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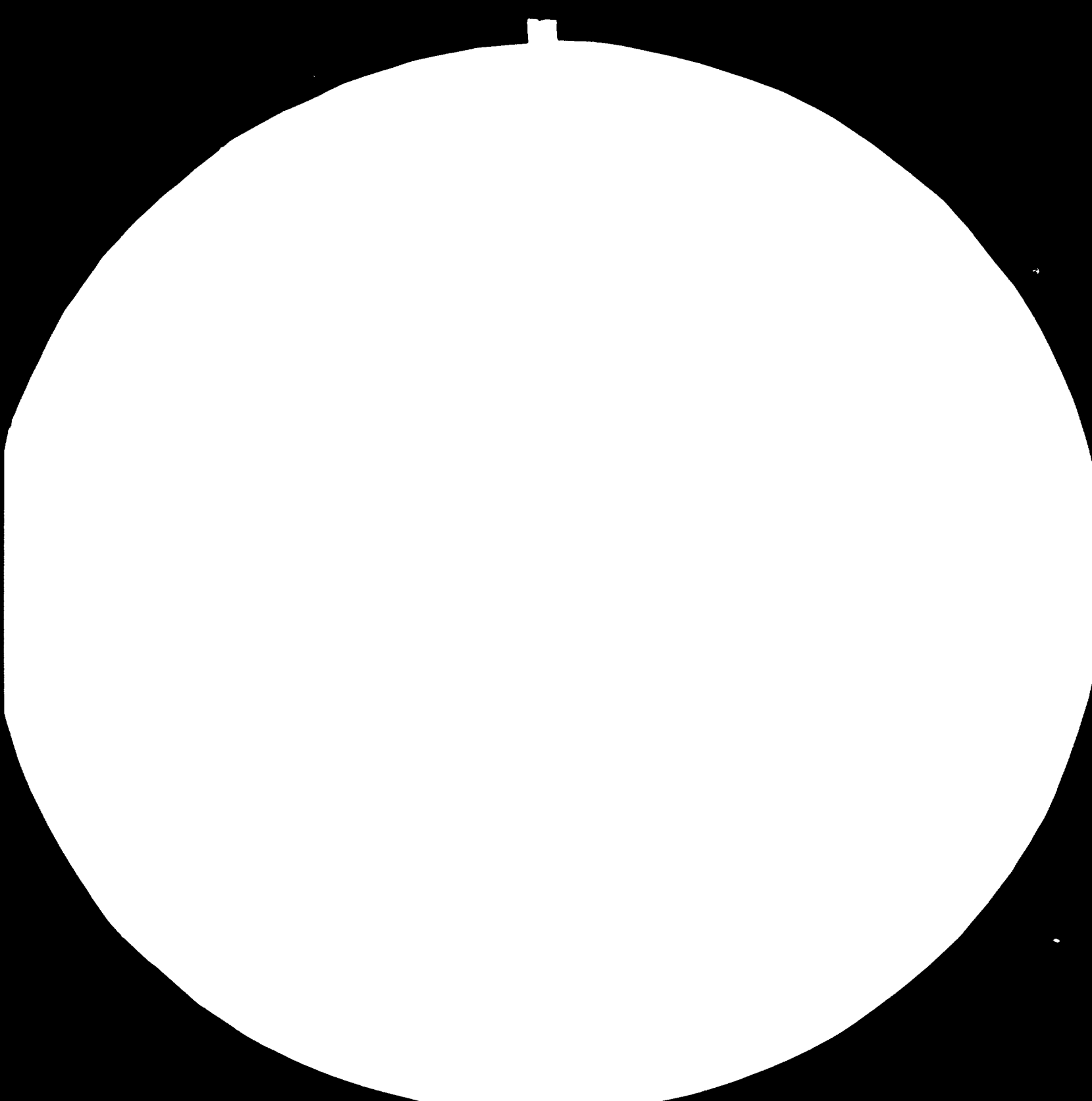

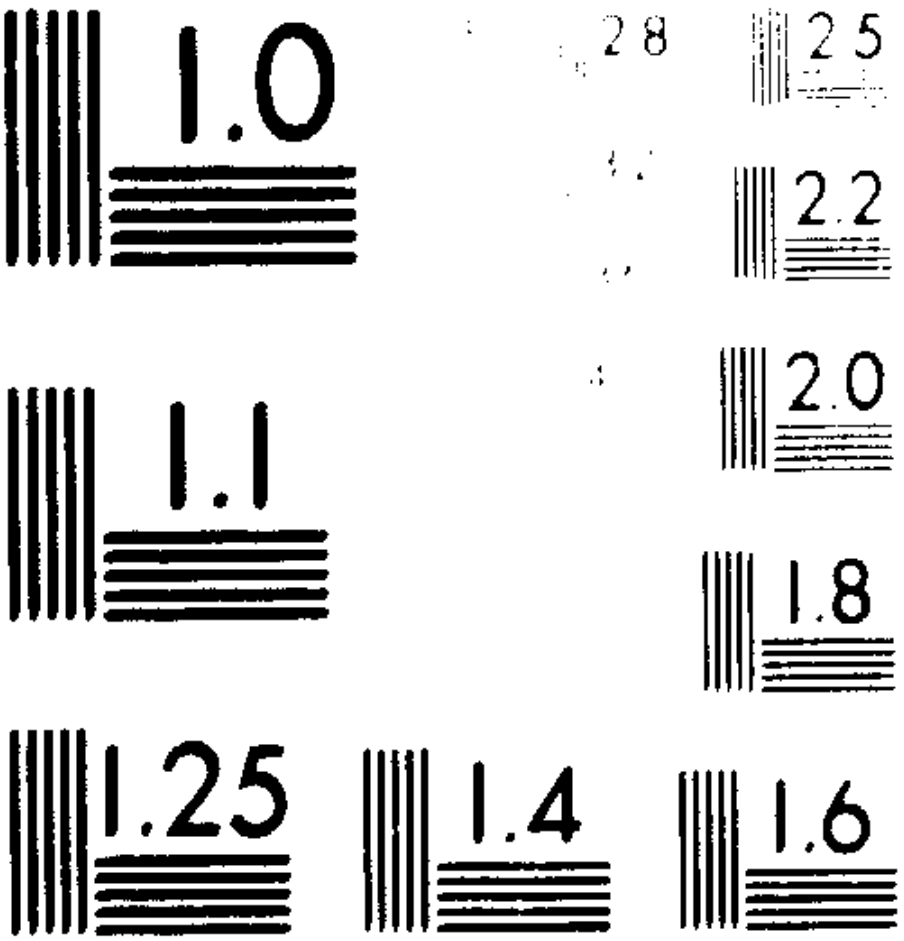

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Report No. 53

Restricted Circulation

Terminal Report

Thailand

Environmental Pollution Control within Existing and Proposed Industrial Estates in Thailand - Findings and Recommendations

Project DP/THA/77/009

Assistance to the Industrial Estate Authority of Thailand

by

R.N. Chakrabarty, Ph. D. (Engg)
(Environmental Pollution Control Adviser)
Expert of the United Nations Industrial
Development Organization acting as the
Executive Agency for United Nations
Development Programme

20 May, 1983

This report is yet to be cleared with the United Nations Industrial Development Organization which, therefore, does not necessarily share the views presented herein.

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CONTENTS

I. Introduction

In accordance with the policies outlined in the Royal Thai Government's 5th National Economic and Social Development Plan, the Industrial Estate Authority of Thailand (IEAT) has been playing an increasingly important role in developing industrial estates in different parts of the country.

In this task, the IEAT gave due emphasis on environmental pollution control from the industrial estates. Accordingly, the assistance of an expert on environmental pollution control was earlier provided by UNIDO/UNDP to the IEAT for a period of six months in 1979, an again recently for an initial period of four months, from February to May, 1983. While, however, the assistance of the expert has been envisaged to be continued for a further period of seventeen months, from the last quarter of 1983 to the first quarter of 1985, as per the decision taken at the Tripartite Review meeting held on 8 April 1983 at IEAT, the present report contains the findings and recommendations of the author during his current mission of four months with the IEAT.

II. Findings and Recommendations

Since the revision 'J' outlining the scope of work of the Environmental Pollution Control Adviser to IEAT was signed in 1982, the priorities of certain IEAT projects were revised and the requirements of assistance for other projects were reviewed by IEAT. This was necessitated particularly in view of the launching of the Eastern Seaboard project of heavy and ancillary industries at Map Ta Pud and Laem Chabang and the Northern Region Industrial Estate (NRIE) at Lamphun, and also of certain problems being faced by the IEAT in some of the existing industrial estates, especially Bang Poo.

The author held discussions with the Governor, Deputy Governor and other Project Directors of IEAT with a view to having first hand informations on the present status of the work relating to pollution control for the industrial estates, and also to indentifying the priorities in order that they could be attended to during the present mission. The author also visited the proposed NRIE at Lamphun and the operating Bang Poo Industrial Estate and studied/examined various documents/reports relating to the subject of wastewater treatment/pollution control of the concerned industrial estates.

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The two important tasks that were identified to be of priority and were assigned by IEAT to the author were-

i) Review of wastewater treatment/pollution control System proposed for NRIE, Lamphun

and ii) Recommendation of measures for control of pollution from Bang Poo Industrial Estate

Having examined critically the necessary informations and data relating to NRIE and Bang Poo the following two reports were prepared which were submitted to the IEAT for consideration and possible implementation.

1. Report No. 53. Comments and Guidelines on the Planning and Design of Common Wastewater Treatment Plant for Northern Region Industrial Estate, Lamphun, April, 1983.
2. Report No. 57. Suggested Measures for Control of Pollution at Bang Poo Industrial Estate, May, 1983.

The important findings and recommendations for NRIE (Report No. 53) were:-

1. Protection of Kuang river vis-a-vis the downstream Lamphun water works from the NRIE effluents is the prime consideration.
2. Stabilization ponds are not satisfactory for production of effluents fit for disposal into small streams used for water supply to a downstream community.
3. Wastewater from the "wet" industries in the western block of NRIE should be segregated from those of the "dry" industries in the eastern block.
4. The construction of wastewater treatment plants should be done in two phases, the first phase dealing with 50 per cent of the ultimate wastewater flow for a period of five years or so before the second phase is constructed.
5. Predigestion followed by extended aeration activated sludge process would be most technically appropriate and economical method for treatment of waste-waters of the western block and safe for disposal of the treated effluent into Kuang River.

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7. Arrangement for the treatment and disposal of the domestic sewage of the housing colony of NRIE may be entrusted to NHA.
8. The probable total capital cost of the proposed two wastewater treatment plants for the first phase was worked out to be about ฿ 6.0 million and their annual O & M costs ฿ 1.26 million. The total annual cost for these plants was worked out to be about ฿ 2.815 million. This is less than half the total annual cost for the plant featuring stabilization ponds (Alternative Scheme III) suggested by the consultants.
9. The total land area to be occupied by the proposed treatment plants would be about 13 rais (5.2 acres) as against 122 rais (48.8 acres) to be occupied by the treatment plant under Alt. Scheme III suggested by the consultants.
10. The total permanent saving (from land and 30 percent reduction in the cost of sewerage) that can be achieved by installing the proposed treatment plants has been worked out to be about ฿ 45 million.

The findings and recommendations for the Bang Poo Industrial Estate were:-

1. The work of sewerage including the lift stations and other ancillary work should be completed by middle of June 1983
2. Action for getting the industries install effluent pretreatment plants at their factory premises and connecting their treated effluent lines to the common sewer should be speeded up and be completed by the end of August, 1983. The special system of effluent treatment suggested for Citric Acid Co., Ltd. at Bang Poo, which has a potentiality for biogas production and utilization, should be given due consideration.
3. Servicing of all the mechanical equipment and repair of civil structures of the common treatment plant should be completed by the end of August 1983.
4. The common wastewater treatment plant should be commissioned around middle/end of August, 1983 and be operated continuously. Monitoring of the influent and effluent of the plant should also be done during this period and the data thus collected should be used for evaluation of plant performance and identification

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of the corrective measures, if necessary.

In regard to implementation of the recommendation contained in the aforesaid two reports, while the IEAT has already initiated necessary action for correcting the situation at Bang Poo Industrial Estate, it is still uncertain if the recommendations made for NRIE, Lamphun, would be implemented.

III. On-the-job Training of Personnel

The author is happy to record here that during preparation of the aforesaid reports IEAT's environmental and other engineers were closely associated and received an on-the-job training in the subject of critical analysis of a proposal, planning and development of conceptual system of wastewater treatment, basic and process design, and preparation of plant specifications, economic analysis, cost estimation and finally a techno-economic feasibility report.

IV. Further Assistance for Eastern Seaboard Project

The Eastern Seaboard Industrial Complex is a top priority project of the Royal Thai Government and is proposed to be established at Map Ta Pud and Laem Chabang Industrial Estates. The Complex at Map Ta Pud would house three large and polluting industrial units, namely a petrochemical complex, a fertilizer complex and a soda ash plant besides the gas separation plant (which is presently under construction for supplying feed stock to the aforesaid units) and a thermal power plant. The Laem Chabang Eatate would house various other types of organic and inorganic industries.

The petrochemical complex will include two upstream units, namely the ethane cracker and the propane dehydrogenator, and five downstream units comprising low density polyethelene (LDPE), High Density Polyethelene (HDPE), Vinyl Chloride Monomer (VCM), ethylene oxide/glycol (EG) and Polypropylene (PP) plants.

The fertilizer complex will include an ammonia and urea manufacturing plant (with gas conversion plant), phosphoric acid and sulphuric acid plants and other ammonium phosphatic fertilizer manufacturing units.

Laem Chabang complex is proposed to house many pollutive industries, both organic and inorganic, and would include an urban complex.

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Control of pollution arising from discharge of highly toxic and polluting wastewaters has been given due emphasis in the Terms of Reference for the Master Plan to be prepared by Japan International Cooperation Agency (JICA), the consultant for the Map Ta Pud Complex, and a broad programme/scope of work for this utility has been outlined.

Further, a bar chart prepared by the NESDB, as well as the project report prepared by IEAT on Technical Manpower Requirements for the Eastern Seaboard Project specified a time period of 15 months (from October, 1983, to December 1984) for preparation of the detailed design of the entire system including that for pollution control. This period has of late been extended.

Wastewaters that are generated from petrochemical and fertilizer projects are extremely complex in nature, an many of the individual wastewater streams also carry highly toxic constituents. Secondly, the role of a particular process suggested/selected for making a product is also important from the point of view of its pollution potential. For example, among the various processes used for separation of carbon dioxide in a urea making plant, a particular process (known as Vetrocoke process) gives rise to effluent containing high concentration of arsenic. Safe disposal of arsenic then becomes an extremely difficult problem .

Therefore, unlike the subject of treatment of the wastewaters from traditional types of industries like agro-based or small scale industries, the approach for effective pollution control from complex industries like petrochemical an fertilizer industries, etc., should necessarily start from the study of the manufacturing processes suggested by the supplier of technical know-how or the consultants.

Thirdly, in both petrochemical and fertilizer industries, there are many processing units which generate wastewaters which are noncompatible to each other from the point of view of their common collection an treatment. These wastewater streams must be segregated and be given necessary pretreatment individually so as to make them compatible for further treatment in a common plant.

From the foregoing it would be apparent that it would be very necessary to oversee and critically examine the manufacturing processes suggested by

consultants and advise the IEAT and other concerned agencies on the least polluting processes. It would also be desirable during the work of planning and designing of the wastewater treatment (pretreatment and collective treatment) systems to guide the concerned consultants from the very beginning, particularly when the local consultants are likely to be involved, who have not so far handled such type of projects.

From Leam Chabang complex, unlike earlier such industrial estates, the planning for siting the industries based on their "environmental compatibility" would need to be looked into, besides planning and designing of cost-effective wastewater treatment system(s).

V. Acknowledgement

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