

SPECIFIC EXPERIENCE OF MANDERSTAM

This section outlines Manderstam's specific experience in the fertilizer field.

The Manderstam Group has over fifty years experience in ninety countries.

International concerns, governments, national agencies and industry employ us because:

- As independent consultants we identify ourselves unreservedly with the client's interests.
- Our approach is professional scientific and unbiased.
- Projects are dealt with by a team of competent engineers, technologists and economists.
- We are investment conscious and can project the anticipated economics of an enterprise.
- We place at the client's disposal the accumulated experience of over 60 years.
- The client benefits by our know-how and knowledge of local conditions in ninety countries.
- We keep ourselves informed of the latest developments and techniques and this knowledge is used exclusively in the interest of the client.

Manderstam's Experience in the Fertiliser Industry

The Manderstam Group has been involved in the ammonia and related fertilizer industry since the early 1940's when production was based on the Fischer Tropsch process for the gasification of coal. Since that time fertilizer projects have been undertaken in Afghanistan, Algeria, Bangladesh, Brunei, the Canary Islands, Colombia, Cyprus, Egypt, Eire, Ghana, India, Indonesia, Iran, Jordan, Kenya, Lebanon, Liberia, Libya, Mali, Nigeria, Pakistan, Qatar, Sri Lanka, Sudan, Thailand, Turkey and Vietnam ranging from phosphates to integrated ammonia, urea and compound fertilizers.

In the last eighteen months members of the Manderstam staff have visited the USA several times, most western European countries and the Middle East in addition to Malaysia, Bangladesh, Indonesia, the Philippines, Sabah, Singapore, Pakistan, Syria and Thailand for fertilizer marketing, distribution and/or export potential assessments.

The Consultants' scope of work in these projects varied according to the need of the Client, but in many cases involved the preparation of a feasibility study, marketing plan and investment policy, assistance with loan negotiations, preparation of the pre-engineering designs, production of specifications for international tender, the evaluation of the bid documents, assistance with the selection of a contractor, contract negotiations and drafting of contracts, negotiation of licenses, supervision of design, engineering and construction, financial control within a prescribed budget, preparation of training programmes, collation of operating and maintenance manuals, specification of spare parts, examination of safety procedures and assistance with commissioning and start-up. The international market for fertilizers is kept constantly under review. Costs of production and relative costs of raw materials in various parts of the world are also regularly appraised.

Transportation and distribution, establishment of depots, storage size and type, organisation of distribution etc are all interlinked with demand and manufacturing rate. Demand and manufacturing costs are related to selling prices and demand and selling prices to credit and agricultural produce value. Substantial costs are involved in distribution and marketing activities and optimisation is essential if capital demand is to be minimised.

An international market study should encompass all these factors. Our experience in carrying out such studies is indicated by the following marketing and Distribution Studies for Ammonia, Urea, Nitrogenous Compound and Complex Fertilizers carried out for:

Bangladesh	Greece	Portugal
Brunei	India	Nigeria
Egypt	Indonesia	Spain
Ethiopia	Jordan	United Kingdom
Ghana	Kenya	Vietnam

Details on the above assignments are contained in Section 1.6.4.

Special Expertise in Fertiliser Projects

The Manderstam Group offers comprehensive services and expertise for fertilizer projects and assignments which it confidently believes cannot be matched by many other consultancy organisations. Comprehensive services and all expertise required for studies and projects can be offered from our own permanent staff. This includes all agronomic, marketing, distribution, economic, social and financial aspects in addition to project engineering, processing, management, training etc.

The Manderstam Group has on its permanent staff a team of experts who are fully conversant with and almost continually involved in fertilizer activities. This Fertiliser Division is supplemented as necessary by other engineers and specialists within the organisation. The team has years of experience in the design, engineering and control of major ammonia-urea projects as well as marketing and distribution know-how in both the domestic and international fields, in addition to agronomic understanding of fertilizer development requirements. It has also carried out the basic design for off-sites and utilities and ancillary equipment for refrigerated ammonia storage tanks, an export jetty of ammonia and urea (including conveyors, ship-loader and hydraulically operated ammonia loading arms) with all the associated inter-connecting piping. The design and specification of complete urea storage buildings, together with reclaim conveyors and bagging plant, have also recently been carried out.

Process Licensors and Equipment Suppliers

During its long association with ammonia and urea plants, the Manderstam Group has had the unique advantage of continuous contact with licensors, contractors and equipment suppliers. The relative merits of these organisations have been established on the basis of cost/efficiency/reliability/availability. Up to date price information and costs of production are available within the organisation.

Computer Analysis

The Manderstam Group is a subscriber to one of the most powerful computers in London. Computer analysis is used for economic modelling, cash flow predictions, investment return and optimisation of product distribution systems. These facilities are also used to check engineering design as well as for preparing critical path analyses for large projects. Our planning programmes not only consider the inter-relationship of engineering, purchasing, shipment and erection, but also ensure that the marketing and distribution products from the plants are regularly reviewed during the construction period.

Fertiliser Usage

In addition to the Group's expertise in the marketing and production of fertilizers, specialist staff are available to advise on the application of fertilizers to enhance agricultural production.

The choice of fertilizer and the optimum amount required to achieve high yields and to maintain them requires detailed knowledge of the soil characteristics, climate, the type of crop and its nutrient requirement. Our specialist staff is familiar with the typical plantation crops in the region and problems associated with fertilizers, herbicides and pesticides.

This expert knowledge in the choice of fertilizer plus the Group's experience and capability in marketing with particular knowledge of the region's complex market will enable the Group's engineers and specialists to optimise the amount and type of fertilizer to be applied to achieve maximum economic return.

Through our associates at Rothampstead Experimental Station, Dr W Flaig at the German Federal Agricultural Research Centre and various university research departments in the UK we can organise, supervise and interpret field work from soil analysis to crop response.

Worldwide Fertilizer Experience

Some of the fertilizer assignments carried out by the Manderstam Group are briefly summarised below:

Lithuania (Achema)

Review international forms of model contract and advise programme schedules and cost estimates for ACHEMA fertiliser plant Lithuania - \$100M extension - Client The European Bank for Reconstruction and Development (EBRD).

Participated in negotiations with prospective contractors with ACHEMA - Client The European Bank for Reconstruction and Development (EBRD).

Nigeria (NAFCON)

Carried out full technical and financial audit of the NAFCON plant at Port Harcourt on behalf of the NAFCON Executive Management Team and potential external investors. Carried out in-depth site audit of financial controls and production efficiencies with recommendations for plant modifications to improve efficiencies. Conducted in-depth discussions with Kellogg who were the local management contractor.

Bahrain (GPIC)

Manderstam carried out feasibility studies into port access and loading jetty layouts for urea storage, transfer and ship loading on behalf of GPIC.

Subsequently Manderstam carried out on behalf of GPIC the conceptual design, bid documentation and project management support services for the new Urea plant constructed by a Japanese contractor.

Greece (Government of Greece, Ministry of Coordination)

This project consisted of a detailed survey of the fertilizer and petrochemical industry in Greece. The work included an agricultural survey and market projections evaluating the existing and

future production facilities and carrying out an integrated technological engineering and economic study of existing and proposed fertilizer and petrochemical plants.

United Kingdom (Stavely Chemicals Limited, Chesterfield, Derbyshire)

The project consisted of establishing a complex which included the production of nitrogen via steam reforming naphtha. Services included:

- i) Carrying out a techno-economic feasibility study and the engineering integration of the complex followed by financial studies.
- ii) Carrying out the engineering design and process engineering for the complex followed by the preparation of tender documents and plant equipment specifications, assistance with tender evaluation, choice of construction and negotiations with contractors.
- iii) Direction of engineering, project management and control, supervision of plant erection and commissioning.

Ivergordon Chemical Enterprises (Inverness, Scotland)

The project consisted of a 1,000 tonnes per day ammonia unit and 1,700 tonnes per day urea together with full off-sites and facilities.

A thorough analysis of the various processing routes offered by four major contractors was required. Selection of the contractor was made after studying the process routes, the economics of each route, capital investment and terms and operating conditions of the contract.

Arab Republic of Egypt

A techno-commercial appreciation for the production of petrochemicals including fertilizers was carried out for the Five Year Plan Organisation including nitrogen fertilizer production associated with the Aswan Dam scheme.

Tanzania

We were appointed by the World Bank as technical consultant for a 1,000 tonnes per day ammonia plant and 1,600 tonnes per day urea plant complete with utilities and off-sites on a green field site.

Ethiopia (Ethiopian Petroleum Share Corporation)

The study involved establishing the projected demand for fertilizers up to 1995 as part of a wider study involving a re-evaluation of oil refining philosophy including the impact on new oil and gas strikes in Ethiopia. The work included studies of domestic market demand followed by a review of the regional and international fertilizer market supply and demand pattern and also an assessment of the price structures and the competitive position of fertilizers produced in

Ethiopia. The study also included consideration of the integration of the production of fertilizers with the expansion of petroleum refining facilities.

Brunei (Crown Agents)

This study was for the production of nitrogen fertilizers based on natural gas and their marketing potential in export markets.

Ghana (United Nations)

A techno-economic appreciation for the manufacture of nitrogen fertilizers based on the power from the Volta Dam.

Spain (CEPSA)

The design engineering and preparation of specifications for the production of ammonium sulphate fertilizers in Tenerife.

Nicaragua/Trinidad and Tobago (Investment Group of Banks)

Development of the case of petrochemical and fertilizer production facilities based on regional cooperation.

Kenya (Kenyan Government)

The Manderstam Group acted as consultants to the Government for a turnkey project to produce nitrogenous and compound fertilizers in Kenya via the naphtha reforming route.

Vietnam (UK Government)

The Manderstam Group assessed and forecasted the domestic market requirements for fertilizers. Distribution systems and pricing policies were detailed. The preferred site was selected and the case presented for a major complex to produce ammonia, urea and complex fertilizers.

Bangladesh (Commonwealth Secretariat)

A major component of the study on the utilisation of natural gas reserves in Bangladesh and presenting the technical and commercial case for and against establishing an export-orientated fertilizer complex on the coast. Selected potential export outlets were examined in detail.

Portugal

A study on the utilisation of fertilizers in Portugal was carried out for Quimigal, the company representing the fertilizer producers in the country. The agricultural sector was reviewed in Portugal, Madeira and the Azores. This included fertilizer utilisation in the past, government policies, crop trials, agricultural research, optimum use of different fertilizers, identification of

other factors such as improved seeds, pesticides, machinery cultivation practices and agricultural extension services. Economical aspects covered prices, subsidies and analysis of costs and benefits, credit, optimum marketing patterns, distribution channels, transport, wholesalers and retailers, warehouses, dealers, incentives, drainage and irrigation, land conservation and reclamation, desalination, present and future systems of land tenure and of agricultural exploitation.

The study was concluded by short, medium and long term recommendations on removal of obstacles to fertilizer utilisation.

Indonesia (National Indonesia Oil and Gas Company - PERTAMINA)

We were retained as consultants to the National Indonesian Oil and Gas Company - PERTAMINA to advise on the development of refinery products, natural gas and hydrocarbon by-products for the production of fertilizers, petrochemicals and downstream products and on the planning of future operations in these fields.

We have advised PERTAMINA inter alia on the production of fertilizer intermediates in Indonesia (West Java and Sumatra). The projects consisted of carrying out detailed engineering and economic evaluations of two complexes, each to produce 1,000 tonnes per day of ammonia, up to 1,600 tonnes per day of urea and compound NPK fertilizers.

The work included estimating the gas reserves and the preparation of recovery and conservation programmes, including the capital investment programme to ensure adequate gas supplies to cover the economic life of the proposed complex. It also included carrying out assessments of capital costs and engineering plant integration, followed by financing and engineering studies. We have also prepared detailed plant and equipment specifications and tender documents for international bids. The project necessitated carrying out detailed studies of the storage, handling and shipping of liquid ammonia to markets in South East Asia within an economic radius.

We acted as consulting engineers to PERTAMINA advising on the design and supervising the construction of a complex consisting of 1,500 tonnes per day ammonia and 1,750 tonnes per day urea plants, urea carriers and the necessary services, product handling and berthing facilities at Bontang, Kalimantan. After design, procurement, partial erection and harbour construction the project was transferred to the Ministry of Industries and renamed Kaltim II.

Cyprus

Technical and Safety audit of Allied Fertilizers Plant.

International Marketing

In addition to the above projects the collective experience of the Manderstam Group in the field of fertilizers includes a multiplicity of projects in Algeria, Belgium, Burma, Germany, Holland, India, Norway, Pakistan, Saudi Arabia, Turkey, Malaysia and Sri Lanka covering marketing and distribution systems and the production of ammonia, nitric acid, urea, nitrophosphates phosphoric acid and all types of complex and compound fertilizers.

Sales opportunities in the international field are reviewed and the performance and capabilities of many plants throughout the work are well-known to members of the permanent staff. The activities of the European and Japanese fertilizer cartels, the Middle East producers and the USA market activities are closely followed in addition to sales in and out of Russia and the East European sector.