THE REPUBLIC OF INDONESIA

Chemical safety and major hazards control

Terminal report
# Contents

1. **INTRODUCTION** ......................................................... 1
   1.1. Background .......................................................... 1
   1.2. The origin and main features of the project ..................... 1

2. **OBJECTIVES** .............................................................. 3
   2.1. Development objective ............................................. 3
   2.2. Immediate objectives of the project ............................. 3

3. **PROJECT IMPLEMENTATION** ............................................. 4
   3.1. Government inputs .................................................. 4
   3.2. ILO/FRG inputs .................................................... 4
   3.3. Project activities ................................................ 6
   3.4. Outputs of the project .......................................... 15
   3.5. General implementation factors .................................. 19

4. **PROJECT PERFORMANCE** ................................................ 21
   4.1. Achievement of objectives ....................................... 21
   4.2. Actual impact of the project .................................... 22
   4.3. Project relevance ................................................ 23
   4.4. Project efficiency ................................................ 23

5. **CONCLUSIONS** ............................................................ 23
   5.1. Chemical safety ................................................... 23
   5.2. Major hazards control ............................................ 24

6. **RECOMMENDATIONS** ................................................... 24
   6.1. Priority needs ..................................................... 24
   6.2. Follow-up project ................................................ 25

7. **ACKNOWLEDGEMENTS** .................................................. 26

**ANNEXES**

1. Project international personnel ....................................... 27
2. List of fellowships .................................................... 28
3. List of equipment purchased and distributed by the project .... 29
4. Information about major hazard installations ..................... 33
5. Report on training in chemical safety and major hazards control in Indonesia ............................. 35
6. List of chemical factories inspected by project international staff .............................................. 41
7. Priority list for inspections of hazardous chemical factories . 42
8. Inspection of chemical factory (questionnaire) .................. 46
9. Check-list for chemical inspection of factories .................. 53
10. List of chemical safety guidelines published in Bahasa Indonesia by the project .......................... 57
11. Major hazards control .................................................. 58
1. INTRODUCTION

1.1. Background

During the last two decades, Indonesia has experienced rapid industrial growth. The use of new technologies, complex processes and various chemicals has increased rapidly to a significant extent. A large number of establishments in the chemical and related industries are carrying out operations involving hazardous chemical substances and processes. Workers employed in such industries are exposed to different hazards arising from the use of these substances. Such industrial activities may cause serious or fatal injuries not only to workers but also to the population living in the vicinity of the establishments. Also, the growth of the manufacturing industries has been very significant in the country. A substantial number of them are large users of chemicals, in addition to the chemicals manufacturers.

Many of such establishments presenting potential chemical hazards are located in industrial areas, such as in North and South Sumatra, East, Central and West Java and Kalimantan. They include large liquified natural gas plants, petroleum refineries, fertilizer and pesticide factories and other chemical plants. Other industries such as oil and gas mining, paper and paper products, food products, textile, rubber products, metal and machinery manufacturing industries make extensive use of chemicals.

The economic and technological developments in industrial and agricultural sectors are generally increasing the use of hazardous chemicals, and the amount of energy stored in one place. Many factories are located in heavily populated areas.

Lessons learned from previous accidents involving hazardous chemicals have shown that well-planned protective measures are essential to protect workers and the public in the surroundings of such establishments.

Out of many occupational accidents in various industries, many were due to explosions and fires and also due to intoxications and other harmful effects of chemicals. Chemicals account also for a major part of occupational diseases. Further, a series of incidents involving explosions or leakage of chemicals is known to have occurred in Indonesia in recent years. Often such incidents caused serious or fatal injuries to workers and to the public.

1.2. The origin and main features of the project

The past experience has shown that in spite of strenuous efforts of the Government problems still widely exist with respect to handling, storage and use of hazardous chemicals. Particularly relevant were the lack of a list of hazardous chemicals and chemical data sheets, the lack of records about utilisation of chemicals at plant level, the absence of safety regulations for chemical factories, the lack of basic procedures for inspection of chemical plants and of a check-list for chemical safety inspection, inadequate qualification and training of inspectors and safety officers in chemical safety, the absence of labels and instruction on containers of chemicals, incomplete exposure limit system, incomplete list of occupational diseases, the lack of training of company doctors in occupational toxicology, under-reporting of occupational accidents and diseases, unsafe methods of loading/unloading and of storage of chemicals, and the lack of emergency plans. Certain efforts have been made with the assistance of the two UNDP/ILO projects for upgrading in-plant training programmes on chemical hazards.

17640/v.2
Therefore, it has been perceived as very important to establish effective preventive programmes within the enterprises concerned, based on the identification of hazardous substances and processes, the assessment of potential risks and the involvement of all concerned.

The regulatory measures and advisory services provided by the inspectorate needed to be strengthened and linked with the voluntary improvements by private industries. Intensive training programmes needed to be organised for the governmental inspectors and for safety officers and workers from chemical industry and from enterprises dealing with hazardous substances and processes. Training in occupational toxicology was needed for company doctors of these enterprises. The members of BILIK also needed training in the field of chemical safety as well as in major hazards control and environmental protection to make them operative.

It was also urgent to establish a major hazards control system. Such a system should identify installations with potential major accident hazards, give guidance about organisational and preventive measures against these hazards and draw up emergency plans. The initiative of the private industries, with the support of qualified personnel and the creation of a unit at the Department of Manpower, are essential components of this system.

The activities of the previous UNDP/ILO projects have demonstrated the particular need of technical assistance in developing appropriate guidelines and training modules with respect to the use of hazardous chemicals. Training aimed at multiplier effects needed to be organised with the active cooperation of employers' and workers' organisations in the chemical and related industries. The present project aimed at providing the required assistance so as to enable the Government and enterprises concerned to plan and implement the training activities concerning chemical safety and major hazards control.

The main component of the project has been expert assistance in chemical safety inspection and major hazards control, preparation of regulations on major hazards control and chemical safety, setting up of the major hazards database and development of occupational toxicology.

The direct recipients (target groups) of the project assistance are the Department of Manpower of the Republic of Indonesia, the Indonesian Association of Employees (APINDO), the All Indonesian Workers' Union (SPSI), the Employees' Social Insurance (ASTEK) and the local authorities in the vicinity of chemical works. This, of course, includes the workforce of enterprises manufacturing and/or using chemicals.

The immediate problems the project was intended to solve, and the logic of its approach to solving them were stated clearly by the project document at the outset of the project.

Whilst such immediate problems still exist in the Indonesian industry, a significant part of the mechanism for dealing with them has been set up and put into motion, leading to more efficient accident prevention.

The only feature of the project design, which has appeared to be premature, was the objective of tackling major hazards control in the country simultaneously with introducing and developing chemical safety. As discussed

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1 BILIK is the acronym for Bina Lingkungan Industri (Industrial Environment Forum) consisting of workers, the population of the community surrounding the factory and of the local government's representatives.

17640/v.2
later, major hazards control should be developed on established and functioning chemical safety system.

2. OBJECTIVES

2.1. Development objective

The Department of Manpower of Indonesia received ILO/UNDP technical assistance since 1978 in the field of occupational safety and health. During the operational phase of the previous projects, the capability of the Department to assess and evaluate safety and health problems as well as to determine the issues that needed priority consideration was strengthened. The national infrastructure to promote enterprise-level action to provide for improved protection of the workers was also developed.

The strengthened action capability helped to identify the need to put special emphasis on the development of technical skill in chemical safety and major hazards control. Therefore the main component of the present project is expert assistance in chemical safety inspection and major hazards control. The other components include the preparation of regulations to deal with hazardous installations with major accident potential and development of occupational toxicology.

Thus the development objective of the project is linked to economic development. Indonesia's strenuous efforts restructure the economic pattern to establish a balance between agriculture and industry. Chemical industry and industries using hazardous chemicals are growing rapidly. This rapid industrial growth contributes significantly to the economic development. The general guideline of state policy in the field of protection of the working population has been clearly defined: the policy gives high priority to safety and health at work. Therefore, the present project fits in with the development policy of the Government. It contributes towards the improvement of health of workers by preventing the hazards posed by the use of hazardous substances in chemical industry and in major hazard installations.

2.2. Immediate objectives of the project

The project had two complementary immediate objectives. By the end of the project:

(a) the Directorate General of Industrial Relations and Supervision of Labour Standards of the Department of Manpower in Jakarta and regional inspectorates in 15 provinces, staffed with inspectors trained in chemical safety, will be fully operational for technical inspection of chemical factories;

(b) the Major Hazards Control Unit established within the Directorate General of Industrial Relations and Supervision of Labour Standards will be fully operational as a technical and organising basis of the national system for the identification and control of industrial activities involving hazardous substances and processes which have the potential to cause major accidents with serious injuries inside or outside the industrial establishments.

17640/v.2
3. PROJECT IMPLEMENTATION

3.1. Government inputs

3.1.1. National counterpart staff

The national technical and administrative and supporting staff mentioned in this project document is available and can execute the majority of activities planned. The selection and appointment of five additional technical inspectors was completed between June-July 1990. One of them was appointed at headquarters, the other in the regions. Their training was successfully accomplished.

3.1.2. Government-provided facilities

The office facilities necessary for the accommodation of project activities, training facilities, lecture rooms for courses and seminars were adequate and provided in time.

3.1.3. Miscellaneous Government inputs

The Government covered all miscellaneous inputs required for the smooth running of the project. Several documents produced by the project were translated by the counterparts or national consultants into Bahasa Indonesia.

3.2. ILO/FRG inputs

3.2.1. Project personnel

3.2.1.1. International staff

According to the modified work plan the ILO appointed nine experts or short-term consultants who executed ten missions of total duration of 40.75 months as compared with 42.5 months originally planned. All posts foreseen in the project document were covered, the duration of short-term consultancies was reduced. The last mission was completed in June 1991. All experts were technically fully qualified. The detailed list of project international personnel with exact timing of their missions is contained in Annex 1.

3.2.1.2. National consultants

As foreseen in the project document, four national consultants - Dr. Soemanto Imam Kasani, Mr. D. Soemali, Mr. M. Marbun and Mr. Sri Hartono\(^1\) - have been subcontracted by the Chief Technical Adviser. They covered the fields of major hazards control, chemical safety training, and development of information materials for chemical safety. All efforts have been made to coordinate their appointment with the presence of relevant international consultants in the country. This combination of national talents with international expertise provided an opportunity for national specialists to contribute to the success of the project. It also improved its cost-effectiveness.

\(^1\) Who passed away before the publication of this report.
3.2.2. Training

3.2.2.1. Individual fellowships

A total of nine fellowships of 15.5 months' duration for training abroad were foreseen in the original project document. This was adequate for the requirements of the project and corresponded to the number of national technical counterparts. In order to compensate the increased costs of travel and subsistence allowances and to adapt the programmes to the proposals of the host countries, some fellowships were reduced. By the end of the project nine planned fellowships had been executed but their total duration was cut down to 12.25 months. The details of fellowship training are described under activities, the subjects of studies, duration, names of fellows, host countries and timing are listed in Annex 2.

3.2.2.2. International group training

A two months' international training course "Chemical Safety and Factory Inspection" (six weeks in Curtin University of Technology, Perth, Western Australia, and two weeks in Jakarta, Surabaya/Gresik and Cilacap, Indonesia) for 22 participants was organised from 25 September to 25 November 1989.

3.2.2.3. Training in Indonesia

This input was organised in the country as an important part of project activities. It was provided by the national technical counterparts with the assistance of international experts and national technical consultants. The details are described below under activities and outputs.

3.2.3. Equipment

An amount of US$160,000 was foreseen in the project budget for purchase of 15 sets of field testing equipment for all Manpower regional inspectorates in the whole country:

1. Aceh
2. North Sumatra
3. West Sumatra
4. South Sumatra
5. Riau
6. Jakarta
7. West Java
8. Central Java
9. Yogyakarta
10. East Java
11. South Kalimantan
12. East Kalimantan
13. North Sulawesi
14. South Sulawesi
15. Bali.

One person of each of these inspectorates has been trained in operation, calibration and maintenance of the relevant equipment.

In addition to these 15 sets, some selected equipment for national and regional Institutes of Industrial Hygiene and Occupational Health, office and audiovisual equipment, training aids and material and a car for project
operation have been planned. The allocated funds enabled the purchase of all this equipment, which was delivered in time and facilitated smooth project operation. The total amount spent for equipment was US$160,349. The list of equipment purchased and distributed by the project is in Annex 3. The microcomputer for the computerised data bank (including various databases) has been delivered through the ILO International Occupational Safety and Health Information Centre (ILO-CIS), and the counterpart staff has received instruction on how to operate it.

In order to eliminate the hazard of loss or damage during the transport to the regions, the equipment was donated to the officials of regional offices at the occasion of their participation in various training programmes.

3.3. Project activities

3.3.1. Preparation of work plan

A detailed work plan for the implementation of the project, including programme of training courses, was prepared in July 1989 by the Chief Technical Adviser and the Chief National Counterpart. The sequence of activities had to be modified (compared with the project document) because of the delayed start of the project, to achieve maximum result utilising the counterpart resources. Also, in cooperation with the Chief National Counterpart, the "Framework for Effective Participation of National and International Staff" has been developed.

3.3.2. Activities of the project personnel

The international expert assistance started on 1 July 1989 by the first mission of Dr. Milos Nedved, the Chief Technical Adviser and Expert in Chemical Safety (Post 01). His appointment was delayed by 11 months as compared with the project document. During his first mission of four months he devised, in close collaboration with the Chief National Counterpart, a detailed work plan for the implementation of the project and prepared a list of equipment to be ordered. The programme for international group training (six weeks in Australia, followed by two weeks in Indonesia) was finalised. In cooperation with the counterpart, the participants have been selected and the course organised in September-November 1989. Detailed training programmes for international fellowships were prepared in August 1989, the candidates for fellowships have been nominated, the forms completed and submitted to the ILO. The timetable for the entire project training programme was developed and started. A national consultant in chemical safety was appointed for the first period between 1 August and 15 December 1989. After the first mission of four months, the Chief Technical Adviser left Indonesia in September 1989 and resumed his function in February 1990.

This was the beginning of full activities of the international project personnel. The assistance in the establishment and operation of the inspection of chemical factories, preparation of reporting forms, training materials and guidelines, as well as training in this field was the main task of the Chief Technical Adviser who acted also as Expert in Chemical Safety. Assistance in the establishment and operation of the Major Hazards Control Unit and development of major hazards control started by the CTA already before the appointment of Mr. Ens as Expert in Major Hazards Control (Post 02) on 24 May 1990 for a period of eight months. It was envisaged to cover the duties of the Post 02 by three consultants. The second consultant Dr. Ellis executed his one month appointment in August 1990, Mr. Lewis participated in project activities during two months from mid-February to mid-April 1991. The
Major Hazards Control Unit was set up and priority tasks allotted to its members. Draft Regulations on Major Hazards Control have been prepared, drafts of relevant departmental responsibilities and interfaces completed and essential elements of major hazards control system outlined to different departments. The activities of Mr. Chesson, Expert in Occupational Toxicology (Post 03), started on 4 February 1991. He organised a training course for company medical officers. His main achievement was the review of the document "Maximal Allowable Concentrations of Chemical Substances in Air in Workplaces" published in July 1984 and preparation of a draft of revised list of occupational diseases, attached to the Regulation No. 34/1977. During his two assignments, Mr. Cena, Expert in Organisation of Operations of Information Centres (Post 04) visited the country in May-July 1990 and in April-June 1991 for a total of 3.5 months. He reviewed the organisation, administration and current operations of the National ILO-CIS Information Centre and assisted the Department of Manpower in upgrading the Centre's operations. The Expert on Occupational Safety and Health Legislation (Post 05) participated in the project activities during three months in February-May 1991. He examined the whole complex of the occupational safety and health and related legislation and prepared a draft of the enabling legislation "Occupational Safety, Health and Welfare Act, 1991" which was presented to the Government for consideration. He assisted in the finalisation of the drafts of standards prepared by other experts. At the end of their assignments all experts produced comprehensive reports with recommendations.

3.3.3. Institution building

3.3.3.1. Technical inspection of chemical factories

The Department of Manpower appointed five additional technical inspectors. In order to improve the prevention of accidents in chemical and allied industries, the project organised intensive training for safety inspectors, safety officers and medical officers in ten regions. A total of 429 participants were trained in ten-day courses organised in each of the selected regions in 1989. An additional 100 participants were trained in 1990. Their training was completed in a two months' course in Australia and Indonesia and by fellowship training abroad. Thorough training was provided during the inspections of factories executed jointly by the international experts, national consultant and the counterpart staff.

The analytical equipment of the national and regional Institutes of Industrial Hygiene and Occupational Health was completed and the field testing equipment was provided to all divisions in the selected regional offices. Basic inspection procedures for chemical inspection of factories, including guidelines and check-lists, were prepared. The chemical inspection was extended to all 15 regions and a long-term programme of chemical inspection of factories covering at least 60 factories in each region was prepared and its execution started.

3.3.3.2. Major Hazards Control Unit

The establishment and organisation of a Major Hazards Control Unit has been discussed on numerous occasions between the CTA and the Chief National Counterpart. Whilst the group as such has not yet been established, two members of it have been sent for fellowship training to Germany, the Netherlands and the United Kingdom. Two other members were intensively trained by the Experts 02 and 04 in the areas of:
major hazards control;
organisation and management of data bank; and
chemical safety.

The Chief National Counterpart was waiting for additional inputs from other governmental departments, and finally by the end of March 1991 the Major Hazards Control Unit in the Directorate General of Industrial Relations and Supervision of Labour Standards in Jakarta, staffed with five specialists qualified in chemistry and chemical engineering and trained in major hazards control, has been formally established.

Progress has taken place in the area of policy and legislation, preparation of guidance materials and training, and first contacts with safety inspectors in the regions. This unit has so far been unable to organise inspections of major hazard installations, since only some of these have been identified. Problems with the identification of major hazards, and proposed way to overcome these problems, are discussed below (paragraphs 3.3.6. and 5.2.).

3.3.3.3. Computerised data bank

The project document has anticipated the establishment of the computerised data bank for the storage, retrieval and dissemination of information on:

- hazardous substances which may present major accident hazards in Indonesia;
- all Indonesian installations carrying out operations involving one or more such substances;
- national specialists and agencies capable of providing assistance in the event of major accident.

Ad.1 Because of the delay in the appointment of the Expert on Major Hazards Control (Post 02), the CTA and the Chief National Counterpart commenced the collection of this information already in March 1990. A questionnaire was utilised for the survey, obtained by the CTA from the ILO project in Thailand, which was translated into Bahasa Indonesia (see Annex 4). A substantial delay has been experienced in obtaining from the Department of Industry the names and addresses of the enterprises to be surveyed. Finally, the questionnaire was sent to over 150 companies all over the country. The response rate was disappointingly low, but the list was completed by useful information from the participants of various training courses organised by the project. The data bank with all relevant information about hazardous chemical substances was established.

Ad.2 The preparation of procedures and forms for registration of major hazard installations was started by the Expert (Post 02) who developed another (simpler) questionnaire and sent it to a number of companies in order to obtain some specific information. He also further developed a computerised database for registration of major hazard installations. However, only a few enterprises have returned the forms.
The collection of the names and of national specialists capable of providing assistance and advice in the event of major accident started, but apart of some large refineries, it is a very little experience in this field in the country. The component of the data bank with information on national major hazard specialists could therefore not be established.

3.3.3.4. National Occupational Safety and Health Information Centre

The organisation, administration and operations of the Centre were upgraded and improved with the assistance of the expert. In addition to the in-service training of the counterparts, one fellowship of three weeks was awarded to study in ILO-CIS in Geneva and in the United Kingdom the organisation of the Centre. The fellowship was postponed until July-August 1991 because the originally proposed candidate has left the Directorate of Occupational Safety and Health.

The Centre received from ILO-CIS a database with information on at least 5,000 chemicals.

3.3.4. Training activities

3.3.4.1. Fellowship training

The following fellowships were executed during the project life:

- Two fellowships in chemical safety and chemical inspection of factories (Mr. Nasrul Syarief and Mr. Fridel Dawar) to the United Kingdom and Germany - originally planned for three months - had subsequently been modified to two months' duration and took place in September and October 1990.

- Two fellowships in major hazards control (Mr. Chalik Jaman and Mr. Purwanto) to the Netherlands, the United Kingdom and Germany - originally planned for three months - had been shortened by one month each because of budgetary constraints. The programme commenced in late April 1990 and was very successful.

- Two fellowships in the organisation of major hazards control, of two weeks' duration (Dr. Soekarno, Mr. Soedirman), took place during May 1990. Dr. Soekarno took part in the World Congress in Hamburg. Both fellowships have been successfully completed.

- Fellowship in the organisation of chemical inspection of two weeks' duration (Dr. Suma'mur, Director General of Industrial Relations and Supervision of Labour Standards) had to be postponed because of the heavy workload of the candidate during May and June 1990 to September 1990. The programme in the United States was accomplished without any difficulties.

- Fellowship in occupational toxicology (Dr. Amminudin) to Japan, of one-month duration, has been executed according to the work plan.

- Fellowship in the organisation of information on chemical safety and major hazards, of one-month duration, to CIS-IL0 and the United Kingdom had to be postponed. The fellow who had been originally nominated has left the Directorate of Occupational Safety and Health to take up another
position. His responsibilities have been taken over by a new incumbent, Mr. Sant Sihaan, who undertook the fellowship training in July-August 1991.

3.3.4.2. International group training

A six-week course in "Chemical Safety and Factory Inspection" was organised within the framework of the project in Curtin University of Technology in Perth, Western Australia. The course was followed by a two-week stage, including several visits to chemical plants in Jakarta, Surabaya-Gresik and Cilacap. The course lasted from 25 September to 25 November 1989 and was attended by 15 safety inspectors from all regions, two members of the Department of Manpower and five selected specialists of other institutions and chemical industry.

3.3.4.3. Training in Indonesia

3.3.4.3.1. Training courses

The training programme syllabi in chemical safety and chemical inspection were prepared during the first mission of the Chief Technical Adviser and after the appointment of national consultant in July 1989. They have been developed for the following groups:

- governmental safety inspectors;
- company medical officers;
- company safety officers/safety engineers;
- trainers in occupational toxicology.

The training of trainers (national counterpart staff and two safety specialists from cooperating industries, ICI and Pertamina) was conducted by CTA over a one-week period. It aimed at updating the trainers' knowledge in the area of chemical safety, and at developing unified ideas about accident prevention philosophy. The main emphasis of this trainers' training, as well as of all subsequent training courses, was on:

- prevention of accidents and ill health at work;
- minimising risks to workers by adequate training and information dissemination about the safe use and handling of chemicals.

The timetable for the entire project training programme has been developed, and the training was conducted accordingly. Most of the training was completed during the planned period (August-December 1989) in ten courses covering 431 participants.

The training continued in 1990-91 after the arrival of international experts in Indonesia. One course for the company safety officers/safety engineers was conducted in August 1990 with 40 participants in Jakarta during the period of time when the experts in major hazards control were present. Similarly, the course for trainers in occupational toxicology took place in late 1990, when the major role in it was played by the expert in occupational toxicology (participation of 20 specialists out of 15 regions). One more course for company medical officers was run in Jakarta during May-August 1991, when the organisers had some guarantee of good attendance.
The numbers of course participants in the categories of governmental safety inspectors and company safety officers/safety engineers were higher and much higher, respectively, as distinct from the originally planned numbers. On the other hand, the numbers of company medical officers actually attending the training courses were much lower than their original registration suggested. The reason given to the organisers was the difficulty in attending the course, whilst expected to attend some patients (most of medical doctors, working as company medical officers, run their private practices in the evening). To make up for the shortfall in the number of company medical officers trained by the project, the organisers paid attention to the preparation of an additional course in Jakarta, as mentioned above.

The report on training in chemical safety and major hazards control is attached as Annex 5.

3.3.4.3.2. In-service training

The international experts assigned to the project elaborated basic inspection procedures and check-lists for inspection of chemical factories. Several inspections have been carried out jointly by the CTA, international experts, national consultant and the national counterparts who were trained in the planning, preparation, execution and follow-up of the inspections. This in-service training took place in three major locations: West Java, East Java and North Sumatra.

Extensive training of national counterparts in computer information, database management and other computer related activities has been conducted by the Expert in Organisation of Operations of Information Centres (Post 04) who has been reassigned in April-June 1991. He also finalised activities related to the upgrading of work by the CIS Centre in Indonesia.

The Expert in Major Hazards Control (Post 02) has discussed the organisation and execution of specific in-service training in inspection of major hazard installations. Some training has been completed, but it would require further efforts.

3.3.4.3.3. Production of training material

As mentioned above, training curricula and materials for training of trainers in safe storage, handling and use of hazardous substances, model training programmes for training in the prevention of occupational accidents and diseases related to chemical hazards, training curricula and materials for training of inspectors and other government officials concerning inspection and management of major hazards control and for training of managers, workers' representatives and key personnel in control of major accident hazards and establishment of emergency plans were prepared, translated into Bahasa Indonesia and submitted to the counterpart. All training materials (prepared for all training programmes conducted by the project) in Bahasa Indonesia have been printed as a manual, and distributed to the participants of the courses.

A computer with a plotter and special programme for material development has been purchased and put into operation. Modern audiovisual equipment and teaching aids, including complete video equipment and video programmes dealing with occupational safety and health subjects were used for training courses.
3.3.5. Inspections and surveys

3.3.5.1. Inspections

A number of inspections of factories have been carried out by the CTA, the national consultant in chemical safety, and by counterpart staff.

These inspections took place during July-August 1990 in West and East Java and North Sumatra. The main goals of these inspections was to train the technical inspectors and the members of the Major Hazards Control Unit in the planning, execution and follow-up of the inspections. The list of 23 chemical works inspected is in Annex 6.

As a result of extensive theoretical and in-service training of inspectors and following the provision of field testing equipment the inspection of chemical factories was extended to all 15 regions.

A long-term programme of inspection of chemical factories was prepared. In the inspection of major hazards installations no progress was made, owing namely to the lack of necessary data.

3.3.5.2. Surveys

A survey of the use of hazardous substances and of safety and health conditions in the chemical and allied industries started in April 1990 with a good input from the national consultant and the national counterparts together with the regional and subregional offices of the Department of Manpower. This activity has already been pre-empted in 1989, when during training activities in a number of provinces the project staff managed to obtain useful information on the use of hazardous substances from the participants of various training courses (governmental safety inspectors, company safety officers and company medical officers).

A substantial delay has been experienced in obtaining the names and addresses of the enterprises to be surveyed for the potential existence of major hazards. The questionnaire has been obtained by the CTA from the ILO project in Thailand, which, after translation to Bahasa Indonesia, has been sent to over 150 companies all over the country. Their names and addresses have been obtained from the Department of Industry. The response rate to this questionnaire was disappointingly low, and led to substantial delays in some major hazards control activities including surveys of installations.

3.3.6. Major hazards control

A detailed analysis of the project's major hazards control activities, as described in the report of Mr. Ens, Expert in Major Hazards Control (Post 02), can be summarised as follows.

The inspectors, who have been selected by the counterpart for the training in special techniques of inspection of major hazard works, did not have sufficient technical qualifications and were not familiar with actual plant operation. Another stumbling block has been the identification of major hazard installations.

Before the expert in major hazards control started his assignment a questionnaire requesting information about the presence of quantities of a large number of dangerous chemicals (the entire list of 180 substances included in the ILO Major Hazards Control Manual), had been sent by the
project and the counterpart to a number of industries. Very few replies came in, so a reminder was sent, but this did not produce many responses either.

It was thought then that possibly the form had been too complicated, so a much simpler questionnaire was prepared, asking for quantities and types of storage of only the most predominant dangerous substances (five substances). Hardly any replies to that questionnaire were received.

In order to obtain results as quickly as possible it was tried in the meantime to ask the questions via the telephone. With that purpose a form for recording the answers to these telephoned queries was designed. Personnel which were to be employed in the Major Hazards Control Unit were asked to conduct the telephone query but not a single filled out form came back to the expert.

Subsequently, an effort was made to have the government inspectors collect the data required for identification of major hazard companies. It was intended to start out with the Jakarta region where transportation problems should not arise. A number of inspectors employed in that region were invited to attend a briefing meeting where Expert 02 explained what data were required, and handed out the registration forms, but no completed forms came back to him.

The procedure for identifying major hazard installations by mail, that had been successfully applied in other projects elsewhere (e.g. Thailand and Malaysia) was not found to be feasible Indonesia. Therefore, training the factory inspectors in the identification of major hazard installations by conducting field visits was very urgent and a priority need. Furthermore, this activity is a prerequisite to the implementation of operational and organisational major hazards control measures. The inputs to complete this activity by the present project were limited and the additional international inputs needed have been therefore identified during the mid-term project review. Unfortunately, because of a number of constraints outside the ILO's control, these further inputs have not been made available. Recommendations for the activities aimed at identification of major hazard installations, are outlined in section 6.2 of this report.

In spite of the above problems, the establishment and initial operation of the Major Hazards Control Unit at the Department of Manpower has been satisfactorily accomplished. Also Major Hazards Control Regulations have been drafted, translated, and are currently circulated to a number of different governmental departments.

3.3.7. Preparation of lists, procedures, standards and guidelines

An important project activity was drafting, publication and translation into Bahasa Indonesia of different technical documents. In addition to their training, advisory and organisational work, all experts produced different documents relevant to their speciality. This work was done in close collaboration with the national counterparts and national consultants. The Chief Technical Adviser prepared safety guidelines for chemical factories, procedures and forms for registration of hazardous chemicals, priority lists, basic procedures and check-lists for inspection of chemical factories and for field testing of chemical hazards; the experts on major hazards control drafted procedures and forms for registration of major hazard installations and for handling, storage and use of hazardous chemicals, list of hazardous substances, the Control of Industrial Major Accident Hazards Regulations and guidelines for early warning system. The expert in industrial toxicology
revised the list of occupational diseases, drafted the Regulation on Labelling and the Ministerial Circular on Threshold Limit Values for Chemical Substances. The expert in occupational safety and health legislation assisted on the basis of the work of other experts and national counterparts in the finalisation of drafts, namely of Regulations Establishing a Labelling System, instructions on containers of chemical substances and on registration of hazardous chemicals. This expert, having reviewed the existing Indonesian safety and health legislation, has prepared a draft of enabling legislation entitled "Occupational Safety Health, and Welfare Act, 1991", for the consideration of the authorities. It is believed that all the above developed and revised elements of legislation, and all similar subsequent ones, could be accommodated systematically and in a coherent manner in this newly proposed framework.

All the project's publications are listed in paragraph 3.4.1. below. They have all been transmitted to the Chief National Counterpart and have been translated into Bahasa Indonesia.

3.3.8. Production and dissemination of information

A number of information material has been developed, its volume far exceeded the initial estimates. All materials have been translated into Bahasa Indonesia. Some of them have been already printed, some of them are still in press and are expected to be distributed.

Thirty guidelines on chemical safety were produced, translated into Bahasa Indonesia, printed and widely distributed. They are listed in Annex 6.

The preparation of the list of national specialists and institutions capable of providing assistance in the event of an emergency involving major hazards was started by the expert in major hazards control, but it appeared that apart from large oil refineries there is very little expertise in Indonesia which could be useful in case of major emergencies.

The computerised data bank for chemical safety information has been established, using the questionnaire developed by Chief Technical Adviser and the national consultant in chemical safety.

The workshop for all governmental and non-governmental organisations and institutions interested in using computerised data banks on chemical safety and major hazards control has been successfully organised on 6 June 1990. The workshop was attended by over 50 participants, and four papers on various aspects of appropriate information services in the above field were presented. The participants' suggestions on the operation of the data banks, and on information dissemination have been incorporated in the work of experts on major hazards control and organisation of operations of information centres.

The organisation of an information campaign has been well planned and prepared. The preparations started on time. The information days for:

- employers;
- trade union representatives;
- owners of small and medium-sized enterprises;
- members of safety committees;
- representatives of local authorities and of BILIK.
took place between July and November 1990, at the following locations: Jakarta; West Java; Central Java; East Java; North Sumatra; East Kalimantan; South Sulawesi; and Bali.

They have been attended by 1,078 participants. The dates of information days and number of participants are indicated in Annex 5.

3.4. Outputs of the project

3.4.1. Standards, instructions, procedures and guidelines

3.4.1.1. Guidelines for chemical factories and other industrial establishments on safe handling, storage and use of chemical substances (38 pages).

Completed. Bahasa Indonesia translation submitted to the counterpart.

3.4.1.2. Procedures and forms for registration of hazardous chemical substances stored, handled or used in establishments in the chemical and related industries.

Completed by the counterpart, with limited assistance from CTA. Developed in Bahasa Indonesia and published by the Department of Manpower.

3.4.1.3. Basic inspection procedures for inspection of chemical factories and other industrial establishments, handling, storing and using chemical substances and procedures for field testing of chemical hazards (16 pages).

Completed, submitted to the counterpart.

3.4.1.4 Basic inspection procedures for inspection of chemical factories and other industrial establishments, handling, storing and using chemical substances and procedures for field testing of chemical hazards (16 pages).

Completed, submitted to the counterpart.

3.4.1.5. Inspection of chemical factory questionnaire (9 pages).

Completed, published in Bahasa Indonesia and in English. Attached as Annex 8.

3.4.1.6. Check-list for chemical inspection of factories (6 pages).


3.4.1.7. Draft of a revised list of occupational diseases attached to the Regulation No. 34/1977 including main occupational diseases caused by chemical hazards (4 pages).

Completed, submitted to the counterpart.

3.4.1.8. Draft of a revised and completed Ministerial Circular on threshold limit values for chemical substances (38 pages).

Completed, submitted to the counterpart.
3.4.1.9. Draft of Regulations Establishing a Labelling System; and
3.4.1.10. Instructions on containers of chemical substances.

Both items have been developed by the Department of Health, Republic of
Indonesia, for enforcement as a Presidential Decree, applicable generally and
overriding previously developed regulations.

3.4.1.11. Draft of Control of Industrial Major Accident Hazards
Regulations including inspection and reporting procedures (6 pages).

Completed. Translated into Bahasa Indonesia by the Major Hazards Control
Unit.

3.4.1.12. Procedures and forms for registration of installations
storing or using hazardous substances over a certain quantity so that they may
present major accident hazards (9 pages).

Completed, published in Bahasa Indonesia and in English. Submitted to
the counterpart.

3.4.1.13. List of hazardous substances with indication of
quantities which may present major accident hazards (1 page).

Completed, submitted to the counterpart.

3.4.1.14. Guidelines for the establishment of early warning systems
for major hazard alarms at high-risk establishments.

Completed.

3.4.1.15. Thirty guidelines on chemical safety on major hazards
control and emergency plans (60 pages in total).

The guidelines were produced in Bahasa Indonesia, printed and widely
distributed. The list of guidelines is attached as Annex 10.

3.4.1.16. Draft of the enabling legislation "Occupational Safety,
Health and Welfare Act, 1991" (70 pages).

Completed, submitted to the Government for consideration.

3.4.2. Institution building

3.4.2.1. The Directorate General of Industrial Relations and
Supervision of Labour Standards and 15 divisions in the regional offices
staffed with trained chemical inspectors and equipped for field testing of
chemical hazards.

Completed.

3.4.2.2. National and regional Institutes of Industrial Hygiene and
Occupational Health equipped with additional equipment for testing and
assessment of chemical hazards.

Completed.
3.4.2.3. Major Hazards Control Unit established in the Directorate General of Industrial Relations and Supervision of Labour Standards in Jakarta, staffed with five specialists qualified in chemistry and chemical engineering and trained in major hazards control.

Completed.

3.4.2.4. Computerised data bank established for the storage, retrieval and dissemination of information on:

- all hazardous substances which may present major accidents hazards, including the description of their risks, their identity, methods and precautions laid down by the manufacturer in connection with handling, storage and transport, brief indication of hazards for men and for the environment, preventive and emergency measures including treatment of injuries in case of accidents, etc.;

- all Indonesian installations carrying out operations involving or possibly involving one or more hazardous substances presenting major accident hazards;

- national specialists and agencies capable of providing assistance in the event of emergency involving major hazards.

Partly completed. Computerised data bank established with all relevant information about hazardous substances. However, data on all Indonesian major hazard installations not yet collected. National specialists capable of providing assistance not available.

3.4.2.5. CIS database with abstracts of the worldwide literature in the field of occupational safety and health and with comprehensive information on at least 5,000 chemicals used in industry.

Completed.

3.4.3. Outputs of training activities

3.4.3.1. Training curricula and materials for training of trainers in safe storage, handling and use of hazardous chemical substances.

Completed.

3.4.3.2. Model training programmes for training of inspectors, managers, supervisors and workers in the prevention of occupational accidents and diseases related to chemical hazards in industry.

Completed.

3.4.3.3. Training curricula and materials for training of inspectors and other government officials concerning inspection and management of major hazards control and for training of managers, workers' representatives and key personnel in control of major accident hazards and formulation of emergency plan.

Completed.

3.4.3.4. Fifteen safety inspectors and two members from the Directorate of Occupational Safety and Health of the Department of Manpower and five selected trainers of other institutions and of the chemical industry
trained in an international course as trainers in chemical safety and inspection and major hazards control.

Completed.

3.4.3.5. Four inspectors with chemical background trained abroad in chemical inspection of factories, major hazards control and formulation of emergency plans.

Completed.

3.4.3.6. One medical officer trained abroad in new achievements of occupational toxicology.

Completed.

3.4.3.7. One information officer trained abroad in the operation of information centres and storage and dissemination of occupational safety and health information.

Completed. This fellowship has been delayed and executed in July-August 1991 (see above 3.3.4.1).

3.4.3.8. At least 100 inspectors from the regional divisions of the Department of Manpower trained in inspection of chemical factories and in major hazards control.

Completed. (155 trained)

3.4.3.9. At least 100 safety officers and engineers from chemical enterprises trained in safe handling, storage and use of chemicals, accident reporting, major hazards control and emergency measures.

Completed. (264 trained)

3.4.3.10. Fifteen trainers trained in occupational toxicology.

Completed. (20 trained)

3.4.3.11. At least 100 company doctors trained in occupational toxicology, diagnosis of occupational diseases and related matters.

Completed partly. (92 trained)

3.4.3.12. At least 500 employers' representatives and factory owners and 500 workers' representatives and members of safety committee from chemical factories and major hazards installations informed on safe use, storage and handling of chemical substances and major hazards control.

Completed partly. (478 informed)

3.4.3.13. At least 300 owners of small and medium-sized enterprises informed and advised on safe use, storage and handling of chemicals.

Completed. (300 informed)

3.4.3.14. At least 300 representatives of the communities surrounding major hazard works or members of BILIK from the vicinity of such works trained or informed in the emergency plans and dissemination of information on major hazards control.
3.5. General implementation factors

3.5.1. Compliance with prior obligations and prerequisites

3.5.1.1. Prior obligations

The following prior obligations of the Government were stipulated in the project document:

(a) Financial sanction of the budgeting provision for the appointment of the additional technical counterpart staff.

The budgeting provision was provided and an additional five technical inspectors appointed in June-July 1990.

(b) Appointment on a full-time basis of the Chief National Counterpart responsible for government participation in the implementation of the project.

Dr. Soekarno, Director of Occupational Safety and Health was appointed as Chief National Counterpart. In spite of not having been released from his duties in the Directorate, his performance was exceptional and it is thanks to him that the project could achieve its objectives and be brought to the successful end.

3.5.2. Prerequisites

The award of one ILO fellowship for the study tour of the Director General of Industrial Relations and Supervision of Labour Standards to study the organisation of major hazards control was included in the project document as ILO prerequisite. It was fulfilled before the signature of the project.

3.5.2. Management of the project

3.5.2.1. Institutional framework

The Department of Manpower of the Republic of Indonesia is divided into two General Directorates. One of them, the Directorate General of Industrial Relations and Supervision of Labour Standards, is responsible for enforcement of the occupational safety and health and labour standards legislation through two Directorates:

(a) Directorate of Occupational Safety and Health headed by a Director who is also Chief Inspector under the Safety Act No. 1, 1970;

(b) Directorate of Labour Standards headed by a Director as a Chief Inspector who is responsible for the enforcement of the Labour Standards Act No. 1, 1951 and Workmen's Compensation Act No. 2, 1951.

The country is divided into 27 provinces. In order to ensure the enforcement of the legislation in the whole country, each of the 27 provinces has a regional office of the Department of Manpower with a Division of Labour Standards covering the geographical area of the respective province. The head of each division is directly subordinated to the head of the regional office. On the regional level there are Chief Labour Inspectors who are responsible for the management and organisation of labour inspection.
The inspection services are assisted in their work by one national and 11 regional Institutes of Industrial Hygiene and Occupational Health. One of their functions is to assess and evaluate hazardous chemicals in the working environment.

The project activities covered 15 provinces, with the most important concentration of industrial establishments in:

1. D.I. Aceh
2. North Sumatra
3. West Sumatra
4. Riau
5. South Sumatra
7. West Java
8. Central Java
9. D.I. Yogyakarta
10. East Java
11. South Kalimantan
12. East Kalimantan
13. North Sulawesi
14. South Sulawesi
15. Bali

The government cooperating agency of the project was the Directorate General of Industrial Relations and Supervision of Labour Standards of the Department of Manpower in Jakarta. Within the Directorate General, the project worked closely with the Directorate of Occupational Safety and Health. Dr. Soekarno, Director of Occupational Safety and Health was nominated the Chief National Counterpart of the project. Where project activities were carried out at regional or district level, cooperation was established with the regional or district offices of the Department of Manpower, in particular with the Divisions of Labour Standards. The activities of the project were supported by the national and regional Institutes of Industrial Hygiene and Occupational Health.

The project headquarters were located at the Directorate General for Industrial Relations and Supervision of Labour Standards in Jakarta. The activities required extensive travelling throughout the 15 provinces covered by the project.

3.5.2.2. Project monitoring and evaluation

The surveillance of the implementation of the project was a continuous process discharged by the Chief Technical Adviser and the Chief National Counterpart. In longer intervals the physical implementation of the project was monitored by the ILO.

Two tripartite review meetings held on 7 August 1990 and 10 June 1991 examined project impact and progress towards achievement of the objectives. The terminal review under the chairmanship of Mr. Mudjiman, Head of Planning Bureau, on behalf of the Secretary General of the Department of Manpower, concluded that:

(a) the project has been run and accomplished smoothly, efficiently and effectively;

(b) the project has been of significant importance, and therefore should be continued with government funding or from other sources;

(c) priorities of activities should be established due to limitations of funds and manpower.

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3.5.2.3. Administrative support and technical backstopping

The administrative support and backstopping of the project was provided by the Director of the ILO office in Jakarta. The technical supervision and backstopping was carried out by the ILO Regional Adviser in occupational safety and health, posted in the ILO Regional Office for Asia and the Pacific in Bangkok, who works under the technical guidance of the Occupational Safety and Health Branch of the ILO headquarters in Geneva.

4. PROJECT PERFORMANCE

4.1. Achievement of objectives

4.1.1. Development objective achievement

The project has been designed to contribute towards the improvement of the health and safety of the workers in the chemical industry. It is not possible to measure the achievement of this development objective after two years of the duration of the project. This period was too short for the amelioration of statistics to reflect the reduction of accidents due to improved safety in chemical industry and the increase of reporting of occupational diseases due to their better diagnosis. The success of the project is therefore measured by indirect indicators of the immediate objectives achievement which are dealt with below.

4.1.2. Immediate objectives achievement

The following verifiable indirect indicators, listed in the project document, have been used to measure the achievement of the immediate objectives of the project.

4.1.2.1. The Directorate General of Industrial Relations and Supervision of Labour Standards and 15 divisions in the regional offices of the Department of Manpower are staffed with trained chemical inspectors and equipped with adequate field testing equipment fully operational in inspection of chemical factories, carrying out at least 1,000 inspections of chemical factories per year.

Achieved.

4.1.2.2. The Major Hazards Control Unit in the Directorate General of Industrial Relations and Supervision of Labour Standards in Jakarta using the data bank on hazardous substances and the inventory of hazardous chemical factories fully operational and organising inspection of at least 300 major hazard works in the whole country per year.

The unit has been established and started its initial operation. But it has not been able to organise inspections of major hazard works, since only some of them have been identified.

Not achieved, only partly completed.
4.1.2.3. A 20 per cent increase occurs in the number of reports of the Department of Manpower concerning occupational accidents and diseases related to the use of chemicals.

Achieved.

4.1.2.4. At least 500 enterprises in chemical and related industries implement safety and health programmes with regard to chemical hazards.

Only partly achieved.

4.1.2.5. At least 300 small and medium-sized enterprises reached by information programmes and advisory services with respect to the use of training modules and by the number of cases of advice given to these enterprises.

Achieved.

4.1.2.6. At least 500 safety committees in chemical and related industries include safety and health measures against hazardous chemicals in their regular activities.

Achieved.

4.1.2.7. The regional Institutes of Industrial Hygiene and Occupational Health and relevant institutions increase by 20 per cent the number of analyses of chemicals in the working environment on the basis of requests from enterprises and labour inspectorate.

Achieved.

4.1.2.8. At least 300 enterprises implement a major hazards control programme involving trained personnel.

Not achieved, as explained in paragraph 3.3.5.2.

4.1.2.9. An early warning system in the case of major hazard alarms is operational in the vicinity of 300 high-risk establishments producing or storing hazardous chemicals.

Not feasible before establishment of major hazard control. See Annex 11.

4.1.2.10. Employers' and workers' organisations and other non-governmental groups organise promotional activities concerning chemical hazards and major accident hazards and produce and distribute at least ten information sheets and 15 posters per year.

Achieved.

4.2. Actual impact of the project

As it is possible to see from the previous text, the project has achieved all its objectives (even exceeding some of the planned outputs) in the area of chemical safety, and a significant proportion of its objectives in the area of major hazards control. All that has made an important contribution to the achievement of the development objective.
In spite of the successful achievements mentioned above, the real impact on the improvement of chemical safety and prevention of major accidents in Indonesia is not yet very important. According to the experience in other countries, similar projects need several years to consolidate the technical work, acquire more technical experience, develop close contacts with workers and employers and receive their full recognition and support. This will require continuation of efforts and additional national and international support, as recommended in paragraph 6.2. below.

4.3. Project relevance

With the continuing development of chemical industry in the country, the project is even more relevant than at the time of its preparation and project objectives are still valid.

4.4. Project efficiency

All costs were subject to careful scrutiny during the project backstopping and monitoring. The following savings, which reduced the expenses, were achieved:

- the Chief Technical Adviser was assigned only for the period of 20 months out of the duration of the project execution. During his absence the supervision of project activities was performed by the Chief National Counterpart;

- the part of assistance in establishment of the CIS Centre was paid by the CIS from ILO headquarters;

- the services of national specialists as external collaborators were used whenever possible;

- four fellowships have been shortened to comply with increased costs of travel and daily subsistence;

- the project equipment did not exceed the planned proportion of the total project costs.

The costs of the project can be successfully compared with other similar institutions building projects in the field of occupational safety and health. The project was efficient and the results justify its costs.

5. CONCLUSIONS

5.1. Chemical safety

All project objectives in the area of chemical safety have been achieved, and a number of indicators set up by the project document have been exceeded. Certain project activities have led to a "snowballing effect", i.e. that the project activities, having been successfully completed, are being continued by other agencies, in particular:

- the National Safety Council of Indonesia, using the model training curricula, and all training materials developed by the project, is conducting a number of training courses in chemical safety and major
hazards control for company safety officers and safety engineers. Up to date, 214 participants have been successfully trained. The training is continuing further;

- the Asian-American Free Labour Institute (AAFLI) assisting the Indonesian trade unions, has decided, as an extension of the project's training activities, to carry out the training in chemical safety for shop-floor workers. The project has indicated what should be the selected areas of such training, identified during the project execution;

- a Ph.D. programme in chemical safety at the Curtin University of Technology, Western Australia, was arranged for two senior officials of the Department of Manpower. The funding was obtained from the Australian Government.

5.2. Major hazards control

The achievements in the area of major hazards control have been, however, less satisfactory. The main reason is that both chemical safety and major hazards control have been quite new concepts for Indonesia, and major hazards control activities commenced only about a half-year after the commencement of the chemical safety activities. Major hazards control could be, however, successfully developed only as an extension of the chemical safety activities, or, in other words, major hazards control should be built on already well-established chemical safety system, operating successfully for some time. Since this has not been the case in Indonesia, it is obvious that full success in establishing the major hazards control system would require further effort, for which the Department of Manpower would need further substantial assistance. Such activities should not start earlier than one year after the completion of the present project, so that the chemical safety system could have time for proper consolidation.

In summary, in the area of major hazards control, first groundwork has been laid down by this project on the basis of which it will be possible to continue further developments. The details of these further developments are described in Annex 11.

6. RECOMMENDATIONS

6.1. Priority needs

The mid-term project review meeting, held in August 1990, identified a number of priority needs in the area of chemical safety and major hazards control, for which financial provisions did not exist within the present project.

These priority needs are:

6.1.1. Additional training in chemical safety at regional and subregional level

The training would be executed by the regional inspectors who have been trained as trainers under present project in the overseas course in Australia and during in-service training. All these trainers are highly motivated and their motivation and their enthusiasm has to be sustained. The regional team would need minimum facilities such as slide projectors, overhead projector and
projection screens (one set for each region, i.e. 15 sets). In total, 15 courses of one-week duration would train at least 250 persons at regional and subregional level (inspectors, industrial safety officers) in chemical safety and fundamentals of major hazards control.

6.1.2. Identification of major hazard installations

The identification of major hazard installations is a prerequisite to the implementation of all major hazards control measures.

The procedure for identifying major hazard installations by mail, that had been successfully applied in other projects, elsewhere, was not found to be feasible in Indonesia as was realised during the present project. The identification would be executed by inspections of all chemical factories which may present hazards of major accidents. This collection of major hazard data in 15 provinces would train the inspectors in identification of major hazard plants and establish the computerised data of about 225 major hazard installations in the country.

6.1.3. Safety campaigns at enterprise level

The involvement of safety and health committee members in safety in the use of chemicals and major hazards control measures need to be expanded. It is proposed to organise in each of the 15 provinces a series of two-day safety training in emergency planning and preventive aspects of the major hazards control and in the cooperation between the company and local services. This training would reach about 450 safety committees' members.

6.2. Follow-up project

It is recommended that the priority needs identified during the mid-term project review, as well as the consolidation and expanding of the achievements of the present project, be covered by a follow-up project which would start about one year after the end of the present project in 1993. The title of this follow-up project should be "Major Hazards Control and Chemical Safety". The project would have two immediate objectives. By the end of the project:

(a) the entire staff of the regional inspectorates in 15 provinces with the highest concentration of chemical and allied industries, will be trained not only in technical inspections of chemical factories, but also in the widest aspects of chemical safety in general, and in specific aspects of accident prevention, so that they would be able to offer comprehensive advice to the industry on all relevant issues. They will also act as trainers to train adequate numbers of employers' and workers' representatives;

(b) all major hazard installations in Indonesia will be identified under the leading role of the Department of Manpower Major Hazards Control Unit, established by the present project. The key technical staff of this unit, as well as the key technical staff of the relevant regional inspectorates, will be trained in specific technical skills of inspection of major hazard installations. The unit staff will be trained to undertake a full range of technical activities which are described in Annex 11 of this report.
7. ACKNOWLEDGEMENTS

The Director-General of the International Labour Office wishes to express his acknowledgements to the Government of Indonesia for its high interest in the improvement of occupational safety and health and namely of the safety in chemical enterprises in the country. Sincere thanks are due to the Department of Manpower of the Republic of Indonesia and namely to H.E. Cosmas Batubara, Minister for Manpower, the former Director General of Industrial Relations and Supervision of Labour Standards, Dr. P.K. Suma'mur, and the present Director General, Dr. Payaman Simanjuntak. The success of the project is a result of friendly and efficient collaboration of the international and national consultants with the national counterparts of the Directorate of Occupational Safety and Health headed by the Director, Dr. Soekarno, whose invaluable contribution is also acknowledged. The support given by staff of the regional and district offices of the Department of Manpower and of the national and regional Institutes of Industrial Hygiene and Occupational Health also contributed to the achievements of the project. Special gratitude is due to H.E. Ambassador of the Federal Republic of Germany in Indonesia and to Mr. Helmut Siedler, Counsellor for Development Cooperation from the Embassy, for their valuable advancement and support of project activities. The objectives of the project have been achieved thanks to the lasting advice and assistance of Mr. Ian G. Cummings, Director, Mr. Guy Thijs and Ms. Shizue Tomoda, programme officers, and all the colleagues from the ILO office in Jakarta.
ANNEX 1

Project international personnel

Post 01: Chief Technical Adviser and Expert in Chemical Safety:
Dr. Milos Nedved
Appointment for 20 months, divided into two periods of four and 16 months.
Period 1: June-September 1989
Period 2: February 1990-June 1991

Post 02: Expert in Major Hazards Control:
02/1: Mr. Henk Ens

02/2: Dr. Adrian Ellis
Appointment for one month, July-August 1990.

02/3: Mr. Hugh Lewis
Appointment for two months, February-April 1991.

Post 03: Expert in Occupational Toxicology:
Mr. Barry Chesson
Appointment for three months, November 1990-February 1991.

Post 04: Expert in Organisation of Operations of Occupational Safety and Health Information Centres:
Dr. Kris Cena
Appointment for two months, May-July 1990.

Post 05: Expert in Occupational Safety and Health Legislation:
Mr. A.T. Rajah
Appointment for 2.5 months, extended by additional 0.5 month, February-May 1991.

Short-term consultants:

Dr. Peter Hollingworth, one week, November 1989.
Dr. Kris Cena, six weeks, April-June 1991.
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<th>No.</th>
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<td>Dr. P.K. Suma'mur, Mr. Sant Sihaan</td>
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### List of equipment purchased and distributed by the project

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<th>Quantity</th>
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<td>Hydrogen Sulphide 5 B</td>
<td>15 packs</td>
<td>- Ria</td>
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<td></td>
<td></td>
<td>Bxylarm (basic)</td>
<td></td>
<td>- Jakarta</td>
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<tr>
<td></td>
<td></td>
<td>Universal Charger</td>
<td>15 units</td>
<td>- West Java</td>
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<td>Pac II Co 500 ppm</td>
<td>15 pcs</td>
<td>- Central Java</td>
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<td>Akku NICD</td>
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<td>- Yogyakarta</td>
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<td>Universal Charger</td>
<td>15 pcs</td>
<td>- East Java</td>
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<td></td>
<td>Plate</td>
<td>15 pcs</td>
<td>- South Kalimantan</td>
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<td>- East Kalimantan</td>
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<td>- North Sulawesi</td>
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<td>- South Sulawesi</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Bali</td>
</tr>
<tr>
<td>43347/JC</td>
<td>February '90</td>
<td>Personal dust sampler</td>
<td>15 sets</td>
<td>idem</td>
</tr>
<tr>
<td>43348/JC</td>
<td>March '90</td>
<td>Thermometer, digita &quot;BRAVO&quot;</td>
<td>15 pcs</td>
<td>idem</td>
</tr>
<tr>
<td>44160/JC</td>
<td>September '90</td>
<td>Gas Chromatograph Set</td>
<td>2 sets</td>
<td>- Hyperkes Medan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Model 263-39, FID only</td>
<td></td>
<td>- Hyperkes U.Pandang</td>
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<tr>
<td></td>
<td></td>
<td>D-2500 Chromato Data Processor</td>
<td>2 sets</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Micro Syringe, 10 UL</td>
<td>2 pcs</td>
<td></td>
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<td></td>
<td></td>
<td>Packed column</td>
<td>2 pcs</td>
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<td></td>
<td></td>
<td>Pressure regulator for H2</td>
<td>2 pcs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pressure regulator for carrier</td>
<td>2 pcs</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>063-0285 Carrier gas pipe</td>
<td>2 sets</td>
<td></td>
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<tr>
<td>44160/JC</td>
<td>September '90</td>
<td>Oilless air compressor</td>
<td>2 sets</td>
<td>Hyperkes Medan</td>
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<tr>
<td></td>
<td></td>
<td>SC-62</td>
<td></td>
<td>Hyperkes U.Pandang</td>
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<tr>
<td></td>
<td></td>
<td>60F-1080</td>
<td>2 sets</td>
<td></td>
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<td>Inj. Septum, 25 pcs/set</td>
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<td>Thermal paper for D-2500</td>
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<td>Quantity</td>
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<td>------------------------</td>
<td>---------------</td>
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<tr>
<td>44160/JC September '90</td>
<td>H₂ gas connection 063-0287</td>
<td>2 sets</td>
<td>Hyperkes Medan</td>
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<tr>
<td></td>
<td>Air connection pipe FI06002</td>
<td>2 sets</td>
<td>Hyperkes U. U.Pandang</td>
<td></td>
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<tr>
<td></td>
<td>Carrier Gas Dryer FI 06102</td>
<td>2 sets</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>Air dryer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consumable parts</td>
<td>2 lots</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D-2500 Chromato Data Processor</td>
<td>1 set</td>
<td>Hyperkes, Jakarta</td>
<td></td>
</tr>
</tbody>
</table>

| 43167/CT March '90 | Microprocessor CD Room | 1 unit | Project office |
|                    | Panasonic printer | 1 unit | |
|                    | Word Perfect 5.0 | 1 set | |
|                    | Dbase IV | 1 set | |
|                    | Microsoft chart | 1 set | |
|                    | Ribbon for MM-PP1124 | 10 | |
|                    | Diskettes | 50 | |
|                    | Continuous paper | 10 boxes | |

| 43166/CT March '90 | CIS Data bank | idem | |

| 72144/MM July '89 | Toyoto Kijang Short Chassis Minibus | 1 unit | idem |

| 72191/MM August '89 | Electric Typewriter "Olympia" | 1 unit | idem |
| July '89 | Photocopier machine "Konica UBX 2205%" | 1 unit | |

| 72191/MM July '89 | Overhead Projector "ELMO" | 1 unit | Project office |
| July '89 | Screen "Star 2000" | 1 unit | |

<p>| 72505/MM March '89 | Det. tube Drager: | 15 Manpower reg. off. |
| 72505/MM | Det. tube Ammonia | 15 packs |
|           | Det. tube Carbon Dioxide | 15 packs |
|           | Det. tube Chlorine | 15 packs |
|           | Det. tube Hydrogene | 15 packs |
|           | Det. tube Oxygen | 15 packs |
|           | Det. tube Sulphure | 15 packs |
|           | Det. tube Dioxide | 15 packs |</p>
<table>
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<tr>
<th>Order No.</th>
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<th>Specification</th>
<th>Quantity</th>
<th>Office having custody of item</th>
</tr>
</thead>
<tbody>
<tr>
<td>72505/MM</td>
<td>February '89</td>
<td>Florite Air Velocity Meter &quot;BACHARACH&quot;</td>
<td>15 pcs</td>
<td>15 Manpower reg. off.</td>
</tr>
<tr>
<td>73061/MM</td>
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<td>Binding Machine</td>
<td>1 pc</td>
<td>Project office</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Computer Table</td>
<td>1 pc</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paper Cutter</td>
<td>1 pc</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Computer Chair</td>
<td>1 pc</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stabilizer AVR 808</td>
<td>1 pc</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Screen Filter</td>
<td>1 pc</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cover for Computer</td>
<td>1 pc</td>
<td></td>
</tr>
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<td></td>
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<td>Cover for Printer</td>
<td>1 pc</td>
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<td>November '90</td>
<td>ENDS Report - subscription for 1 year</td>
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<td>in 1991</td>
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<td>74088/MM</td>
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<td>Library Reference:</td>
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<td>1 vol</td>
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<td>- Critical Aspect of Safety</td>
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<td></td>
<td>May '91</td>
<td></td>
<td>idem</td>
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<td></td>
<td></td>
<td>- Learning from Accidents in Industry</td>
<td>1 vol</td>
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<td></td>
<td></td>
<td>- Loss Prevention in the Process Industries</td>
<td>2 vols</td>
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<td></td>
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<td>Leaflet &amp; Brochure</td>
<td></td>
<td>idem</td>
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<td>Microprocessor HYUNDAI Super 386S 8/16 MHZ</td>
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<td></td>
<td></td>
<td>HCM 402C Monitor, VGA Color</td>
<td>1 unit</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>HP Laser Jet III, Printer</td>
<td>1 unit</td>
<td></td>
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<tr>
<td>73676/MM</td>
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<td>Original Software &quot;Picture It&quot;</td>
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<td>Quantity</td>
<td>Office having custody of the item</td>
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<td>------------------------</td>
<td>---------------</td>
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<td>1 pc</td>
<td>idem</td>
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<td>Ripper Stripper</td>
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<td></td>
<td></td>
</tr>
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<td></td>
<td>Disk Cleaner 3 1/2</td>
<td>1 pc</td>
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<td></td>
</tr>
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<td></td>
<td>Disk Cleaner 5 1/4</td>
<td>1 pc</td>
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<td>Chair &quot;GENERAL&quot;</td>
<td>1 pc</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Wire Extension</td>
<td>1 pc</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>Stabilizer</td>
<td>1 pc</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Computer table</td>
<td>1 pc</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Screen Filter</td>
<td>1 pc</td>
<td></td>
<td></td>
</tr>
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<td>Cover for computer</td>
<td>1 pc</td>
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<td>73695/MM November '90</td>
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<td>November '90 Laboratory Equipment:</td>
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<td>Hyperkes, Jakarta</td>
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<tr>
<td></td>
<td>Quick Lab Analyzer</td>
<td>1 unit</td>
<td></td>
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<tr>
<td></td>
<td>Quick Lab Incubator</td>
<td>1 unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quick Lab Flow Cell</td>
<td>1 unit</td>
<td></td>
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<tr>
<td></td>
<td>Quick Lab Suction Pump</td>
<td>2 units</td>
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<td>Statspin III Centrifuge</td>
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<td></td>
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<td></td>
<td>Absolutter pipette 100 Ul</td>
<td>1 unit</td>
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<td></td>
<td>Absolutter pipette 20 Ul</td>
<td>1 unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absolutter pipette 10 Ul</td>
<td>1 unit</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Albumin Serapak</td>
<td>1 kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S.G.T. Kit</td>
<td>1 kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S.G.O.T. Kit</td>
<td>1 kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Bilirubin</td>
<td>1 kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cholesterol Serapak</td>
<td>1 kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creatinine Serapak</td>
<td>1 kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glucose Serapak</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Haemoglobin</td>
<td>1 kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Protein</td>
<td>1 kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Triglyceride</td>
<td>1 kit</td>
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</tr>
<tr>
<td></td>
<td>Uric Acid</td>
<td>1 kit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANNEX 4

Information about major hazard installations

1. Company name :

2. Address :

3. Telephone :

4. What is your main product?

5. How much of that main product is made per year?

6. What are the main raw materials used in your production?

7. From where do you receive these raw materials?

8. Do you have refrigerated storage tanks for:
   - LNG
   - LPG
   - ammonia
   - chlorine
   If Yes what is the number of tanks for each product and their capacities?

9. Do you have pressurised storage tanks for:
   - LPG
   - ammonia
   - chlorine
   If Yes what is the number of tanks for each product and their capacities?

17640/v.2
10. Do you have very large quantities of petroleum products, e.g. floating roof tanks?

If so, please give the name of the substances and the data mentioned hereafter (notes).

11. Do you have any other large storage of toxic and or flammable substances?

If so, please give the name of the substances and the data mentioned hereafter (notes).

Note:

* Total storage capacity (not production, consumption or quantity present on site at any specific moment).

* Capacity, number and type of tanks.

* Pressure.

* Temperature.

................................................................. 1990

Manager.
I. INTRODUCTION

Training in "Chemical Safety and Major Hazards Control" had been carried out in Indonesia as one of the project's activities. The training was aimed at improving the chemical safety in general, and at controlling the chemical safety in general, and at preventing and controlling major accidents in chemical and allied industries.

The training materials were designed on the basis of considering the aims of the training, time allocation and the background of the participants. Ten industrial provinces were chosen as the venues, but the participants might have come also from other provinces.

II. PROGRAMMES AND PARTICIPANTS

1. Locations of training activities

The training was held in various cities of ten provinces, i.e. Surabaya, Medan, Samarinda, Ujung Pandang, Palembang, Semarang, Bandung, Jakarta, Banjarmasin, Pekanbaru (Dumai), and Bali.

2. Training materials

Training materials were designed to suit the needs and the background of the participants, i.e. safety inspectors, safety officers, medical doctors and others. The activities of the training may be divided into:

(a) Lectures, which mainly consist of several subjects:

1. Regulations and government policy on chemical safety.

2. Introduction to chemical safety (basic philosophy, accidents, chemicals in the workplace).

3. Basic principles of toxicology.


5. Flammable and explosive substances.

6. Handling and storage of hazardous substances.


8. Recent development in major hazards control.

Additional materials such as protective equipment, analysis of toxic gases, medical aids procedures, procedural approach of working in confined spaces and waste treatments, were also given to the specific groups of participants. Each lecture was followed by discussion.

(b) Plant visits

Visits to factories were aimed at relating the knowledge obtained in the lectures to the real conditions in industries. The plant visits were followed by discussion and feedback.

(c) Evaluation

Evaluations were carried out by giving preliminary and final tests which were given at the beginning and the end of the training, respectively.

- A1: Preliminary test given at the beginning and the end of the training, respectively.
- A2: Similar problems to pre-test given at the end of training.
- B: Final test given at the end of training.

Values of A1 indicate the level of the participants' knowledge before training. Whilst A2 - A1 = A and value of B show their capability and success in absorbing new knowledge.

**Phase 1 - Training during 1989**

**Table 1. Venues of training and participants**

<table>
<thead>
<tr>
<th>No.</th>
<th>Venue</th>
<th>Date-1989</th>
<th>Government safety inspectors</th>
<th>Company safety officers</th>
<th>Company medical doctors</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Surabaya</td>
<td>21-30 Aug.</td>
<td>28</td>
<td>51</td>
<td>-</td>
<td>79</td>
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<td>2.</td>
<td>Medan</td>
<td>4-13 Sep.</td>
<td>30</td>
<td>-</td>
<td>26</td>
<td>56</td>
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<tr>
<td>6.</td>
<td>Semarang</td>
<td>1-10 Nov.</td>
<td>2</td>
<td>-</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>7.</td>
<td>Bandung</td>
<td>13-22 Nov.</td>
<td>3</td>
<td>-</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>8.</td>
<td>Jakarta</td>
<td>16-25 Nov.</td>
<td>30</td>
<td>-</td>
<td>-</td>
<td>30</td>
</tr>
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<td>10.</td>
<td>Pekanbaru</td>
<td>4-9 Dec.</td>
<td>-</td>
<td>43</td>
<td>-</td>
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<td>Total</td>
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<td>155</td>
<td>224</td>
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17640/v.2
### Phase 2 - Training 1990-91

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of training</th>
<th>Place</th>
<th>Schedule</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Trainers in occupational toxicology</td>
<td>Ciloto (West Java)</td>
<td>10-22 Dec. '90</td>
<td>20 out of 15 regions</td>
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<td>2.</td>
<td>Company safety officers</td>
<td>DKI - Jakarta</td>
<td>21-23 Aug. '90</td>
<td>40</td>
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<tr>
<td>3.</td>
<td>Company medical officers</td>
<td>DKI - Jakarta</td>
<td>May-23 Aug. '91</td>
<td>40</td>
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<tr>
<td>4.</td>
<td>In-service training for chemical safety committees</td>
<td>West Java</td>
<td>10-11 Aug. '90</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>East Java</td>
<td>24-25 July '90</td>
<td></td>
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<td></td>
<td>North Sumatra</td>
<td>29-30 Aug. '90</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Information campaign on chemical safety and major hazards control in five regional areas for members of industry safety committees</td>
<td>East Java</td>
<td>2 Oct. '90</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Central Java</td>
<td>3 Sep. '90</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>West Java</td>
<td>29 Oct. '90</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>South Sulawesi</td>
<td>5 Nov. '90</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DKI - Jakarta</td>
<td>19 Sep. '90</td>
<td>100</td>
</tr>
<tr>
<td>6.</td>
<td>Information campaign day on chemical safety and major hazards control in three regional areas for owners of small and medium-sized enterprises</td>
<td>Bali</td>
<td>4 Aug. '90</td>
<td>100</td>
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<tr>
<td></td>
<td></td>
<td>East Java</td>
<td>3 Oct. '90</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DI-Yogyakarta</td>
<td>25 Oct. '90</td>
<td>100</td>
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<tr>
<td>7.</td>
<td>Information campaign day on chemical safety and major hazards control for BILIK members in three regional areas</td>
<td>West Java</td>
<td>10-11 Sep. '90</td>
<td>100</td>
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<tr>
<td></td>
<td></td>
<td>East Kalimantan</td>
<td>30-31 July '90</td>
<td>100</td>
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<tr>
<td></td>
<td></td>
<td>DKI Jakarta</td>
<td>26-27 Sep. '90</td>
<td>100</td>
</tr>
</tbody>
</table>
III. FEEDBACK INFORMATION

From discussions, plant visits and questionnaires some useful information has been obtained:

1. Chemical safety and health

(a) Accidents due to hazardous substances were less clearly understood and recognised than mechanical or other accidents.

(b) The hazards of chemicals were not well known to the workers, who have been working with them for some time.

(c) Chemicals which are used in industries in Indonesia (collected from questionnaires) are listed on the last page.

(d) It has been noted that benzene is still widely used in Indonesia, although the use of this chemical must be limited due to its health hazards.

(e) Information on the chemicals, their properties, hazards, control and medical aids in case of exposure is being sought by industries.

(f) Most industries do little environment monitoring, and they have not enough guidance for evaluation.

(g) Transportation of hazardous chemicals in Indonesia is an important problem for industries. Regulations and code of practice are urgently needed.

2. Major hazards control

(a) Many industries have no guidance on the quantities of chemicals used or stored which might constitute major hazards, as well as no guidance for the safe distances between installation and housing.

(b) Large and modern industries generally have good safety and major hazards control system, but there are many industries with little awareness and attention to these matters.

(c) In some cases, the location of major hazard installation is too close to housing, schools and offices, due to the fact that the use and development of the land surrounding the factories are beyond their control. Removing houses or offices to other areas is difficult and expensive.

(d) The key for major hazards control is largely determined by the technology transfer, i.e. selection of technology, supply and quality of equipment procured.

(e) National or international seminars on major hazards control in Indonesia are necessary to trigger the awareness of the industries, particularly their top managers, as well as government decision-makers.
3. **Recommended future training activities**

(a) Training programmes as previously done should be carried out continuously with the cooperation of large industries or association of industries. The training should be divided into two groups, i.e.:

(i) basic chemical safety - for the beginners;

(ii) advanced chemical safety and major hazards control - for higher level safety management.

(b) Information dissemination through books, brochures, etc. should be encouraged, since this would have wider impact, and would be less expensive than training.

(c) Introduction of chemical safety curricula to the universities, particularly for the engineering, chemistry or chemical technology students, would have great effects from the long-term point of view.
| 1. | Ammonia          | 30. Vinyl chloride monomer (VCM) |
| 2. | Sulphuric acid  | 31. Chromic acid              |
| 3. | Hydrochloric acid | 32. Ammonium acid             |
| 4. | Nitric acid     | 33. Boric acid                |
| 5. | Sodium hydroxide | 34. Sodium borate (borax)     |
| 6. | Methanol        | 35. Chlor oxyde               |
| 7. | Formaldehyde    | 36. Acetone                   |
| 8. | Urea            | 37. Tetraethyl-lead (TEL)     |
| 9. | Ether           | 38. Xylene                    |
|11. | Hypochlorit (Na, Ca) | 40. Calcium carbide          |
|12. | Chlorine        | 41. Carbon monoxide           |
|13. | Monoethanol amine (MEA) | 42. Carbon dioxide |
|15. | Phenol formaldehyde | 44. Hydrogen oxyde           |
|16. | Melamine formaldehyde | 45. Trisodium phosphate      |
|17. | Perchboro acetylene | 46. Phosphoric acid        |
|18. | Acetic acid     | 47. Compressed $O_2$          |
|19. | Formic acid     | 48. Compressed $H_2$          |
|20. | Ammonium nitrate | 49. Lead vapour              |
|21. | Phenol          | 50. Sulphur dioxide           |
|22. | Sodium nitrate  | 51. Fluorine                 |
|23. | Mercaptan (methyl, ethyl, butyl) | 52. Hydrogen fluoride |
|24. | Hexamine        | 53. Silica                   |
|25. | Benzene         | 54. Asbestos                  |
|27. | Acetylen-chloride | 56. Methylene chloride       |
|28. | Carbon disulfide | 57. Ethylene oxyde           |
|29. | Styrene monomer | 58. Ozone                    |

17640/v.2
<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Company</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>PT. I N A L U M</td>
<td>Kuala Tanjung, North Sumatra</td>
</tr>
<tr>
<td>2.</td>
<td>PT. Pasific Chemicals Indonesia</td>
<td>Jl. Tangjung Morawa Km. 9,5, Medan, North Sumatra</td>
</tr>
<tr>
<td>3.</td>
<td>PT. Kartini Perintis Agro Industries</td>
<td>Jl. Raya Mundu Pesisir No. 23, Cirebon, West Java</td>
</tr>
<tr>
<td>4.</td>
<td>PT. Alfa Abdi Pestisida</td>
<td>Jl. Raya Mundu Pesisir No. 23, Cirebon, West Java</td>
</tr>
<tr>
<td>5.</td>
<td>PT. I C I Pestisida</td>
<td>Gunung Puteri Desa Tlanjung, Udik Bogor, West Java</td>
</tr>
<tr>
<td>6.</td>
<td>Kilang Minyak Cilacap</td>
<td>Cilacap, Central Java</td>
</tr>
<tr>
<td>7.</td>
<td>PT. Petrokimia Kayaku</td>
<td>Jl. Jeneral A. Yani Gresik, East Java</td>
</tr>
<tr>
<td>8.</td>
<td>PT. Petrokimia Gresik</td>
<td>Jl. Jeneral A. Yani Gresik, East Java</td>
</tr>
<tr>
<td>9.</td>
<td>PT. Arjuna Utama Kimia Caruki</td>
<td>Jl. Rungkut Industri I/18, Surabaya, East Java</td>
</tr>
<tr>
<td>10.</td>
<td>PT. Fabrik Kulit Makmur</td>
<td>Jl. Katamso, Yogyakarta</td>
</tr>
<tr>
<td>11.</td>
<td>PT. Usaha Kulit Jaya</td>
<td>D.I. Yogyakarta</td>
</tr>
<tr>
<td>12.</td>
<td>PT. Inti Indo Rayon Utama</td>
<td>Porsea Tapanuli Utara, North Sumatra</td>
</tr>
<tr>
<td>13.</td>
<td>PT. Kertas Padalarang</td>
<td>Jl. Cihaliwung 181, Padalarang, West Java</td>
</tr>
<tr>
<td>14.</td>
<td>PT. Pupuk Kujan</td>
<td>Cikampek, West Java</td>
</tr>
<tr>
<td>15.</td>
<td>PT. I N T I</td>
<td>Jl. Moh. Toha Bandung, West Java</td>
</tr>
<tr>
<td>16.</td>
<td>PT. Pupuk Kujan</td>
<td>Cikampek, West Java</td>
</tr>
<tr>
<td>17.</td>
<td>Pertamina</td>
<td>Balikpapan, East Kalimantan</td>
</tr>
<tr>
<td>18.</td>
<td>Badak LNG Storage Terminal</td>
<td>Bontang, East Kalimantan</td>
</tr>
<tr>
<td>19.</td>
<td>Pupuk Kaltim</td>
<td>Bontang, East Kalimantan</td>
</tr>
<tr>
<td>20.</td>
<td>Eastern Polymer</td>
<td>Jl. Cilincing Raya, Tanjung Priok, DKI Jakarta</td>
</tr>
<tr>
<td>21.</td>
<td>Pertamina Refinery</td>
<td>Plaju, Palembang, South Sumatra</td>
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<tr>
<td>22.</td>
<td>Pupuk Sriwidjaja</td>
<td>Palembang, South Sumatra</td>
</tr>
<tr>
<td>23.</td>
<td>Asahimas Subentra Chemical</td>
<td>Cilegon, West Java</td>
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</tbody>
</table>
PRIORITY LIST FOR INSPECTIONS OF HAZARDOUS CHEMICAL FACTORIES

1. Background

The present system of routine inspections does not allow the most effective of human resources available to the Department of Manpower.

A system that can identify high risk workplaces will overcome some of the shortcomings identified with the routine inspection system currently employed.

2. Proposed priority inspection procedure

Every workplace will accumulate a points score to be called the Workplace Risk Rating (WRR). This points score will be comprised of several elements, some of which will be fixed whilst others will change depending upon factors, such as the number of accidents which occur at that workplace, etc.

The method of establishing the WRR is discussed in section 3 of this document. High risk workplaces will receive a high WRR and will, as a result, attract more frequent attention from the inspectorate than workplaces with a low WRR.

3. Workplace risk rating system

The system proposed is comprised of five major elements.

Elements

1. Department interaction with workplace.
2. Workplace assessment.
3. Accidents.
4. Special factors.
5. Period since last complete inspection.

As previously stated workplaces with a high WRR will attract more attention from the inspectorate than those with a low WRR.

3.1. Department interaction with workplace

In this component it is proposed to include the following items and scores:

3.1.1. Notices

It is proposed that each Improvement Notice issued on a workplace will result in an addition to its WRR as follows:

Each First Improvement Notice ....................... 3 points
Each Second Improvement Notice ...................... 5 points
Each Third Improvement Notice ....................... 7 points
3.1.2. Prosecutions

Each prosecution commenced against a workplace will be recorded and will result in an addition to its WRR of ................. 8 points

and each successful prosecution would add a further ........................................ 2 points

3.1.3. Number of responses to requests

Visits on request would count as inspections, but would be distinguished from complete inspections. Each visit would be recorded and would result in an addition to the WRR of that workplace of ......................... 2 points

3.1.4. Presence of safety committees, etc.

A workplace having more than 100 employees and no safety committee would receive an addition to its WRR of ......................... 2 points

A workplace having no safety representative(s) would receive an addition to its WRR of ............ 2 points

A workplace having no safety officer would receive an addition to its WRR of ......................... 2 points

Items 3.1.1. to 3.1.3. would be returned to zero and 3.1.4. would be updated, at each complete inspection.

3.2. Workplace assessment

This will be a subjective assessment of the workplace by the inspector.

Inspectors will be required at each complete inspection to assess:

3.2.1. Management's commitment to safety

What confidence do you have in the commitment of the management to maintain acceptable safety standards in the foreseeable future?

Entirely confident 0
Highly confident 2
Reasonably confident 4
A little confident 6
Almost no confidence 8
No confidence 10

Sub-total for 3.2.1. (10 points max.) __
3.2.2. Inspection details - Health, safety and welfare

Scores will be allocated in this area based on the inspector’s assessment of the health, safety and hygiene areas. They will consider, among others, the following:

Assess the overall effort taken to improve standards, based upon factors such as availability of formal safety programmes, accident reporting systems, effectiveness of programmes, methods for safe handling of dangerous substances, adherence to safe work practices, staff induction programmes etc.

Score out of 5

Have minimum standards for ventilation, lighting, temperature and working space been provided?

Score out of 5

Condition of machines, hand tools, electrical leads and fittings, safety rails, stairs, ladders, fixtures and fittings.

Score out of 5

And in the hygiene/welfare area:

Score out of 5

(Those workplaces that are well catered for in these areas will receive 0 points whilst those with nothing or a poor standard will receive 5 points.)

Assess the overall standard of factors such as housekeeping, fire precautions, availability of first-aid material and trained first-aid staff, hygiene facilities (toilets, showers, wash basins, lockers, lunch room, change room, potable water, etc.)

Score out of 5

(In situations where tasks require the provision of these facilities and they are provided the score will be 0 points. If required and not provided the score could be 5 points.)

Subtotal for 3.2.2. (25 points max.)

Total for 3.2. (35 points max.)

The new assessment made at each complete inspection would replace the previous assessment.
3.3. Accidents

3.3.1. Accidents - Under-reporting

A penalty of ........................................ 5 points for each "reportable" accident that was not reported will be included in the WRR.

It is envisaged that because of Worker's Compensation School, administered by ASTEK, the Department of Manpower will be able to detect all reportable accidents.

3.3.2. Accident frequency

It is proposed to compare on an annual basis, a workplace's accident frequency per 100 employees, with that for similar workplaces in the region and to allocate ........................................ 10 points if the workplace accident frequency is higher in any one year period.

Note: An accident resulting in injury to say two persons will be treated as two accidents, injury to three persons three accidents, and so on.

3.4. Special factors

It is proposed to add the WRR wherever any of the following risk-creating factors are present:

- Hazardous substances ........................................ 3 points
- General machinery ........................................ 2 points
- Classified machinery ........................................ 3 points
- Noise exceeding 90 db(A) ........................................ 2 points

Total for 3.4.

Whilst the addition of this section of the WRR could be seen as double counting it is thought desirable to include it to bring to the attention of inspectors the particular hazards likely to be encountered. This will facilitate preparation for the inspection of the workplace and will bias the WRR to highlight high risk workplaces.

Factors in section 3.4. will remain on the WRR whilst they apply to the workplace in question.

3.5. Period since last complete inspection

As a means of ensuring that no workplace escapes out notice indefinitely, it is necessary to add to the WRR of every workplace 10 points/annum commencing from the date of the last complete inspection.

This component of the WRR will be returned to zero following each complete inspection.

All scores (points) from the sections 3.1., 3.2., 3.3., 3.4., and 3.5. are added together to complete WRR.
INSPECTION OF CHEMICAL FACTORY

INDONESIA

1. GENERAL INFORMATION

Team:                                    From:
1. ........................................... ...........................................
2. ........................................... ...........................................
3. ........................................... ...........................................
4. ........................................... ...........................................
5. ........................................... ...........................................
6. ........................................... ...........................................

For the Company:                        Function:
1. ........................................... ...........................................
2. ........................................... ...........................................
3. ........................................... ...........................................
4. ........................................... ...........................................
5. ........................................... ...........................................
6. ........................................... ...........................................

Type of company:

Main activity:

Organisation structure, hierarchy of management:

Responsibility, training and position of safety function:

17640/v.2
Incident reporting and registration:
- Who reports?
- What is considered an accident?
- Number of incidents in last five years.
- Total costs of these incidents.

Number of employees:

Production capacity of plant:

Raw materials come from:

Products dispatched by means of:

Major hazard:

On-site emergency plan:

Hazard-identification: HAZOP-studies:

Constitution of the team:

<table>
<thead>
<tr>
<th>Name</th>
<th>Responsibility</th>
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<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
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<tr>
<td>4.</td>
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Findings and recommendations:

Implementation:
2. INFORMATION ABOUT THE PROCESS

Flowsheets, P and ID review:

Principal reaction:
Continuous/batch size:

Temperature:
Heat transfer by means of:

Pressure:
Control by means of:

Location of controls, control room:
Alarms:
Type (visual, audible, record.): in situ/control room:
- temp.:  
- flow:
- level:
- pressure:

Trip-actions:

Detection systems:
Number of sensors: how and where situated:
Set point:
Actions: operation of valves, etc.:

Utilities:
Steam:
Electricity:
Instrument-air:
Cooling water:
Nitrogen, or others:

Emergency power provisions:
Fire-fighting provisions:

Systems:

Quantity of water available:

Capacity and mode of operation of pumps:

Frequency and extent of drills:

Organisation: Training of operators:

Work-permit system for hot work and maintenance operations:

3. INSTALLATION INSPECTED

Built in ......................... designed by: ..............................

Plant-layout: separation, proximities:

General condition of plant:

Apparent state of maintenance:

Neatness, orderliness:

Painting:

Accessibility:

Control room:

Location, construction:

Layout:

Type of instrumentation:

Number of operators on duty:

Operating manuals:

General remarks:

Personnel protection equipment:

Fire-fighting equipment:

17640/v.2
4. PROCESS-VESSELS, STORAGE

**Type:**

**Number:**

**Capacity:**

**Operating temp.:**

**Pressure:**

**Construction:**

**Safe working pressure:**

**Location (bund, proximities):**

*Provisions for handling spills, bund drainage:*

**Inspecting and testing:** What tests by whom when?

**Pressure relief/venting:** Type:

- Connection to tank:
- Setting:
- Capacity:
- Discharge to:

**Means of transfer:** Type and location of pumps/compressors:

**Padding:**

**Content monitoring:** Type of instrument:

- Indication (in situ, in control room), recording:
- Alarms, (in situ, in control room):
- Audible, visual, trip functions:

**Shut-off valves - Inlet/outlet:**

- Manual/remote control:
- Automatic operation:

**Excess-flow valves - Dimensions, setting:**

- Non-return valves?
5. LOADING AND TRANSFER FACILITIES

Type of location (proximities):

General description, number of stations:

Who is in charge of operations?

Parking/securing vehicles:

Earth-connection:

Method of loading/discharging:

Connections, suitability of hoses used:

Method of emptying hose, blocking end-valve:

Shut-off valves on installation and vehicle:

Locally/remote controlled:

Excess-flow-, non-return valves: location, size, setting:

Monitoring: flow meters, level indicators/alarms:

Procedures:

Measures to prevent driving away a connected vehicle:

Detection of leaks/emissions: sensors:

Number, setting, actions:

Use of personnel protection equipment:

Fire protection equipment:

6. PIPELINES

Substance carried: diameter: length:

Location (above/underground): pressure:

1764/v.2
In operation since: material, construction code:

Pressure relief of sections between block-valves:

Discharge to:

Frequency and method of inspection:

Flow-monitoring (how will any leakage be detected, and when?):

Shut-off valves: manual/remote operated?

7. RECOMMENDATIONS
CHECK-LIST FOR CHEMICAL INSPECTION OF FACTORIES

1. Basic data on factory or undertaking
   1.1. Name of inspector.
   1.2. Name and address of factory or undertaking visited.
   1.3. Date of visit.
   1.4. Function of the plant.
   1.5. Total number of workers.
   1.6. Production output.
   1.7. Other general information.

2. Basic data on the department investigated
   2.1. Name.
   2.2. Function.
   2.3. Number of workers and main occupational groupings (i.e. 2 × supervisors, 5 × electrical fitters, 2 × instrument fitters).
   2.4. Main raw materials, by-products, end products, including list of toxic substances used in the building.
   2.5. Description of process, equipment and activities being carried out in the building.
   2.6. Other relevant information.

3. Building and surroundings
   3.1. Are emergency exits adequate and accessible?
   3.2. Is lighting adequate for operations, walking, material handling?
   3.3. Is fire-fighting equipment adequate and accessible?
   3.4. Are aisles large enough? Marked? Clear?
   3.5. Is floor free of tripping or slipping hazards?
   3.6. Is general ventilation sufficient?
   3.7. Are stairs and platforms free of tripping hazards? Equipped with guard rails?
   3.8. Are there any openings in fire walls? Are fire doors operable?
3.9. Does building electrical service appear adequate? Does visual inspection reveal any maintenance problems?

3.10. Is building trim (doors, rain gutters, fire escapes, etc.) in safe condition?

3.11. Are lifts regularly inspected and adequately maintained between inspection? Are safe lift loads posted? Adhered to?

3.12. Are safety signs adequate and in good condition?

3.13. Are ladders in a good condition and properly maintained? Are ladder control procedures established?

3.14. Are cylinders with compressed gases safely chained?

3.15. Are electrical cables properly laid, sufficiently protected and in good condition?

4. Equipment

4.1. Are danger points adequately guarded? Rotating parts, belts, cutting edges, hot surfaces, open flames?

4.2. Are operating controls positioned for safe use?

4.3. Is there enough room for the operators to work safely?

4.4. Are switches, valves, instruments and other operating controls clearly identified?

4.5. Are safety alarms properly identified and tested regularly?

4.6. Is equipment rated and inspected for the service in which it is used?

4.7. If the process presents corrosion problems, is equipment inspected regularly to anticipate and prevent failure in service?

4.8. Are hand tools and portable tools inspected regularly? Are they appropriate for the intended use? In good condition?


5. Process

5.1. Is process safe under normal conditions?

(a) Are toxic vapours released into the working environment?

(b) Are flammable vapours released into the working environment? Exhausted in a safe manner? Are sources of ignition prevented (smoking, welding, grinding)?

(c) Are employees liable to be exposed to toxic, corrosive or hot liquids? Is protective equipment properly stored, maintained and used?
(d) Are sampling procedures safe?
(e) Are safe storage conditions provided for hazardous materials?

5.2. Are abnormal conditions provided for?


(b) Mechanical failures.

(c) Operator errors - what can happen?

(d) What ignition sources may develop in the process? Are they guarded against?

(e) Can a fire be controlled in the process?

(f) Are operators protected from probable leak of steam, toxic or corrosive materials?

(g) Are there any hazards which we have not been guarded against?

6. Operating instructions

6.1 Are operating instructions available in a written, legible, easily identifiable form?

6.2 Are they up-to-date?

6.3 Is there a procedure for keeping them up-to-date?

6.4 Are they reviewed regularly with each employee?

6.5 Are they accessible to operators for reference?

6.6. Do the operating instructions spell out hazards of job and how to avoid them?

6.7. Do operating instructions provide definite procedures for emergency situations where required?

6.8. Is operator's performance checked regularly by supervision?

6.9. Is there an effective system for notifying operators of non-standard conditions?

6.10. Are operators permitted to take unauthorised short cuts in operations without reprimand?

6.11. Are operators who work in solated locations checked regularly by supervisors?

6.12. Do department supervisors know immediate first-aid treatment required for exposure to toxic chemicals used in their departments?
7. **Personal protective equipment**

7.1. What equipment is provided?

7.2. Does equipment meet established standards?

7.3. Is equipment in a satisfactory condition?

7.4. Is equipment adequate for the task at hand?

7.5. Are there signs or notices supporting or requiring the use of personal protective equipment?

7.6. Is equipment regularly inspected?

7.7. Does equipment interfere with, or restrict, performance of the task?

7.8. Are the arrangements for issue adequate?

7.9. Are choice and comfort considerations made?

7.10. Are arrangements in place to train workers on how to correctly wear and maintain their equipment?

7.11. Is the equipment actually used when necessary?

8. **Arrangements for occupational safety and health**

8.1. Is there a safety policy statement with all responsibilities assigned?

8.2. Is there a system for new employee selection and placement?

8.3. Is there a system for regular review and updating of safety rules and standards?

8.4. Are environmental health hazards controlled?

8.5. Is there a system for regular internal safety self-inspections or audits?

8.6. Are safety meetings regularly held; are they well-prepared?

8.7. Is there an established system for employees - management safety contact and communication?

8.8. Are all accidents promptly and thoroughly investigated?
LIST OF CHEMICAL SAFETY GUIDELINES
(PEOLOMAN KESELAMATAN KERJA BIDANG KIMIA)
PUBLISHED IN BAHASA INDONESIA BY THE PROJECT INS/88/M01/FRG

1. Policy and strategy
2. Storage
3. Environmental pollution
4. Inert gases
5. Acetylene
6. Benzene
7. Methyl isobutyl ketone
8. Methanol
9. Carbon disulphide
10. Diethyl ether
11. Vinyl chloride
12. Mercury
13. Hydrogen cyanide
14. Carbon monoxide
15. Sodium chromate
16. Chlorine
17. Methyl isocyanate
18. Sulphuric acid
19. Sodium hydroxide
20. Formic acid
21. Acetic acid
22. Phosphoric acid
23. Sodium hypochlorite
24. Hydrogen peroxide
25. Hydrochloric acid
26. Hydrogen fluoride
27. Oxalic acid
28. Methylene chloride
29. Ammonia
30. Phenol
MAJOR HAZARDS CONTROL

1. Role of the Government and of the management

During the development of a real technical inspection capability of the Government, the safety of chemical and other plants depends entirely upon the technical knowledge and dedication to safety of the management. In principle, it is proper and correct that the management of a company is totally responsible for the safety of its operation. And in general the fact that the management of a company is totally responsible for the safety of plants in Indonesia seems to be doing quite well. All available data show that the number of major accidents in chemical industry in Indonesia is quite small.

If, however, the Government wants to control the major accidents hazards of the chemical industry, it cannot take for granted that all major hazards companies are always well managed and well operated. In fact, the Government must be able to find among the many plants which are well managed the few that are not, and it must have the means to make these improve their safety performance. In order to do so, the Government must develop the capability and the means to judge the safety performance of the companies involved. That capability has to be built on top of a more general technical factory safety inspection system.

2. System of safety regulation and inspection

Before any system can be developed which is specifically directed towards major hazards control, a general framework of factory safety regulations and inspection must be established. This includes:

2.1 A system of technical regulations, codes of practice and guidelines for a safe operation of factories in general and chemical plants in particular must be drawn up and enacted. This can be best done within the framework of the enabling legislation entitled "Occupational Safety, Health and Welfare Act, 1991", which has been developed by Expert on Occupational Safety and Health Legislation (Post 05).

2.2. Inspectors with a technical background must be engaged and trained in the enforcement of these regulations.

2.3. The inspection system of the Department of Manpower must be extended to include technical inspection of safety and health in chemical factories presenting hazards of major accidents.

3. Further implementation of major hazards control

After the establishment of the framework of regulations mentioned in paragraph 2. above and based on the knowledge and experience thereby gained, a major hazards control system should be set up. It consists of legislation, training, data collection, advice and information.

3.1. A legal framework must be enacted to make it possible for the Government to check the safety performance of the companies operating major hazard installations. The Draft Control of Industrial Major Hazard
Regulations developed by the present project has been formulated to achieve just that.

The draft Regulations have been translated to Bahasa Indonesia and submitted to other interested governmental departments in order to seek their formal recognition. Then the Department of Manpower should initiate discussions with them in order to achieve an agreement on how a comprehensive system of major hazards control could be operated in Indonesia.

3.2. Major Hazards Control Unit, established within the Department of Manpower, has to have specialised knowledge about all aspects of major hazards control and has to continue collecting all relevant information. The present composition of the group follows the recommendations of Expert on Major Hazards Control (Post 02). It is recommended that additional activities of the group should include:

3.2.1. Training inspectors, factory safety officers in specific technical skills of inspection of major hazard installations.

3.2.2. Advice on technical matters to inspectors, company management, factory safety officers, workers' representatives, all others involved in major hazards control. Subjects to be covered are, among others:

- hazard and operability studies (HAZOP);
- calculations of the possible effects of accidental releases of dangerous substances;
- risk analysis;
- drawing up of safety reports and emergency plans.

3.2.3. Providing information about major hazards control topics to everybody concerned.

3.2.4. Guidance of company officers in drawing up safety reports.

3.2.5. Scrutinising safety reports.

3.2.6. Issuing of publications on major hazards control topics.

4. Other aspects of major hazards control

Apart from those mentioned above, there are other aspects of major hazards control which are outside the responsibility of the Department of Manpower, such as:

4.1. Safety regulations in a sizeable number of major hazard installations in Indonesia are administered by other authorities than the Department of Manpower. These include production, storage and processing of petroleum products.

4.2. A very important aspect of major hazards control is the siting of potential major hazard installations. On the one hand, new installations must not be sited in close proximity to densely populated residential areas, places where large numbers of people are liable to come together, installations which are vital to the functioning of the society, or other major hazard installations. On the other hand, it must be ensured that no houses are built
close to existing major hazard installations, and that no illegal settlements are built there.

4.3. Emergency provisions to mitigate the effects of eventual accidents in the major hazard installation must include public services, such as fire service, police, ambulances and medical facilities in the neighbourhood.

All these aspects can only be dealt with in close cooperation between the different government authorities which are responsible for them.

Since no effective major hazards control system can be set up without full cooperation of all parties concerned, it is necessary that contacts between these parties are established. Perhaps that could be done by setting up a coordinating body in which all parties concerned are represented. Such a body might be called "Major Hazards Control Committee", or "Major Hazards Control Board". Since the Department of Manpower is in charge of ensuring basic safety within the plants and therefore deals with the circumstances that are at the root of safety and accidents, it appears logical that the Department of Manpower should assume a leading role in this coordination and provide both chairman and secretary of this body.

5. Training in inspection of major hazard installations

In order to train inspectors in the special techniques of inspection of major hazard chemical plants, two basic conditions must be fulfilled:

- The inspectors must be technically trained individuals who are familiar with safety inspection of factories. They need not be chemical specialists but may well be mechanical, electrical, instrumentation or safety engineers. They must, however, be trained and experienced factory inspectors.

- The inspectors who are to be trained in inspection of major hazard installations should have a sound working knowledge of some foreign language. This is not only necessary to communicate with international experts, but even more to study the subject itself. The overwhelming majority of major hazard installations have been built to, and are operated under, foreign standards, foreign safety regulations, foreign codes of practice and operating manuals. Any inspector who inquires into the safety of the plant must be able to study and understand these documents.