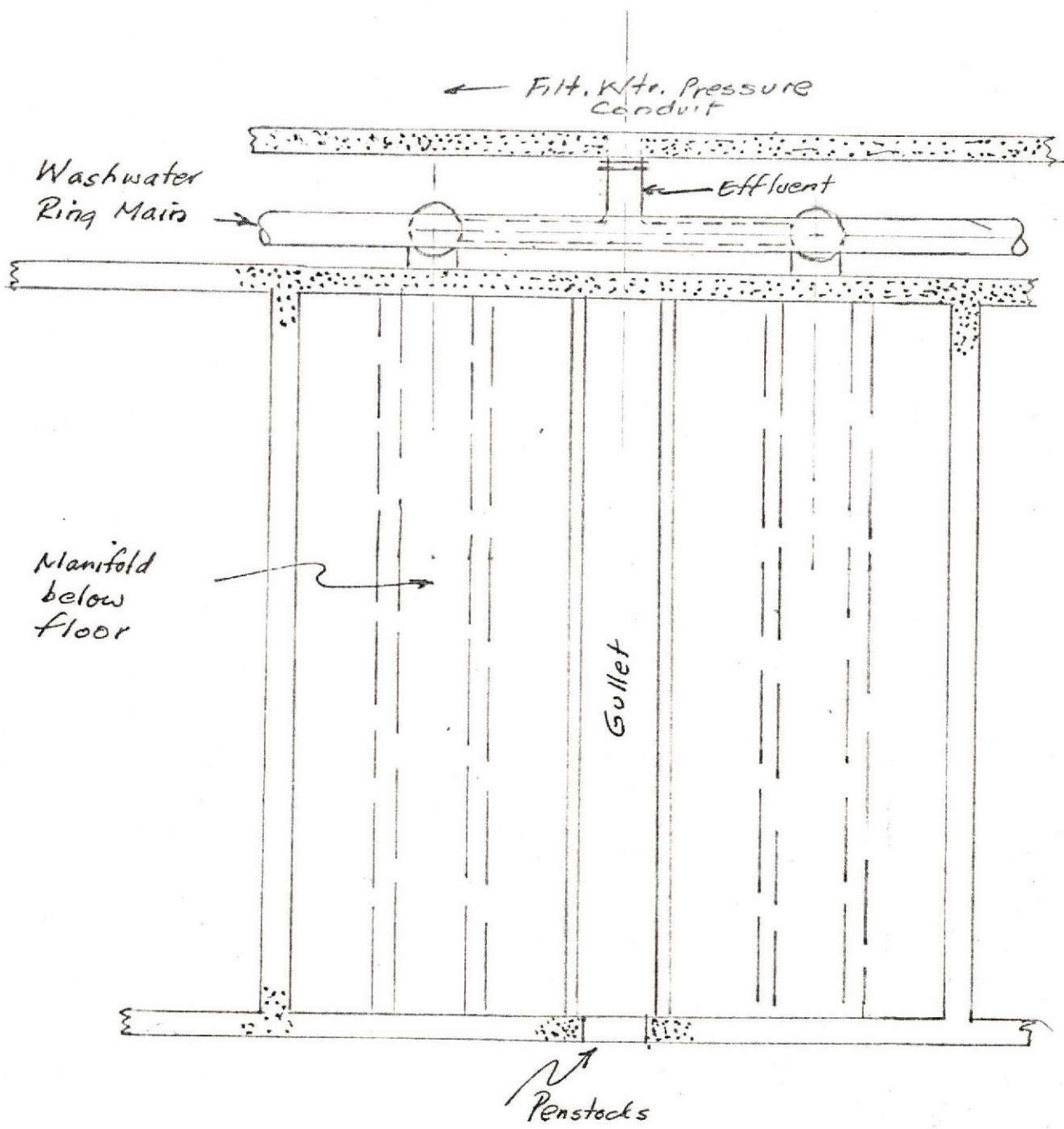
Plan on fabricated steel, enamelled, piping.

18RD

# BOMBAY FILTERS

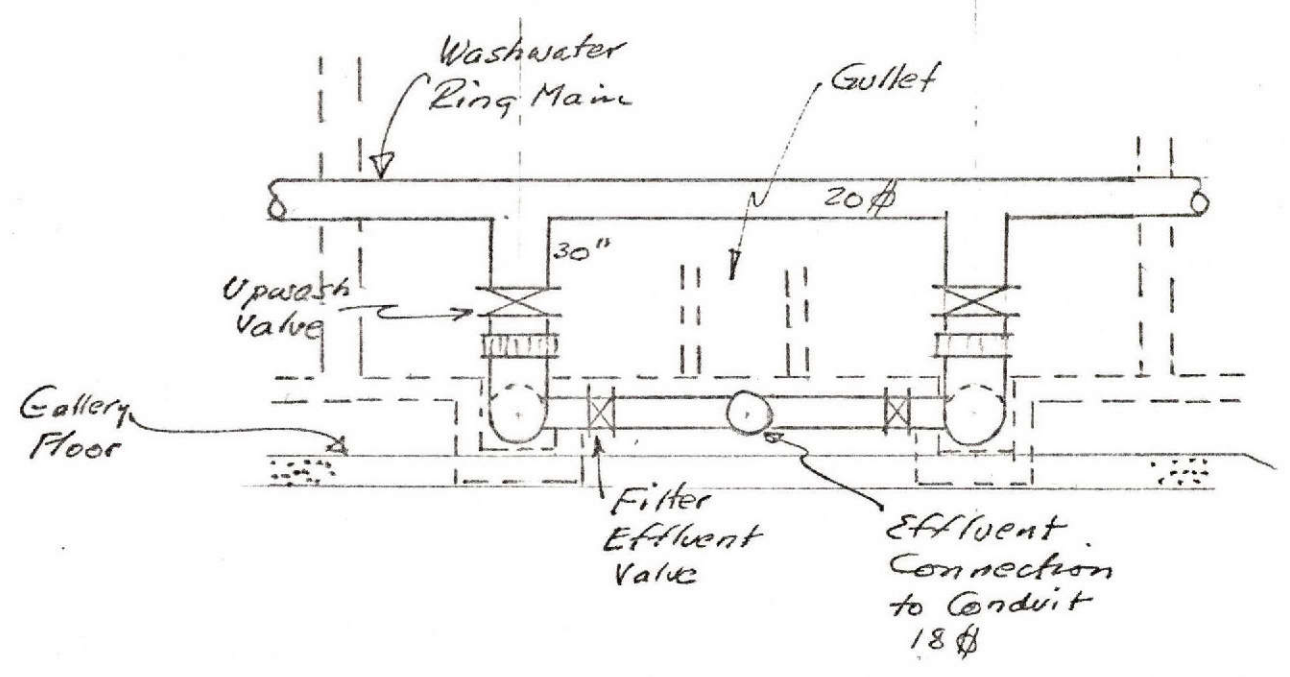
65 P104 12  
105H  
(54)

42 381 50 SHEETS 5 SQUARE  
42 382 100 SHEETS 5 SQUARE  
42 383 200 SHEETS 5 SQUARE  
NATIONAL



PLAN OF TYPICAL FILTER.

42 381 50 SHEETS 5 SQUARE  
42 382 100 SHEETS 3 SQUARE  
42 389 200 SHEETS 3 SQUARE  
NATIONAL  
SANITARY



SCHEMATIC ELEVATION  
OF  
FILTER PIPING.

## 1. Need for additional pilot plant work:

## a. Purpose

- (1) To define filter media characteristics
- (2) To refine mixing and flocculating criteria

## b. When and under whose direction?

- (1) 1973 Monsoon and after
- (2) By BMC or CEPHERI, under direction of Binnie and Binnie's advisors.
- (3) At Pogaon.

## 2. Find suitable coal in India, if possible.

- a. Anthracite preferred.
- b. Bituminous may be all right. Try it.
- c. Blend is ok.

## 3. Elements in pilot plant.

## a. Two parallel flocculated water streams.

(1) One stays on fixed routine, with flocculation kept unchanged. Also two filters at established rates, one sand, one dual media. Control unit.

(2) Other stream to have varied flocculator characteristics to establish design criteria. Also to have about four different filters:

- (a) Sand only
- (b) Dual media, Thin coal, thick sand
- (c) " " Med " Med "
- (d) " " Thick " , thin "

(3) Need careful turbidity monitoring.

- Grab samples hourly or more frequent
- Continuous recording for at least one unit.

3. (Contd)
- b. Alum dose to be controlled to produce desired filtered water quality, rather than by jar testing.
- c. Filters to complete at least one run daily, unless runs longer than 24 hrs. Prefer round-the-clock operation. Install piezometers at several depths within each filter. For example:

(1) Dual media units

- (a) 3" below top of coal.
- (b) Near bottom of coal
- (c) Bottom of sand.

(2) Sand units

- (a) 3" below top of sand.
- (b) Bottom of sand.



ENCL D

## PILOT PLANT DESIGN AND OPERATION

As originally prepared, this enclosure consisted solely of computation sheets, notes and sketches. In the present writing, an attempt is made to describe the computation procedure and further clarify the intent of that work.

Flocculator Design

Binnie and Partners propose 5 minute residence time in the Bhandup flocculator. This squares with my experience, but necessitates rather intense agitation, as measured by the velocity gradient,  $G$ , which is expressed in feet per second per foot, or in reciprocal seconds. General experience indicates that the Camp Number,  $Gt$ , should not be less than 30,000. Thus a velocity gradient of  $100 \text{ sec}^{-1}$  is needed. This means that head loss through the flocculator must be about 1.0 feet.

It was chosen to use two parallel 5 gpm flow streams, as outlined in Enclosure C, one to be a control, and the other to be varied as required in the testing. Part of sheet 1, all of sheet 2, and some of sheet 3 are superseded as noted. Sketch plans of the pilot plant flocculators are given on sheets 4 and 4a, with further computations made to determine that the design would provide turbulent flow, as will occur in the prototype. Some details of design are given on sheet 5.

Filters

Schematic diagrams of filters, assumed to be lucite, plexi-glass, or the like, are given in sheets 6 and 7. The indicated piping should be flexible plastic tubing, although piping from filter to valves may need to be of a rigid material. Some notes about details of construction are given, together with comments on how to arrange the equipment.

ENCLOSURE D

Notes on Pilot Plant  
Design and Operation.

Flocculator Design for Bhandup. (Pilot plant at Pogaon)

Latest retention time 5 min

Using  $Gt$  of 30,000

$$G = \frac{30,000}{300} = 100 \text{ Sec}^{-1} \quad \text{Ref. GWWA WTP Design 1969}$$

$$G = \sqrt{\frac{62.4 H}{\mu T}}, \quad \text{in which } H \text{ is head loss, ft.}$$

$\mu$  = viscosity  
 $(2.73 \times 10^{-5} \text{ lb sec/st})$

$T$  = Detention time, Sec

$$100 = \sqrt{\frac{62.4 H}{2.73 \times 10^{-5} \times 300}}$$

$$H = \frac{10^4 \times 2.73 \times 10^{-5} \times 3 \times 10^2}{62.4} = \frac{8.18 \times 10^1}{62.4} = 1.29' \quad (1.31')$$

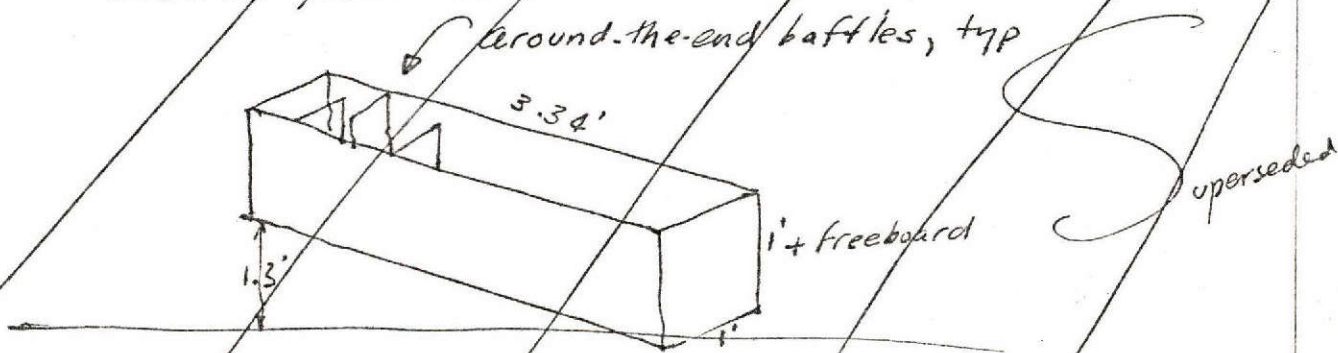
Assume each mixer sized for  $\sqrt{9 \text{ gpm}}^*$

$$= 0.668 \text{ cfm}$$

$$\times 5 \text{ min}$$

$$= 3.34 \text{ cf} \quad (3.34')$$

Assume wooden box  $1' \times 1' \times 3.34'$ , tilted to produce desired gradient.



\* Note: All units used in these computations are either American or metric.

Head loss at bends to be  $2 - 3.5 \frac{V^2}{2g}$

$$Q = 5 \times 2.228 \times 10^{-3} \text{ cfs} = 11.1 \times 10^{-3} \text{ cfs}$$

(11.1 x 10<sup>-3</sup>)

Assume  $V = 3 \text{ fps}$ .

Then cross-sectional flow area at each bend will be  $A = \frac{Q}{V} = \frac{11.1 \times 10^{-3}}{3} = 3.7 \times 10^{-3} \text{ sf}$

$$= 0.0037 \text{ sf}$$

(3.7 x 10<sup>-3</sup>)

If depth of flow is 1', width of opening =

$$0.0037 \times 12 = 0.0445 \text{ in}$$

(0.0445)

$$= \frac{1}{25} \text{ "}$$

(seems absurd)

Try another approach: Solve for V.

Assume partitions 3" apart

$$\frac{3.34'}{0.25} = 13 - 180^\circ \text{ bends}$$

$$h_L = 1.29'$$

$$h_L/\text{bend} = \frac{1.29}{13} = 0.1' / \text{bend}$$

$$\text{If } k/\text{bend} = 2.75 \times \frac{V^2}{2g}$$

$$0.1 = 2.75 \frac{V^2}{2g}, \quad V^2 = \frac{0.1 \times 64.4}{2.75}$$

$$V = 2.34, \quad V = 1.53 \text{ fps}$$

(2.34)      (1.53)

$$A = \frac{11.1 \times 10^{-3}}{1.53} = 7.25 \times 10^{-3} = .00725 \text{ sf}$$

$$\times \frac{1.44}{1.05} \text{ #/opening}$$

(1.04)

This is better, but not good enough

Triple the # of bends. to 39

$$H/bend = \frac{1.29}{39} = 0.033'/bend \quad (1.033)$$

$$0.033 = \frac{2.75 V^2}{64.4}, \quad U^2 = \frac{0.033 \times 64.4}{2.75} = 0.77 \quad (1.77)$$

$$U = 0.875 \text{ fps} \quad (1.033)$$

$$A = \frac{11.1 \times 10^{-3}}{0.875} = 12.7 \times 10^{-3} = 0.0127 \text{ ft}^2$$

$$\frac{0.0127 \text{ ft}^2 \times 144}{1.82 \text{ ft}} = 1.82 \text{ ft} \text{ opening}$$

0.15" wide slots  
(still too narrow)

$$\frac{3.34' \times 12}{39} = 1" \text{ between baffles} \quad (1.03)$$

$$Re \text{ in slots} = \frac{U \rho d}{\mu} = \frac{0.875 \times 62.4 \times 0.0125 \times 10^{-2}}{0.273 \times 10^{-4}} = 25 \times 10^3 = 25,000$$

USE EQUIVALENT DIAMETER FOR SQ. SLOTS:

$$D_e = 4R_H = 4 \frac{A}{P} = 4 \frac{0.0127}{2(0.15 + 1.25)} = 2 \left[ \frac{0.0127}{1.025} \right] = 0.025 \text{ ft}$$

$$Re = \frac{4R_H U \rho}{\mu} = \frac{10.025 \text{ ft} (0.875 \text{ ft/sec}) (62.4 \frac{\text{lb}}{\text{ft}^3})}{0.000672 \frac{\text{lb}}{\text{ft} \cdot \text{sec}}} = 25 \times 10^3 = 25,000$$

$$= 2.0 \times 10^3$$

LAMINAR

Probably turbulent enough  
Not

Lateral velocity between baffles.

$$\text{Area} = 12 \text{ ft}^2 = 0.0833 \text{ ft}^2 \quad (1.033)$$

$$V = \frac{Q}{A} = \frac{11.1 \times 10^{-3}}{8.33 \times 10^{-2}} = 1.33 \times 10^{-1} = 0.133 \text{ fps}$$

$$Re = \frac{D_e V \rho}{\mu}$$

$$D_e = 4R_H$$

$$R_H = \frac{A}{P} = \frac{(0.0833 \text{ ft}^2)}{2(1 \text{ ft} + 0.0833 \text{ ft})} = 0.025 \text{ ft}$$

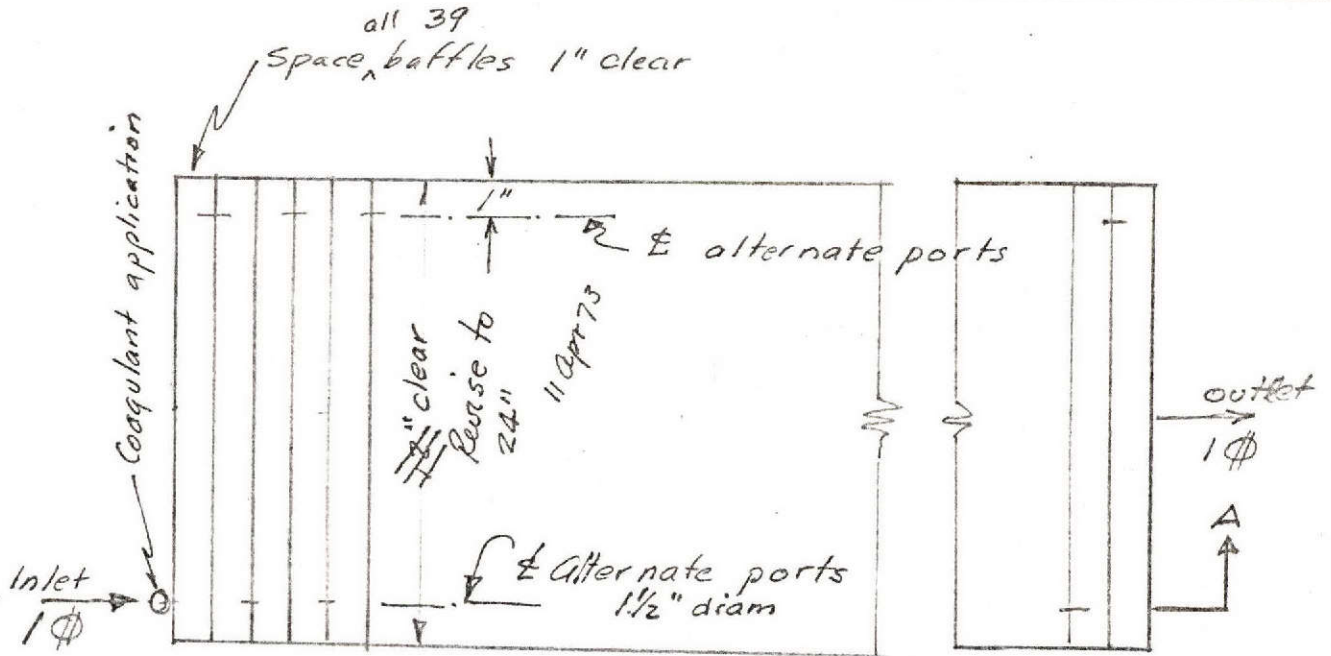
$$D_e = 4R_H = 4(0.025 \text{ ft}) = 0.1 \text{ ft}$$

$$Re = \frac{(0.1 \text{ ft})(0.133 \text{ ft/sec})(62.4 \frac{\text{lb}}{\text{ft}^3})}{0.000672 \frac{\text{lb}}{\text{ft} \cdot \text{sec}}} = 1899 \approx 1900 < 2100 \Rightarrow \text{LAMINAR FLOW}$$

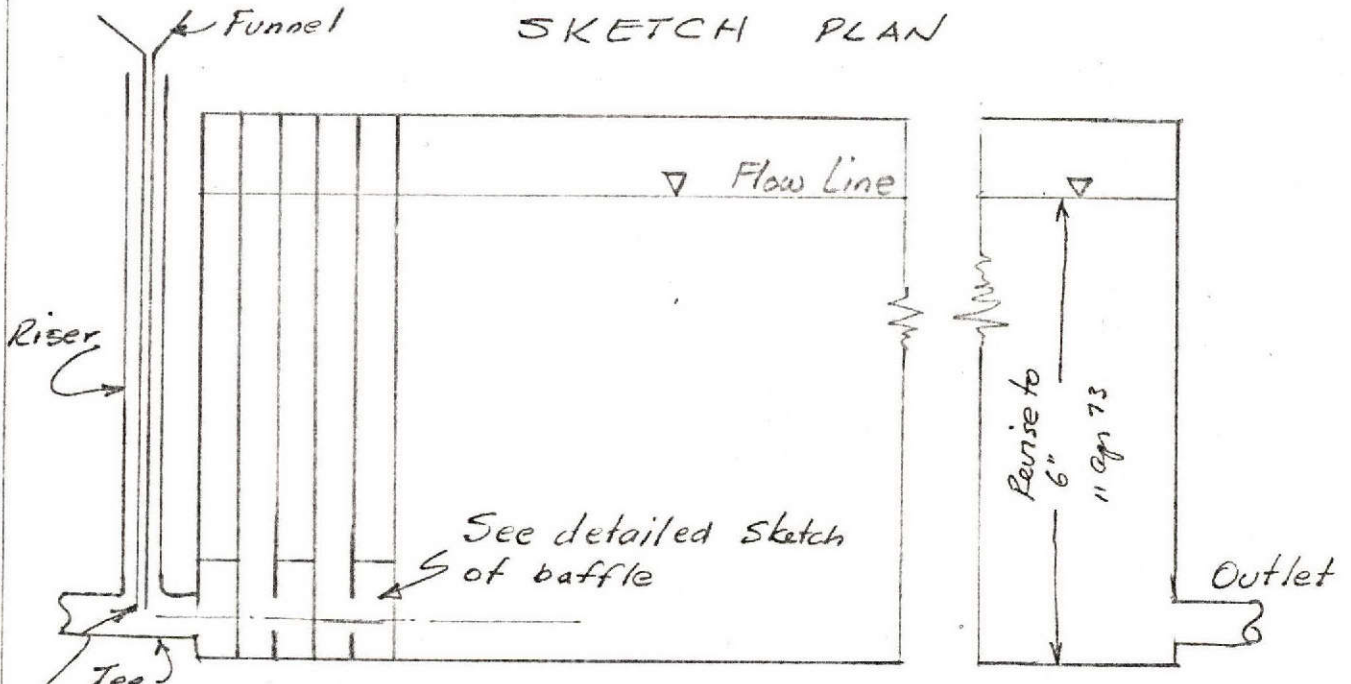
Better drop idea of slots as impractical, and go to ports, each 1.82 ft but circular

$$\pi r^2 = 1.82, \quad r^2 = 0.58, \quad r = 0.75", \quad d = 1.5"$$

42.381 50 SHEETS 5 SQUARE  
42.382 100 SHEETS 5 SQUARE  
42.389 200 SHEETS 5 SQUARE



SKETCH PLAN

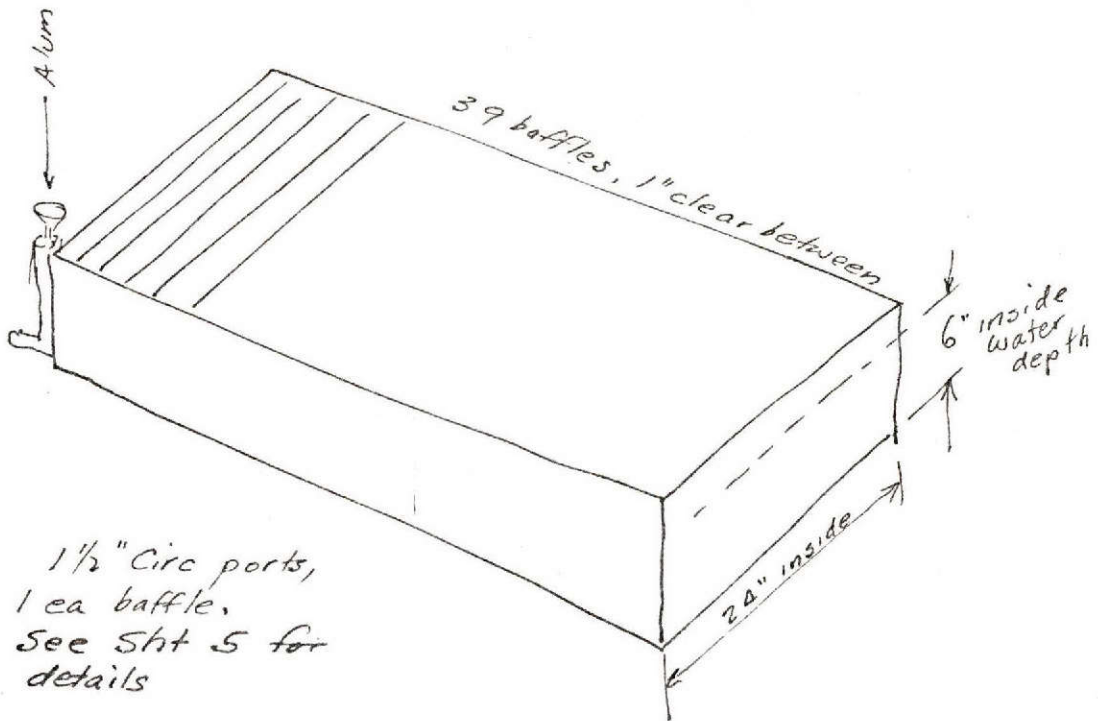


SECTION A-A.

Glass tube to discharge Alum at & flow

See Sht 4a.





Calculate  $N_R$  thru ports @ 25°C, also along  
24" passages

TWD  
4/11/73

$$R_E = \frac{4R_H V \rho}{\mu}$$

$$\rho = 62.4 \text{ lb}_m/\text{ft}^3$$

$$\mu = 0.000672 \text{ lb}_m/\text{ft-sec}$$

$$R_H = \frac{\text{AREA OF FLOW}}{\text{WETTED PERIMETER}}$$

FOR PORTS :  $4R_H = D = 1.5 \text{ in} = 0.125 \text{ ft}$

$$V = \frac{Q}{A} = \frac{4(0.011 \text{ ft}^3/\text{sec})}{\pi (0.125 \text{ ft})^2} = 0.9045 \text{ ft}/\text{sec}$$

$$R_E = \frac{(0.125 \text{ ft})(0.9045 \text{ ft}/\text{sec})(62.4 \text{ lb}_m/\text{ft}^3)}{(0.000672 \text{ lb}_m/\text{ft-sec})}$$

$$= 10500 = \underline{1.05 \times 10^4} \text{ (TURBULENT)}$$

FOR FLOW BETWEEN BAFFLE WALLS :  $A = (6 \text{ in})(1 \text{ in}) / (144 \text{ in}^2/\text{ft}^2) = 0.04167 \text{ ft}^2$

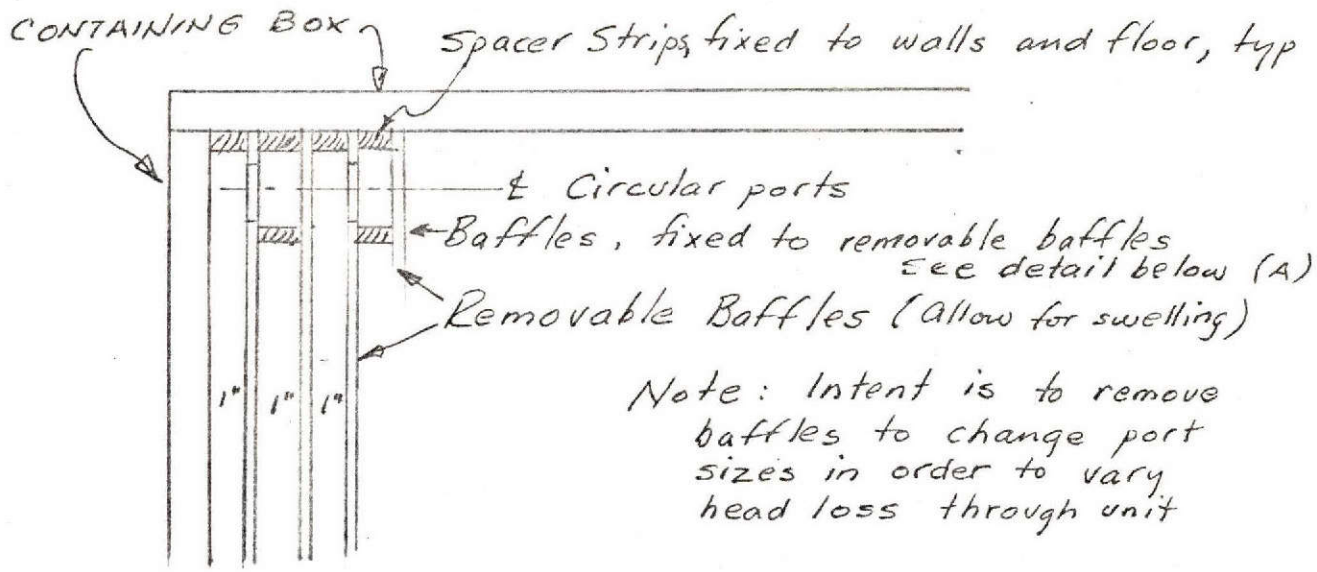
$$4R_H = 4 \left[ \frac{0.04167 \text{ ft}^2}{1.083 \text{ ft}} \right] = 0.1539 \text{ ft}$$

$$V = \frac{Q}{A} = \frac{0.011 \text{ ft}^3/\text{sec}}{(0.04167 \text{ ft}^2)} = 0.266 \text{ ft}/\text{sec}$$

$$R_E = \frac{(0.1539 \text{ ft})(0.266 \text{ ft}/\text{sec})(62.4 \text{ lb}_m/\text{ft}^3)}{(0.000672 \text{ lb}_m/\text{ft-sec})}$$

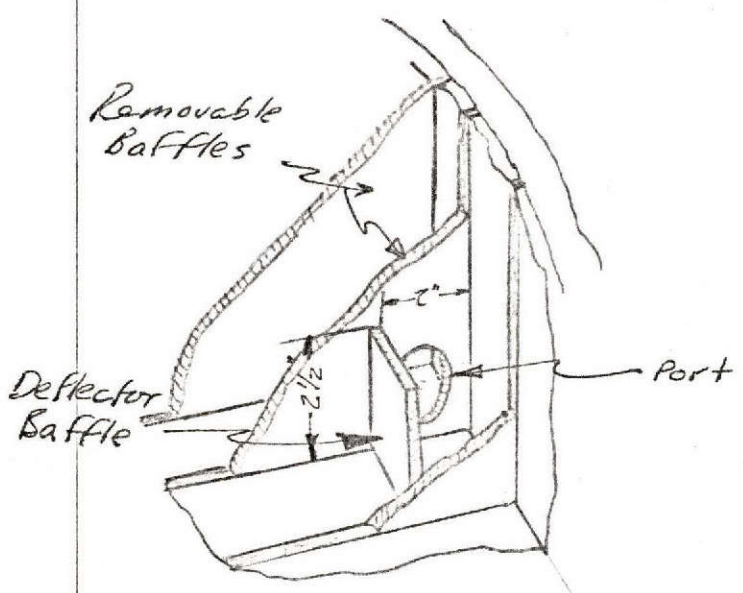
WETTED PERIMETER =  $2(6 \text{ in}) + 1 \text{ in}$   
 $= 13 \text{ in} = 1.083 \text{ ft}$   
 $= 1.083 \text{ ft}$

$$= 3810 = \underline{3.81 \times 10^3} \text{ (TURBULENT)}$$



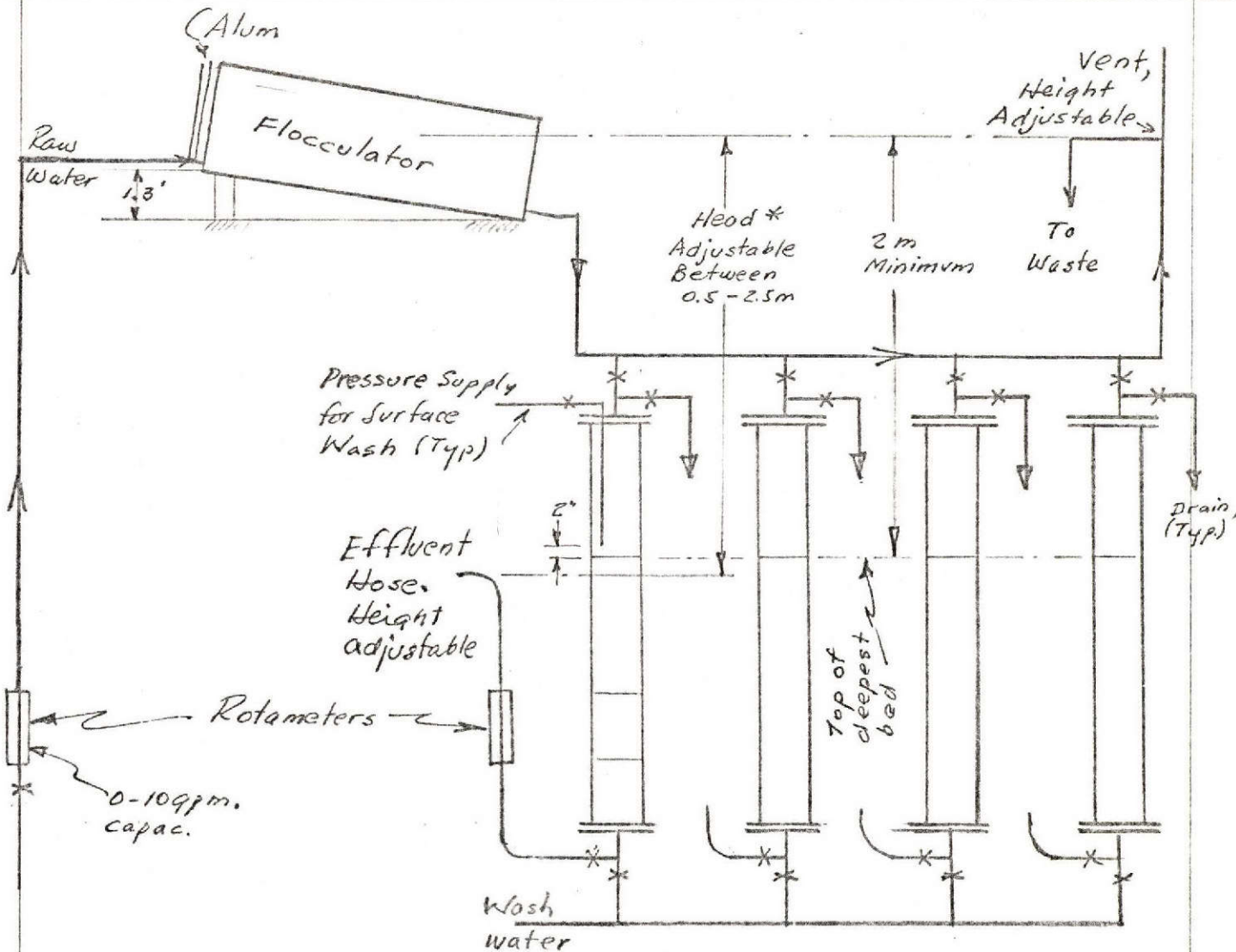
SKETCH PLAN OF ASSEMBLY

Overall



SKETCH DETAIL "A"  
OF DEFLECTOR  
BAFFLE. Purpose:  
to direct flow vertically

42,381 50 SHEETS 5 SQUARE  
42,382 100 SHEETS 5 SQUARE  
42,389 200 SHEETS 5 SQUARE  
NATIONAL

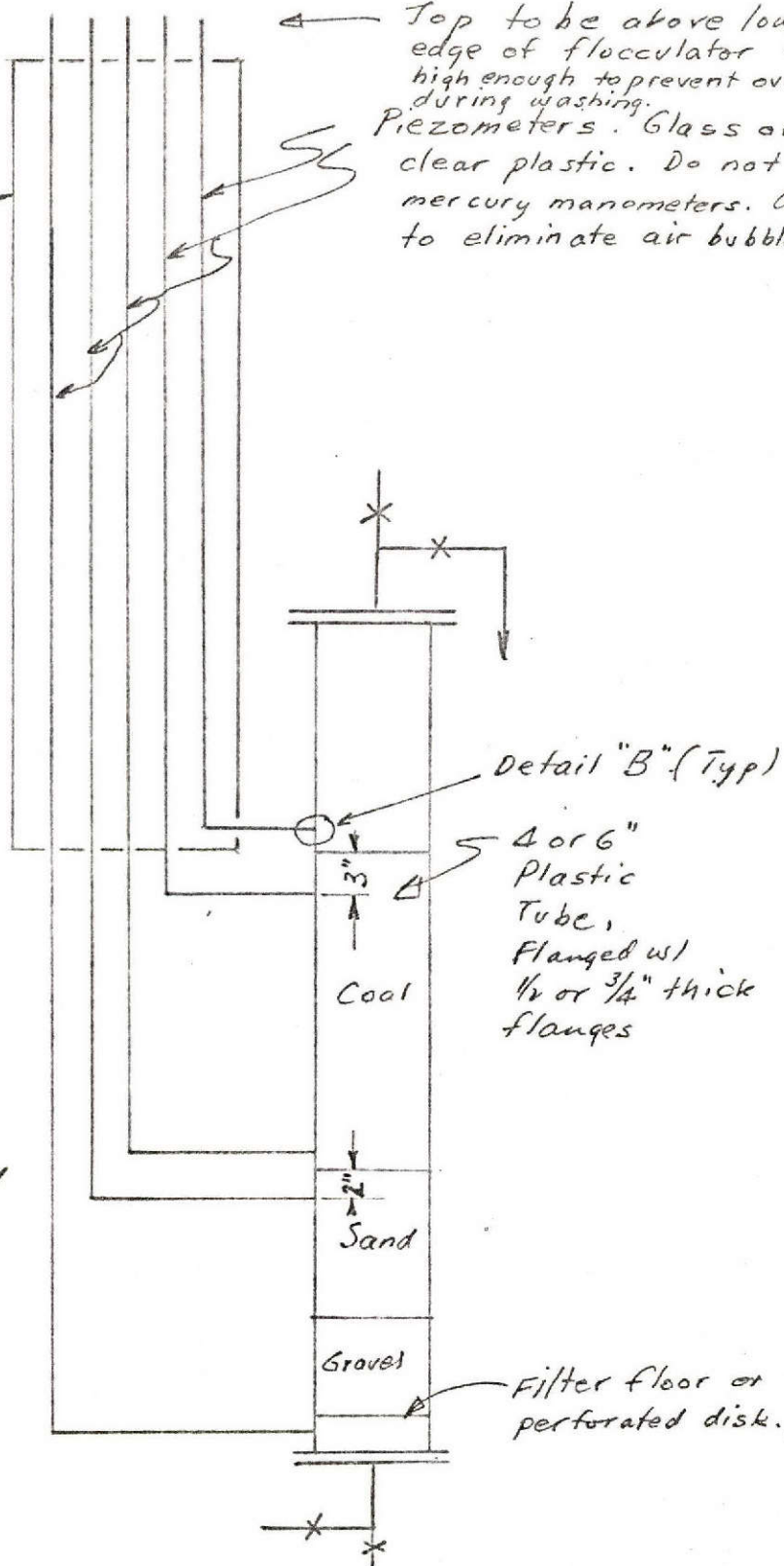
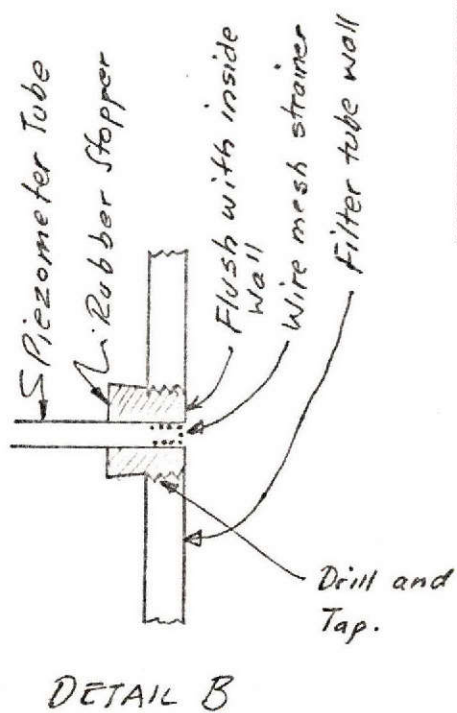


## ELEVATION SKETCH OF PILOT PLANT

- Notes:
- (1) Surface wash pressure should be 25-50 psi.  
" " tube should have  $\frac{1}{16}$ " diam. orifice directed vertically downward.
  - (2) Selected effluent resistance can be applied by adjusting filter effluent valve to produce desired starting rate. Valve setting to be left unchanged throughout run.
  - (3) Head Available (See \*) should preferably be set initially at 1.5 m by adjusting effluent tubing altitude relative to overflow level at vent.
  - (4) Overflow elevation to be selected as required to maintain desired flow level in flocculators.
  - (5) Not to scale
  - (6) Second plant (Control) to be similar.

Sheet of Plywood  
Covered with metric paper.  
To be adjustable up or down.  
Zero to be at level of flocculator flow line.  
Calibrate to read downward

Top to be above lowest edge of flocculator box, high enough to prevent overflow during washing.  
Piezometers. Glass or clear plastic. Do not use mercury manometers. Arrange to eliminate air bubbles.



SKETCH OF FILTER UNIT WITH PIEZOMETERS

42, 381, 50 SHEETS 5 SQUARE  
42, 382, 100 SHEETS 5 SQUARE  
42, 386, 200 SHEETS 5 SQUARE



