

- (l) regulate and require the monitoring by employers or occupiers of conditions at a place of work including the health of their employees;
- (m) secure the provision of adequate welfare facilities by employers for persons at work;
- (n) require the employers to keep and preserve records and other documents;
- (o) prescribe the composition, powers, functions and procedures of safety and health committees and regulate the election or appointment of members of the committees and other related matters;
- (p) prescribe the manner of holding inquiries under section 33 and of hearing appeals under section 36 or 50;
- (q) prescribe the fees payable or chargeable for doing any act or providing any service for the purposes of this Act or any regulation made thereunder;
- (r) prescribe the offences which may be compounded and the method and procedure to be complied with;
- (s) prescribe the requirements for engaging a medical officer and the procedures for the registration of the medical officer;
- (t) prescribe the requirements for employing a safety and health officer, the training required of a safety and health officer and the procedures for registration;
- (u) prescribe any other matter which may appear to the Minister to be expedient or necessary for the better carrying out of this Act.

PART XV

MISCELLANEOUS

67. (1) Save for an inquiry under this Act or in any court proceedings relating to the commission of an offence under this Act or any regulation made thereunder, no person shall disclose any matter including any manufacturing or commercial secret which has come to his knowledge or which he has acquired while performing his duties under this Act.

Duty to keep secret.

(2) A person who contravenes the provision of this section shall be guilty of an offence and shall, on conviction, be liable to a fine not exceeding twenty thousand ringgit or to imprisonment for a term not exceeding two years or to both.

SCHEDULES

FIRST SCHEDULE

(Subsection 1(2))

1. Manufacturing
2. Mining and Quarrying
3. Construction
4. Agriculture, Forestry and Fishing
5. Utilities:
 - (a) Electricity;
 - (b) Gas;
 - (c) Water; and
 - (d) Sanitary Services
6. Transport, Storage and Communication
7. Wholesale and Retail Trades
8. Hotels and Restaurants
9. Finance, Insurance, Real Estate and Business Services
10. Public Services and Statutory Authorities

SECOND SCHEDULE
(Section 10)

1. The members of the Council shall hold office for a term of three years or for such shorter period as the Minister may specify and shall be eligible for reappointment for a maximum of two terms.
2. (1) A member of the Council may at any time—
 - (a) resign from the Council by a notice in writing to the Minister; or
 - (b) be removed from the Council by the Minister for permanent incapacity or other sufficient cause.
 and upon such resignation or removal the term for which he was appointed shall be deemed to have expired.
- (2) Where any question arises as to whether any incapacity or cause exists or whether any incapacity is temporary or permanent or any cause is sufficient, the decision of the Minister shall be final.
3. (1) The following persons shall be disqualified from being appointed to or being members of the Council:
 - (a) a person who has been found or is declared to be of unsound mind;
 - (b) a bankrupt;
 - (c) a person who has been convicted of any offence involving fraud, dishonesty or moral turpitude, or any offence relating to occupational safety and health under any law made thereunder; or
 - (d) a person who is otherwise unable or incapable of performing the functions as a member of the Council.
- (2) A member of the Council appointed under subsection 9(1) shall cease to be a member—
 - (a) if he fails to attend three consecutive meetings of the Council without the permission in writing of the Chairman;
 - (b) if he becomes disqualified under subparagraph (1); or
 - (c) if his appointment is revoked by the Minister.
4. (1) The Minister shall summon the first meeting of the Council and thereafter the Council shall meet not less than once in three months at such place as the Chairman may appoint.

- (2) The Chairman shall call a meeting of the Council on the request of any two members of the Council and such request shall be in writing with the reason therefor.
- (3) At any meeting of the Council the Chairman shall preside, and in his absence the members shall elect one of their numbers to preside over the meeting.
- (4) The quorum of the Council shall be six.
- (5) If on any question to be determined by the Council there is an equality of votes, the Chairman or, in the case where the Chairman is absent, the member presiding over the meeting, shall have a casting vote.
- (6) Subject to subparagraphs (3), (4) and (5) the Council shall determine its own procedure.
- (7) The Council shall cause proper records of its proceedings to be kept.
5. There shall be paid such allowances to members of the Council for attending meetings of the Council as the Minister may determine.
6. A member of the Council who has a pecuniary interest whether direct or indirect in any matter to be considered by the Council shall declare the nature of that interest at every meeting at which the matter is considered.
7. No member of the Council shall incur any personal liability for any loss or damage caused by any act or omission in administering the affairs of the Council unless the loss or damage was occasioned intentionally or through recklessness or gross negligence.

THIRD SCHEDULE

(Paragraph 28 (1)(d))

Occupations involving Special Risk to Health

1. Any occupation involving the use or handling of, or exposure to, the fumes, dust or vapour of silica, asbestos, raw cotton dust, lead, mercury, arsenic, phosphorus, carbon bisulphide, benzene, organic-phosphate, nitrous fumes, cadmium, beryllium or pesticides.
2. Any occupation involving the use or handling of, or exposure to, tar, pitch, bitumen, mineral oil including paraffin, chromate acid, chromate or bichromate of ammonium, potassium, zinc or sodium.

3. Any occupation involving exposure to x-rays, ionizing particles, radium or other radioactive substances or other forms of radiant energy.
4. Any occupation or process carried on in compressed air.

The Occupational Safety and Health
(Registration of Designated Occupational
Health Doctors) Regulation 1994

Preface

The health maintenance of workers requires the co-ordinated application of the knowledge and skills of several disciplines in the health sciences including medicine, nursing, industrial hygiene and health physics along with adequate administrative support and facilities.

The programme of medical surveillance which monitors an individual worker for the purpose of identifying changes in his health status due to occupational exposure to hazards in the workplace should be one of the health maintenance programs implemented by an employer. The person responsible for the carrying out of the program must be professionally qualified and have the necessary skills to carry out the task, interpret data, and make necessary judgement and decisions related to the work.

The Occupational Safety and Health Act 1994 addresses this issue by giving power to the Minister to make regulations to ensure that medical surveillance be carried out by persons registered with the Director General and prescribing the qualifications and other conditions which are to be satisfied in order for the person to be registered.

THE OCCUPATIONAL SAFETY AND HEALTH
(REGISTRATION OF DESIGNATED OCCUPATIONAL
HEALTH DOCTORS) REGULATION 1994.

ARRANGEMENT OF REGULATIONS

REGULATION PART. I PRELIMINARY

1. Citation and Commencement
2. Defination
3. Application.

PART. II - REGISTRATION OF DESIGNATION
OCCUPATIONAL HEALTH DOCTORS

4. General
5. Duty of Designated Occupational Health Doctor.
7. Application for registration as designated
Occupational Health Doctor.
8. Renewal of Registration
9. Refusal to register or renew registration
10. Cancellation of Registration

PART. III - MISCELLANEOUS

11. Fee
12. Penalty

Schedule 1

Schedule 2

The Occupational Safety and Health
(Registration of Designated Occupational Health Doctors)
Regulations 1994.

PART I
PRELIMINARY

Citation and commencement

1. These regulations may be cited as the Occupational Safety and Health (Registration of Designated Occupational Health Doctor) Regulations 1994 and shall come into force on the _____.

Definition

2. In these regulations, unless the context otherwise requires

"medical practitioner" means a person registered under the Medical Act, 1971;

"Medical surveillance" means the monitoring of an individual worker for the purpose of entifying changes in health status due to occupational exposure to health hazards in the work place; and

"recognise" means recognised in writing by the Malaysian Government.

Application

3. These regulations shall apply to all medical practitioners who want to conduct medical surveillance requirements provided under the Act and the regulations made under it.

PART II

REGISTRATION OF DESIGNATED OCCUPATIONAL HEALTH DOCTORS

General

4.(1) All medical surveillance requirements provided under the Act and the regulations made under the Act shall be conducted by a medical practitioner who is registered with the Director General.

(2) A medical practitioner registered in pursuance of sub-regulation (1) shall be referred as a "designated occupational health doctor".

Duty of designated occupational health doctor

5. The designated occupational Health doctor upon request by the employer may assist the employer to inspect the workplace, to investigate into any cases of occupational diseases and to carry out training programme on matters related to occupational health practices at the place of work.

6. The designated occupational health doctor may, with the consent of employer, inspect the place of work where he strongly believes that the person whom he is attending to is likely to be or has been injuriously affected by his employment.

Application for registration as designated occupational health doctor

7.(1) A medical practitioner applying for registration as a designated occupational health doctor shall at least possess -

(a) a diploma in occupational health or occupational medicine from a recognised university, or

(b) has attended a course of training in occupational health or occupational medicine approved by the Director General and passed the prescribed examination for the course.

(2) An application for registration as a designated occupational health doctor shall be made in the form set out in the First Schedule.

Renewal of registration

8. Registration as a designated occupational health doctor shall be renewed every two years and application for renewal shall be made using the form set out in the Second Schedule.

Refusal to register or renew registration

9.(1) The Director General may refuse to register an application made under regulation 6 if he is satisfied that the applicant do not meet the requirements for registration or the applicant is not fit and proper person to be registered as the designated occupational health doctor.

(2) The Director General may refuse to renew registration made under regulation 7 if he is satisfied that the applicant has failed to conduct his duties spelled out under the Act or any other regulations made under the Act.

Cancellation of registration

10. The Director General may cancel the registration of any medical practitioner as a designated occupational health doctor, if the registration was obtained by misrepresentation or fraud.

PART III

MISCELLANEOUS

Fee

11. Any person who intends to be registered as a designated occupational health doctor required under regulation 7 shall pay a fee of three hundred ringgit while renewal of registration of designated occupational health doctor required under regulation 8 shall pay a fee of one hundred ringgit to the Director General.

Penalty

12. Any person who contravenes any provision of these regulations shall be guilty of an offence and shall, on conviction, be liable to a fine not exceeding five thousand ringgit or to imprisonment for a term not exceeding six months or both.

FIRST SCHEDULE

The Occupational Safety and Health
(Registration of Designated occupational Health Doctor)
Regulation 1994

[Regulation 7 (2)]

(1) PERSONAL PARTICULARS

1.1. Name (in block letters) 1.2. Date of Birth 1.3. Sex

..... male/female

1.4. Identity Card Number 1.5 Place of birth 1.6. Citizenship

.....

1.7. Office Address 1.8. Telephone No. (Office)

.....
.....

1.9. Home Address 1.10. Telephone No. (Home)

.....
.....
.....

2. EDUCATION

2.1. Secondary education

| Name of School | Year From To | Level of Certificate and grade achieved |
|----------------|-----------------|--|
|----------------|-----------------|--|

| | | |
|-------|-------|-------|
| | | |
| | | |
| | | |

2.2. Post Secondary Education

| Name of Institution/ University | Year From To | Level to qualification obtained |
|------------------------------------|-----------------|------------------------------------|
| | | |
| | | |
| | | |

Other types of training in Occupational Health or Occupational
Medicine.

.....
.....
.....
.....

I hereby Certify that the above particulars are true and correct
to the best of my knowledge

.....
(Signature of Applicant)

SECOND SCHEDULE

The Occupational Safety and Health
(Registration of Designated Occupational
Health Doctors) Regulations 1994

RENEWAL OF REGISTRATON
(Regulation 8)

Registration No:.....

Expiry Date:.....

I N.R.I.C. No.

would like to apply for renewal of registration as a designated
occupational health doctor for the next 2 years.

Date:

.....
Signature of Applicant

EH/cal Doc1.Reg

THE OCCUPATIONAL SAFETY AND HEALTH ACT 1994

DRAFT

OCCUPATIONAL SAFETY AND HEALTH (THE CONTROL OF INDUSTRIAL MAJOR ACCIDENT HAZARDS) REGULATIONS 1994.

Act 514. IN exercise of the powers conferred by section 66 of the Occupational Safety and Health Act, 1994 the Minister makes the following regulations:

PART I PRELIMINARY

Citation and commencement

1. These Regulations may be cited as The Occupational Safety and Health (The Control of Industrial Major Accident Hazards) Regulations 1994, and shall come into force on the 1st June 1994.

Application.

2. These Regulations shall apply to an industrial activity except-

a) a nuclear installation

b) an installation under the armed forces

c) a vehicle or vessel transporting the hazardous substance to or from the site of industrial activity.

Interpretation

3. In these Regulations unless the context otherwise requires -

"Act" means the Occupational Safety and Health Act 1994;

"Competent Person" means an employee or any other person appointed by the

manufacturer and who has been approved in writing by the Director General to prepare a written report pursuant to the requirement of Part IV;

"Director General" means the Director General of Occupational Safety and Health;

"hazardous substance" means -

(a) any substance which is within any of the criteria laid down in Schedule 1; and

(b) any substance listed in Part 1 of Schedule 2;

"further relevant information", for the purpose of Schedule 3, means information necessary for the assessment of the potential effects of a major accident and which in the circumstance of the case -

(a) is reasonably required by the enquirer to assess the risks to his health and safety created by such an accident and to know and understand what action he should take in the event of an accident; and

(b) where the information is to be disclosed by the manufacturer, it is reasonable for him to disclose it having regard to the requirements of law and his commercial interests;

"industrial activity" means -

(a) an operation carried out in an industrial installation referred to in Schedule 4 involving or liable to involve one or more hazardous substances, and includes on-site storage and on-site transport which is associated with that operation;

(b) a storage of hazardous substances and/or preparations at any place,

installation, premises, building, or area of land, isolated or within an establishment, being a site used for the purpose of storage, except where that storage is associated with an installation covered by Schedule 4 or for the purpose of domestic use;

"local authority" means any city council, municipal council, district council, town board, local council, rural board or similar local authority established by written law and includes any authority in charge of a Federal Territory established by any written law;

"major accident" means an occurrence (including in particular, a major emission, fire or explosion) resulting from uncontrolled developments in the course of an industrial activity, leading to serious danger to persons, whether immediate or delayed, inside or outside the installation, or to the environment, and involving one or more hazardous substances;

"major hazard installation" means an industrial activity which produces, processes, handles, uses, disposes of or stores, either permanently or temporarily, one or more hazardous substances or categories of substances in quantities which is equal to or exceed the threshold quantity or as may be determined by the Director General in accordance with subregulation 7(2);

"manufacturer" means an employer or occupier having control of an industrial activity;

"officer" means occupational safety and health officer appointed under section 5 of the Act;

"preparation" means a mixture or solution of two or more substances;

"site" means :-

- (a) the whole of an area of land under the control of a manufacturer and includes a pier, jetty or similar structure, whether floating or not, or
- (b) a structure, whether floating or not which is under the control of a manufacturer; and

"threshold quantity" means for a given hazardous substance or category of substances that quantity is equal to the amount set out in Schedule 2.

Limitation of
power of
officer.

4. All powers conferred and duties imposed upon the Director General may be exercised by an officer, except those specified in subregulation 7(2) and regulation 13 of these Regulations.

Obligations of
manufacturer
and employee.

5. (1) Every manufacturer who undertake any industrial activity shall -

- (a) comply with the requirements of these Regulations;
- (b) as soon as he becomes aware of the imminent danger which may affect the safety of persons or the environment, take immediate action to rectify the situation; and
- (c) establish and maintain a good management system for controlling major accident as described in the report made under subregulation 14(1) and regulation 16 of these Regulations.

(2) Every employee shall -

- (a) co-operate with the manufacturer in complying with the requirements of these Regulations;

(b) act in such a manner as not to endanger himself or to cause or be likely to cause bodily injury to himself or other persons or damage to life and property; and

(c) notify the manufacturer as soon as he becomes aware of any potential hazards he considers capable of generating a major accident and has the right to notify an officer of those potential hazards.

PART II

IDENTIFICATION AND NOTIFICATION OF AN INDUSTRIAL ACTIVITY

Application.

6. This Part shall apply to an industrial activity in which there is involved or liable to be involved a hazardous substance.

Identification
and
Notification.

7.(1) Every manufacturer shall-

(a) identify any industrial activity within his control; and

(b) submit to the Director General the Notification of Industrial Activity Form specified in the Schedule 5.

(2) Upon receiving the Notification, the Director General may determine that the installation-

(a) is a major hazard installation even though the quantity of hazardous substances listed in Part 1 of Schedule 2; or hazardous substances and preparations falling within a category or categories specified in Part 2 of Schedule 2 is less than the threshold quantity when in his opinion the

installation may caused major accident; or

(b) is not a major hazard installation even though the quantity of hazardous substances listed in Part 1 of Schedule 2 or substances and preparations falling within a category or categories specified in Part 2 of Schedule 2 is equal to or exceed the threshold quantity when in his opinion the installation is incapable causing a major accident.

Notification
or changes.

8. The manufacturer shall immediately notify the Director General of any change in any of the particulars furnished in the Notification of Industrial Activity Form, including an increase or a reduction in the maximum quantity of any hazardous substance which is or is liable to be at the site or in the pipeline or the cessation of the industrial activity by resubmitting the Form.

PART III

DEMONSTRATION OF SAFE OPERATION FOR NON-MAJOR HAZARD INSTALLATION

Application.

9. This Part shall apply to-

(a) an industrial activity in which there is involved, or is liable to be involved-

(i) for a substance listed in Part 1 of Schedule 2, a quantity of that substance which is less than the threshold quantity specified in that Part;

(ii) for substances and preparations falling within a category or categories specified in Part 2 of Schedule 2, a total quantity of such substances and preparations in the category or categories is less than the threshold quantity specified in that Part,

and is not determined as a major hazard installation under paragraph 7(2)(a);
and

(b) an installation which is determined as non-major hazard installation by the
Director General under paragraph 7(2)(b).

Demonstration
of safe
operation.

10. A manufacturer who has control of an industrial activity to which this Part
applies shall at anytime, at the request of the Director General provide evidence
including documents to show that he has -

(a) identified the possible major accident hazards; and

(b) taken adequate steps to -

(i) prevent any major accidents and to minimise their consequences to
persons and the environment;

(ii) provide persons working on the site with the information, training and
equipment necessary to ensure their safety; and

(c) prepare and keep up to date an adequate on-site emergency plan
detailing how major accidents will be dealt with.

Review of
demonstration
of safe
operation

11. The Director General may require the manufacturer to submit documents on
demonstration of safe operation prepared in pursuance of regulation 10 of these
Regulations and may review the documents. In the event that the Director
General is of the opinion that the documents submitted are not satisfactory, he
shall direct in writing for the manufacturer to provide additional information
within such time as the Director General may specify.

PART IV

REPORT ON INDUSTRIAL ACTIVITIES
AND PREPARATION OF EMERGENCY PLANS
FOR MAJOR HAZARD INSTALLATION

Application.

12. This Part shall apply to -

(a) an industrial activity in which there is involved, or liable to be involved-

(i) for a substance listed in Part 1 of Schedule 2, a quantity of that substance which is equal to or exceed the threshold quantity specified in that Part;

(ii) for substances and preparations falling within a category or categories specified in Part 2 of Schedule 2, a total quantity of such substances and preparations in the category or categories is equal to or exceed the threshold quantity specified in that Part,

and is not determined as a non-major hazard installation by the Director General under paragraph 7(2)(b); or

(b) an industrial activity which is determined as a major hazard installation by the Director General under paragraph 7(2)(a).

Registration of
Competent
Persons.

13.(1) The Director General shall register and specify the qualifications of persons to be appointed for the purposes of carrying out the functions of a Competent Person under this Part.

(2) The Director General shall maintain a Register of Competent Persons and shall annually cause the publication of the names of persons registered thereunder and any revocation thereof in the Gazette.

Reports on
industrial
activity

14.(1) A manufacturer shall not undertake any industrial activity to which this Part applies, unless he has consulted a Competent Person to prepare a written report containing the information specified in Schedule 6 and has sent a copy of that report to the Director General at least three months before commencing that activity or before such shorter time as the Director General may agree in writing.

(2) Where a manufacturer -

a) has commenced an industrial activity before the commencement date of these Regulations; or

b) has commenced any construction of an industrial installation for the purpose of an industrial activity six months before the commencement date of these Regulations;

it shall be sufficient compliance with subregulation (1) if the manufacturer sends to the Director General a copy of the report required in pursuance of subregulation (1) within twelve months after the commencement date of these Regulations or within such longer time as the Director General may agree in writing.

(3) The manufacturer shall send a copy of the report required in pursuance of subregulation (1) within twelve months after the date of the Director General has determined that the industrial activity as a major hazard installation under paragraph 7(2)(a) or within such a longer time as the Director General may agree in writing.

Modifications.

15. (1) Where a manufacturer has made a report in pursuance of subregulation 14(1), he shall not make any modification to the industrial activity to which the report relates which can materially affect the particulars in that report, unless he has consulted with a Competent Person to prepare a further written report to take account of the changes and has sent a copy of the report to the Director

General at least three months before making the changes or before such shorter time as the Director General may agree in writing.

(2) Notwithstanding the provision of subregulation (1) the manufacturer shall be entitled to take urgent and remedial action to the industrial activity in order to put an end to or prevent imminent danger to life and property and he shall as soon as possible submit a report to take account of the action taken to the Director General.

Updating
reports.

16. Where a manufacturer has made a report in pursuance of subregulation 14(1) or subregulation 15(1) and that industrial activity is continuing, the manufacturer shall within three years of the date of the last such report, after consulting a Competent Person to make a further report which shall have regard in particular to new technical knowledge which materially affects the particulars in the previous report relating to safety and developments in the knowledge of hazard assessment, and shall within one month after the expiry of the three-year period, or in such longer time as the Director General may agree in writing, send a copy of the report to the Director General.

Report
review.

17. The Director General may review the reports submitted in pursuance of subregulations 14(1), 15(1) and regulation 16 of these Regulations. In the event that the Director General is of the opinion that the information submitted is not satisfactory, he shall direct, in writing, the manufacturer to submit further information within such time as the Director General may specify.

On-site
emergency
plan.

18. (1) A manufacturer who has control of an industrial activity to which this Part applies shall, after consulting with a Competent Person, prepare and keep up to date an adequate on-site emergency plan detailing how major accidents will be dealt with on the site on which the industrial activity is carried on and that plan shall include the name of the person who is responsible for safety on the site and the names of those who are authorised to take action in pursuance of the plan in the case of an emergency.

(2) The manufacturer shall ensure that the emergency plan prepared in pursuance of subregulation (1), is updated to take into account any material changes made in the industrial activity and that every person on the site who is affected by the plan is informed of its relevant provisions.

(3) The manufacturer shall prepare and submit to the Director General the on-site emergency plan required under subregulation(1) -

(a) at least three months before that industrial activity commences; or

(b) in the case of an industrial activity which has commenced before the commencement date of these Regulations, within three months of the commencement date of these Regulations or within such longer time as the Director General may agree in writing; or

(c) in the case of an industrial activity which has been determined as a major hazard installation by the Director General under paragraph 7(2)(a), within three months of the date of the determination or within such longer time as the Director General may agree in writing.

Updating
on-site
emergency
plan.

19. Where a manufacturer has made an on-site emergency plan in pursuance of subregulation 18(1) and that industrial activity is continuing, the manufacturer shall update the on-site emergency plan as part of the report as required in pursuance of regulation 16.

Review of
on-site
emergency
plan.

20. The Director General may review the on-site emergency plan submitted in pursuance of subregulation 18(1) and regulation 19 of these Regulations. In the event that the Director General is of the opinion that the plan submitted is not satisfactory, he shall direct, in writing, the manufacturer to improve the emergency plan to within such time as the Director General may specify.

Off-site
Emergency
Plan.

21. (1) The manufacturer who has control of an industrial activity to which this Part applies shall inform the local authority for that area that -

(a) his industrial activity is considered capable of producing a major accident hazard under these Regulations; and

(b) the need for the preparation of an off-site emergency plan for the area surrounding his site which may be likely to be affected by a major accident.

(2) In pursuance of subregulation (1), the manufacturer shall -

(a) provide the local authority with such information relating to the industrial activity under his control as the local authority may reasonably require, including the nature, extent and likely effects off-site of possible major accidents;

(b) inform the local authority before commencing the industrial activity, in case of an industrial activity which has commenced before the commencement date of these Regulations, within three months of the commencement date of these Regulations, or in case of an industrial activity which has been determined as major hazard installation by the Director General under paragraph 7(2)(a), within three months of the determination date; and

(c) shall afford to the local authority all reasonable facilities for the preparation and implementation of an off-site emergency plan upon request.

(3) The local authority on receiving such reports may prepare and keep up to date an adequate off-site emergency plan.

22.(1) It shall be the duty of a manufacturer who has control of an industrial activity to which this Part applies, to ensure that persons outside the site who are likely to be in an area in which, in the opinion of the Director General, they are liable to be affected by a major accident occurring at the site are supplied, in an appropriate manner, without their having to request for it, with at least the information specified in Schedule 3;

(2) Without prejudice to his duty under subregulation (1), the manufacturer shall endeavour to enter into an agreement with the local authority in whose area the industrial activity is situated for that local authority to disseminate the information required to be supplied in accordance with that subregulation to the persons mentioned in it but the manufacturer shall remain responsible for the accuracy, completeness and form of the information so supplied.

(3) The manufacturer shall ensure that the information supplied in accordance with subregulation (1) is updated and supplied again in accordance with that subregulation at appropriate intervals.

(4) The manufacturer shall take the steps necessary to comply with subregulations (1) and (2) before the industrial activity is commenced, except that-

a) in the case of an industrial activity which have already commenced before the commencement of these Regulations, it shall be sufficient compliance of those paragraphs if the manufacturer takes the necessary steps within six months of the commencement date of these Regulations.

b) in the case of an industrial activity which has been determined by the Director General under paragraph 7(2)(a), it shall be sufficient compliance of those paragraphs if the manufacturer takes the necessary steps within six months of the determination date.

PART V

NOTIFICATION OF MAJOR ACCIDENTS

Notification of
major
accident.

23. Where a major accident occurs on a site, the manufacturer shall notify the nearest occupational safety and health office of that accident by the quickest means available and the manufacturer who made the notification shall provide-

(a) the following information relating to the accident as soon as it becomes available-

(i) the circumstances of the accident;

(ii) the hazardous substances involved;

(iii) the data available for assessing the effects of the accident on persons and the environment;

(iv) the emergency measures taken; and

(b) a statement of the steps envisaged -

(i) to alleviate medium or long term effects of the accident, if any, and

(ii) to prevent the recurrence of such an accident.

PART VI

PENALTY

Penalty.

24.(1) Any manufacturer who commits an offence against any provision of these Regulations for which no corresponding penalty is provided by the Act shall be liable to a fine not exceeding fifty thousand Malaysian Ringgit or to a term of imprisonment not exceeding two years or to both such fine and imprisonment.

(2) Any employee who commits an offence against any provision of these Regulations for which no corresponding penalty is provided by the Act shall, on conviction, be liable to fine not exceeding one thousand ringgit or to a term of imprisonment not exceeding three months or to both.

Made the

(.....)

DATO' LIM AH LEK
Minister of Human Resources

SCHEDULE 1

INDICATIVE CRITERIA

(a) Very toxic substances:-

- substances which correspond to the first line of the table below.

- substances which correspond to the second line of the table below and which, owing to their physical and chemical properties, are capable of producing major accident hazards similar to those caused by the substances mentioned in the first line:

| | LD50 (oral) mg/kg body weight | LD50 (cutaneous) mg/kg body weight | LC50 mg/l(inhalation) |
|---|----------------------------------|---------------------------------------|--------------------------|
| 1 | $LD50 \leq 5$ | $LD50 \leq 10$ | $LC50 \leq 0.1$ |
| 2 | $5 < LD50 \leq 25$ | $10 < LD50 \leq 50$ | $0.1 < LC50 \leq 0.5$ |

(b) Other toxic substances:

The substances showing the following values of acute toxicity and having physical and chemical properties capable of producing major accident hazards:

| | LD50 (oral) mg/kg body weight | LD50 (cutaneous) mg/kg body weight | LC50 mg/l(inhalation) |
|---|----------------------------------|---------------------------------------|--------------------------|
| 1 | $25 < LD50 \leq 200$ | $50 < LD50 \leq 400$ | $0.5 < LC50 \leq 2$ |

(c) Flammable substances:-

(i) flammable gases:

substances which in the gaseous state at normal pressure and mixed with air become flammable and the boiling point of which at normal pressure is 20 degree C or below;

(ii) highly flammable liquids:

substances which have a flash point lower than 21 degree celcius and the boiling point of which at normal pressure is above 20 degree celcius;

(iii) flammable liquids:

substances which have a flash point lower than 55 degree celcius and which remain liquid under pressure, where particular processing conditions, such as high pressure and high temperature, may create major accident hazards.

(d) Explosive substances:

substances which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene.

(e) Oxidizing substances:

substances which give rise to highly exothermic reaction when in contact with other

substances, particularly flammable substances.

For the purpose of this schedule :-

LD50 (oral) means a dose of a substance in mg/kg of body weight that produces death in 50% of a given experimental animals population.

LD50 (cutaneous) means a dose of a substance in mg/kg of body weight that produces death in 50% of a given experimental animals population.

LC50 means a concentration of a substance in air that is estimated to produce death in 50% of a given experimental animals population inhalation for four hours.

SCHEDULE 2

LIST OF SUBSTANCES AND QUANTITIES

The quantities set out below relate to each installation or group of installations belonging to the same manufacturer where the distance between the installations is not sufficient to avoid, in foreseeable circumstances, any aggravation of major accident hazards. These quantities apply in any case to each group of installations belonging to the same manufacturer where the distance between the installations is less than 500 metres.

Part 1 : Named Substances

Where a substance (or group of substances) listed in Part 1 also falls within a category of Part 2 the quantities set out in Part 1 shall be used.

| Substance | Threshold Quantity |
|--|--------------------|
| <i>Group 1-Toxic substances (quantity ≤ 1 tonne)</i> | |
| Aldicarb | 100 kilograms |
| 4-Aminodiphenyl | 1 kilogram |
| Amiton | 1 kilogram |
| Anabasine | 100 kilograms |
| Arsenic pentoxide, Arsenic (V) acid and salts | 500 kilograms |
| Arsenic trioxide, Arsenious (III) acid and salts | 100 kilograms |
| Arsine (Arsenic hydride) | 10 kilograms |
| Azinphos-ethyl | 100 kilograms |
| Azinphos-methyl | 100 kilograms |

SCHEDULE 2 (Continued)

| Substance | Threshold Quantity |
|--|--------------------|
| Benzidine | 1 kilogram |
| Benzidine salts | 1 kilogram |
| Beryllium (powders, compounds) | 10 kilograms |
| Bis (2-chloroethyl) sulphide | 1 kilogram |
| Bis (chloromethyl) ether | 1 kilogram |
| Carbofuran | 100 kilograms |
| Carbophenothion | 100 kilograms |
| Chlorfenvinphos | 100 kilograms |
| 4-(Chloroformyl)morpholine | 1 kilogram |
| Chloromethyl methyl ether | 1 kilogram |
| Cobalt (metal, oxides, carbonates, sulphides as powders) | 1 tonne |
| Crimidine | 100 kilograms |
| Cyanthoate | 100 kilograms |
| Cycloheximide | 100 kilograms |
| Demeton | 100 kilograms |
| Dialifos | 100 kilograms |
| 00-Diethyl S-ethylsulphinylmethyl phosphorothioate | 100 kilograms |
| 00-Diethyl S-ethylsulphonylmethyl phosphorothioate | 100 kilograms |
| 00-Diethyl S-ethylthiomethyl phosphorothioate | 100 kilograms |
| 00-Diethyl S-isopropylthiomethyl phosphorothioate | 100 kilograms |
| 00-Diethyl S-propylthiomethyl phosphorodithioate | 100 kilograms |
| Dimefox | 100 kilograms |
| Dimethylcarbamoyl chloride | 1 kilogram |
| Dimethylnitrosamine | 1 kilogram |
| Dimethyl phosphoramidocyanidic acid | 1 tonne |
| Diphacinone | 100 kilograms |
| Disulfoton | 100 kilograms |
| EPN | 100 kilograms |
| Ethion | 100 kilograms |
| Fensulfothion | 100 kilograms |

SCHEDULE 2 (Continued)

| Substance | Threshold Quantity |
|---|--------------------|
| Fluometil | 100 kilograms |
| Fluoroacetic acid | 1 kilogram |
| Fluoroacetic acid, salts | 1 kilogram |
| Fluoroacetic acid, esters | 1 kilogram |
| Fluoroacetic acid, amides | 1 kilogram |
| 4-Fluorobutyric acid | 1 kilogram |
| 4-Fluorobutyric acid, salts | 1 kilogram |
| 4-Fluorobutyric acid, esters | 1 kilogram |
| 4-Fluorobutyric acid, amides | 1 kilogram |
| 4-Fluorocrotonic acid | 1 kilogram |
| 4-Fluorocrotonic acid, salts | 1 kilogram |
| 4-Fluorocrotonic acid, esters | 1 kilogram |
| 4-Fluorocrotonic acid, amides | 1 kilogram |
| 4-Fluoro-2-hydroxybutyric acid | 1 kilogram |
| 4-Fluoro-2-hydroxybutyric acid, salts | 1 kilogram |
| 4-fluoro-2-hydroxybutyric acid, esters | 1 kilogram |
| 4-Fluoro-2-hydroxybutyric acid, amides | 1 kilogram |
| Glycolonitrile (Hydroxyacetonitrile) | 100 kilograms |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 100 kilograms |
| Hexamethylphosphoramide | 1 kilogram |
| Hydrogen selenide | 10 kilograms |
| Isobenzan | 100 kilograms |
| Isodrin | 100 kilograms |
| Juglone (5-Hydroxynaphthalene-1,4-dione) | 100 kilograms |
| 4,4'-Methylenebis(2-chloroaniline) | 10 kilograms |
| Methyl isocyanate | 150 kilograms |
| Mevinphos | 100 kilograms |
| 2-Naphthylamine | 1 kilogram |
| Nickel metal, oxides, carbonates, sulphides as powders | 1 tonne |
| Nickel tetracarbonyl | 10 kilograms |

SCHEDULE 2 (Continued)

| Substance | Threshold Quantity |
|--|--------------------|
| Oxydisulfoton | 100 kilograms |
| Oxygen difluoride | 10 kilograms |
| Paraoxon (Diethyl 4-nitro-phenyl phosphate) | 100 kilograms |
| Parathion | 100 kilograms |
| Parathion-methyl | 100 kilograms |
| Pentaborane | 100 kilograms |
| Phorate | 100 kilograms |
| Phosacetim | 100 kilograms |
| Phosgene (Carbonyl chloride) | 750 kilograms |
| Phosphamidon | 100 kilograms |
| Phosphine (Hydrogen phosphide) | 100 kilograms |
| Promurit (1-(3,4-Dichlorophenyl)-3-triazenethio-carboxamide) | 100 kilograms |
| 1,3-Propanesultone | 1 kilogram |
| 1-Propen-2-chloro-1,3-diol diacetate | 10 kilograms |
| Pyrazoxon | 100 kilograms |
| Selenium hexafluoride | 10 kilograms |
| Sodium selenite | 100 kilograms |
| Stibine (Antimony hydride) | 100 kilograms |
| Sulfotep | 100 kilograms |
| Sulphur dichloride | 1 tonne |
| Tellurium hexafluoride | 100 kilograms |
| TEPP | 100 kilograms |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) | 1 kilogram |
| Tetramethylene-disulphotetramine | 1 kilogram |
| Thionazin | 100 kilograms |
| Tirpate (2,4-Dimethyl-1,3-dithiolane-2-carboxadihyde 0-methylcarbamoyloxime) | 100 kilograms |
| Trichloromethanesulphenyl chloride | 100 kilograms |
| 1-Tri(cyclohexy)stannyl-1 H-1,2,4-triazole | 100 kilograms |
| Triethylenemelamine | 10 kilograms |

SCHEDULE 2 (Continued)

| Substance | Threshold Quantity |
|---|--------------------|
| Warfarin | 100 kilograms |
| <i>Group 2-Toxic substances (quantity > 1 tonne)</i> | |
| Acetone cyanohydrin (2-Cyanopropan-2-ol) | 200 tonnes |
| Acrolein (2-Propenal) | 200 tonnes |
| Acrylonitrile | 20 tonnes |
| Allyl alcohol (2-Propen-1-ol) | 200 tonnes |
| Allylamine | 200 tonnes |
| Ammonia | 100 tonnes |
| Bromine | 10 tonnes |
| Carbon disulphide | 200 tonnes |
| Chlorine | 10 tonnes |
| Diphenyl methane di-isocyanate (MDI) | 200 tonnes |
| Ethylene dibromide (1,2-Dibromoethane) | 50 tonnes |
| Ethyleneimine | 50 tonnes |
| Formaldehyde (concentration > 90%) | 20 tonnes |
| Hydrogen chloride (liquefied gas) | 250 tonnes |
| Hydrogen cyanide | 20 tonnes |
| Hydrogen fluoride | 50 tonnes |
| Hydrogen sulphide | 50 tonnes |
| Methyl bromide (Bromomethane) | 200 tonnes |
| Nitrogen oxides | 50 tonnes |
| Propyleneimine | 50 tonnes |
| Sulphur dioxide | 20 tonnes |
| Sulphur Trioxide | 20 tonnes |
| Tetraethyl lead | 50 tonnes |
| Tetramethyl lead | 50 tonnes |
| Toluene di-isocyanate (TDI) | 100 tonnes |

SCHEDULE 2 (Continued)

| Substance | Threshold Quantity |
|--|--------------------|
| <i>Group 3 - Highly reactive substances</i> | |
| Acetylene (Ethyne) | 50 tonnes |
| Ammonium nitrate (a) | 500 tonnes |
| Ammonium nitrate (the form of fertilizer) (b) | 1,000 tonnes |
| 2,2-Bis(tert-butylperoxy)butane (concentration > 70%) | 50 tonnes |
| 1,1-Bis(tert-butylperoxy)cyclohexane (concentration > 80%) | 50 tonnes |
| tert-Butyl peroxyacetate (concentration > 70%) | 50 tonnes |
| tert-Butyl peroxyisobutyrate (concentration > 80%) | 50 tonnes |
| tert-Butyl peroxy isopropyl carbonate (concentration > 80%) | 50 tonnes |
| tert-Butyl peroxy maleate (concentration > 80%) | 50 tonnes |
| tert-Butyl peroxy pivalate (concentration > 77%) | 50 tonnes |
| Dibenzyl peroxydicarbonate (concentration > 90%) | 50 tonnes |
| Di-sec-butyl peroxydicarbonate (concentration > 80%) | 50 tonnes |
| Diethyl peroxydicarbonate (concentration > 30%) | 50 tonnes |
| 2,2-Dihydroperoxypropane (concentration > 30%) | 50 tonnes |
| Di-isobutyryl peroxide (concentration > 50%) | 50 tonnes |
| Di-n-propyl peroxydicarbonate (concentration > 80%) | 50 tonnes |
| Ethylene oxide | 5 tonnes |
| Ethyl nitrate | 50 tonnes |
| 3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetroxacyclononane (concentration > 75%) | 50 tonnes |
| Hydrogen | 10 tonnes |
| Methyl ethyl ketone peroxide (concentration > 60%) | 5 tonnes |
| Methyl isobutyl ketone peroxide (concentration > 60%) | 50 tonnes |
| Oxygen | 500 tonnes |

SCHEDULE 2 (Continued)

| Substance | Threshold Quantity |
|---|--------------------|
| Peracetic acid (concentration > 60%) | 50 tonnes |
| Propylene oxide | 50 tonnes |
| Sodium chlorate | 20 tonnes |
| <i>Group 4-Explosive substances</i> | |
| Barium azide | 50 tonnes |
| Bis(2,4,6-trinitrophenyl)-amine | 50 tonnes |
| Chlorotrinitrobenzene | 50 tonnes |
| Cellulose nitrate (containing > 12.6% nitrogen) | 50 tonnes |
| Cyclotetramethylene-tetranitramine | 50 tonnes |
| Cyclotrimethylene-trinitramine | 50 tonnes |
| Diazodinitrophenol | 10 tonnes |
| Diethylene glycol dinitrate | 10 tonnes |
| Dinitrophenol, salts | 50 tonnes |
| Ethylene glycol dinitrate | 10 tonnes |
| 1-Guanyl-4-nitrosaminoguanyl-1-tetrazene | 10 tonnes |
| 2,2',4,4',6,6'-Hexanitrostilbene | 50 tonnes |
| Hydrazine nitrate | 50 tonnes |
| Lead azide | 50 tonnes |
| Lead styphnate (lead 2,4,6-trinitroresorcinol) | 50 tonnes |
| Mercury fluminate | 10 tonnes |
| N-Methyl-n,2,4,6-tetranitroaniline | 50 tonnes |
| Pentaerythritol tetranitrate | 50 tonnes |
| Nitroglycerine | 10 tonnes |
| Pentaerythritol tetranitrate | 50 tonnes |
| Picric acid (2,4,6-Trinitrophenol) | 50 tonnes |
| Sodium picramate | 50 tonnes |
| Styphnic acid (2,4,6-trinitroresorcinol) | 50 tonnes |
| 1,3,5-Triamino-2,4,6-trinitrobenzene | 50 tonnes |
| Trinitroaniline | 50 tonnes |

SCHEDULE 2 (Continued)

| Substance | Threshold Quantity |
|-------------------------|--------------------|
| 2,4,6-Trinitroanisole | 50 tonnes |
| Trinitrobenzene | 50 tonnes |
| Trinitrobenzene acid | 50 tonnes |
| Trinitrocresol | 50 tonnes |
| 2,4,6-Trinitrophenetole | 50 tonnes |
| 2,4,6-Trinitrotoluene | 50 tonnes |

* (a) This applies to ammonium nitrate and mixtures of ammonium nitrate where the nitrogen content derived from the ammonium nitrate is > 28% by weight and aqueous solutions of ammonium nitrate where the concentration of ammonium nitrate is > 90% by weight.

(b) This applies to straight ammonium nitrate fertilizers and to compound fertilizers where the nitrogen content derived from the ammonium nitrate is > 28% by weight (a compound fertilizer contains ammonium nitrate together with phosphate and/or potash).

SCHEDULE 2 (Continued)

Part 2 : Categories of substances and preparations not specifically named in Part 1.

The quantities of different substances and preparations of these same category are cumulative. Where there is more than one category specified in the same entry, the quantities of all substances and preparations of the specified categories in that entry shall be summed up.

| Categories of substances | Threshold Quantity (tonnes) |
|--|-----------------------------------|
| 1. Substances and preparations that are classified as 'very toxic' as in Schedule 1(a) | 5 |
| 2. Substances and preparation that are classified as 'toxic' as in Schedule 1(b) | 10 |
| 3. Substances and preparation that are classified as 'explosive' as in Schedule 1(d) | 10 |
| 4. Substances and preparation that are classified as 'oxidizing' as in Schedule 1(e) | 10 |
| 5. Gaseous substances and preparations, including those | 50 |

SCHEDULE 2 (Continued)

| Categories of substances | Threshold Quantity (tonnes) |
|---|-----------------------------------|
| in liquefied form, which are gaseous at normal pressure and which are classified as 'highly flammable' as in Schedule 1(c)(i) | |
| 6. Substances and preparations (excluding gaseous substances and preparations covered under item 5 above) which are classified as 'highly flammable' or 'extremely flammable' as in Schedule 1(c) (ii) | 5000 |
| 7. Flammable substances as defined in Schedule 1(c)(iii) | 200 |

SCHEDULE 4

INDUSTRIAL INSTALLATIONS WITHIN THE MEANING OF Regulation 2

1. Installations for the production, processing or treatment of organic or inorganic chemicals using for this purpose amongst others -

- alkylation
- amination by ammonolysis
- carbonylation
- condensation
- dehydrogenation
- esterification
- halogenation and manufacture of halogens
- hydrogenation
- hydrolysis
- oxidation
- polymerization
- sulphonation
- desulphurization, manufacture and transformation of sulphur-containing compounds
- nitration and manufacture of nitrogen-containing compounds
- manufacture of phosphorus-containing compounds
- formulation of pesticides and of pharmaceutical products
- distillation
- extraction
- solvation
- mixing.

SCHEDULE 4 (Continued)

2. Installations for distillation, refining or other processing of petroleum or petroleum products.
3. Installations for the total or partial disposal of solid or liquid substances by incineration or chemical decomposition.
4. Installations for the production, processing or treatment of energy gases, for example, LPG, LNG, SNG.
5. Installations for the dry distillation of coal or lignite.
6. Installations for the production of metal or non-metals by a wet process or by means of electrical energy.
7. Installations for the bottling of flammable and toxic substances defined under paragraphs (a), (b) and (c) of Schedule 1, for example, LPG, ammonia, chlorine, acetylene.

SCHEDULE 5

OCCUPATIONAL SAFETY AND HEALTH ACT, 1994

OCCUPATIONAL SAFETY AND HEALTH (THE CONTROL OF INDUSTRIAL
MAJOR ACCIDENT HAZARDS) REGULATIONS 1994

(Notification of Industrial Activity Form)

(paragraph 7(1)b)

I have the undersigned hereby give notice of the industrial activity, particulars of which are given below:

| | |
|---|-------------------|
| <p>(A) Particular of Installation</p> <ol style="list-style-type: none">1. Name of Manufacturer 2. Address of Installation 3. Date of Starting the operation. 4. Name and address of local authorities having statutory jurisdiction over the area where installation is situated. 5. Description of the industrial activities carried on or intended to be carried on. | <p>Use Form A</p> |
|---|-------------------|

SCHEDULE 5 (Continued)

(B) Quantity of hazardous Substances at the Installation

| Substances | Max. Quantity Liable on site | Nature of substances (raw materials) (finished product) (intermediate product) (by product) | Hazardous Criteria as indicated in Schedule 1 or Schedule 2 |
|------------|---------------------------------|---|--|
| | | | |

NOTE:

1. Each substance listed in the table shall be attached with Material Safety Data Sheet.
2. Use additional sheet if required.

SCHEDULE 5 (Continued)

(C) Particulars of manufacturer making the notification

1) Name :

2) I/C No :

3) Designation:

4) Address:

5) Date:

I certify that the information provided is true and correct to the best of my knowledge; or I have ceased operation.*

.....
(Signature)

* delete whichever is applicable.

SCHEDULE 6

INFORMATION TO BE INCLUDED IN A REPORT UNDER SUBREGULATION 15(1)

The report required under subregulation 15(1) shall contain the following information.

1. Information relating to every hazardous substance involved in the activity in a relevant quantity as listed in Schedule 2, namely -

(a) the name of the hazardous substance as given in Schedule 2 or, for a hazardous substance included under a general designation, the name corresponding to the chemical formula of the hazardous substance ;

(b) a general description of the analytical method available to the manufacturer for determining the presence of the hazardous substance, or references to such methods in the scientific literature;

(c) a brief description of the hazards which may be created by the hazardous substance;

(d) the degree of purity of the hazardous substance, and the names of the main impurities and their percentages.

2. Information relating to the installation, namely -

(a) a map of the site and its surrounding area to a scale large enough to show any features that may be significant in the assessment of the hazard or risk associated with the site;

SCHEDULE 6 (Continued)

(b) a scale plan of the site showing the locations and quantities of all significant inventories of the hazardous substance;

(c) a description of the processes or storage involving the hazardous substance and an indication of the conditions under which it is normally held;

(d) the maximum number of persons likely to be present on site;

(e) information about the nature of the land use and the size and distribution of the population in the vicinity of the industrial activity to which the report relates;

(f) information on the nearest emergency service (Fire station, hospital, police station, community hall etc.).

3. Information relating to the management system for controlling the industrial activity, namely:-

(a) the staffing arrangements for controlling the industrial activity with the name of the person responsible for safety on the site and the names of those who are authorised to set emergency procedures in motion and to inform outside authorities;

(b) the arrangements made to ensure that means provided for the safe operation of the industrial activity are properly designed, constructed, tested, operated, inspected and maintained;

(c) the arrangements for training persons working on the site.

4. Information relating to the potential major accidents in the form of risk assessment which contain the information, namely:-

SCHEDULE 6 (Continued)

- (a) a description of the potential sources of a major accident and the conditions or events which could be significant in bringing one about;
- (b) a diagram of any plant in which the industrial activity is carried on, sufficient to show the features which are significant as regards the potential for a major accident or its prevention or control.
- (c) a description of the measures taken to prevent, control or minimise the consequences of any major accident;
- (d) information about prevailing meteorological conditions in the vicinity of the site;
- (e) an estimate of the number of people on-site and off-site who may be exposed to the hazards considered in the report;
- (f) consequences to the surrounding areas in the form of appropriate risk measures where possible.

Rice millers' syndrome: a preliminary report

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ABSTRACT A study was carried out to determine the health effects of rice husk dust in Malaysian rice millers. The study population consisted of 122 male Malay workers from three rice mills, with 42 controls of similar age, sex, ethnic group, and agricultural work background. Interviews using standardised questionnaires, physical examination, total and differential white cell counts, chest radiographs, and lung function tests were performed on each of the millers and the controls. Environmental dust monitoring was also carried out in the three rice mills. Clinical, haematological, and radiological findings suggest that a distinct clinical syndrome seems to be associated with exposure to rice husk dust. The manifestations of this "rice millers' syndrome" include acute and chronic irritant effects affecting the eyes, skin, and upper respiratory tract; allergic responses such as nasal catarrh, tightness of chest, asthma, and eosinophilia; and radiological opacities in the chest, probably representing early silicosis or extrinsic allergic alveolitis.

In many Asian countries rice is a major agricultural crop and forms the staple food of more than one quarter of the world's population. The cultivation of rice (*Oryza* sp) is usually carried out in irrigated "padi" (fields). After harvesting, the rice is dried and milled and a large amount of dust is thereby generated. Apart from reported cases of occupational asthma¹ and keratitis nummularis,² little research has been carried out on the effects of rice husk dust. A study was thus carried out in Malaysia (a major rice growing country) to determine whether there were adverse health effects associated with occupational exposure to rice husk dust.

Methods

The study population consisted of all workers employed at the time of the study (March-May 1983) in three rice mills in the rice growing area of the State of Selangor. Altogether there were 122 male Malay subjects. As controls, 42 workers employed as farmers in an agricultural work station in the same state were selected. The controls were of the same sex and ethnic group and from a similar agricultural work background but without exposure to rice husk dust.

Each subject and control was interviewed by a physician using a standard questionnaire based on the British Medical Research Council questionnaire on respiratory symptoms. This also contained questions pertaining to symptoms of eye irritation (defined as any complaints of itchiness, grittiness, soreness, lachrymation, redness, or photophobia of the eyes) and pruritus (defined as any complaints of itchiness or irritation of the skin with or without rashes). A full physical examination was also carried out on each subject and control by another physician who was not aware of the dust exposure levels. Blood samples were also collected by finger prick using a triangular surgical needle and analysed for total white and differential count by a trained laboratory technologist. For total white count, 2% aqueous acetic acid solution was used for dilution and counting was carried out using an improved Neubauer chamber. Leishman's stain was used for slide preparation in the differential white count.

Standard erect posterior anterior chest radiographs were taken for each subject and control, using conventional exposure of between 60-80 KV without an absorption grid. The focal film distance was fixed at three metres, with centering point between fourth or fifth thoracic vertebra. Exposures were obtained at full suspended inspiration with elbows flexed, back of hands placed on hips, and elbows pushed gently forwards. Exposure time was between 0.05 and 0.08 seconds. The radiographs

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Table 1 Age distribution of rice mill workers and controls

| Age (years) | Rice millers | | Controls | |
|-------------|--------------|---|----------|---|
| | No | % | No | % |
| 16-19 | 11 | | 2 | |
| 20-24 | 33 | | 13 | |
| 25-29 | 21 | | 8 | |
| 30-34 | 22 | | 15 | |
| 35-39 | 14 | | 3 | |
| 40-44 | 5 | | 1 | |
| 45-49 | 9 | | 0 | |
| ≥50 | 7 | | 0 | |
| Total | 122 | | 42 | |
| Mean | 30.6* | | 27.6* | |
| SD | 10.0 | | 5.6 | |

*No significant difference, $t = 1.86$, $p > 0.05$.

were read by a radiologist and the examining physician who were not aware of the subjects' dust exposure levels. Findings were classified into broad descriptive categories (such as nodular opacities, increased reticulation, generalised haze, and fibrotic opacities of old tuberculosis) without any attempt being made at this stage to use the ILO International Classification.

Ventilatory function, forced expiratory volume in one second (FEV₁) and forced vital capacity (FVC) were measured in each subject and control using a Vitalograph spirometer, the instrument being calibrated before conducting the investigation. Measurements were made on the first working day of the week, at the beginning and end of the work shift. The subjects were tested in a standing position with the chin slightly raised and the neck slightly extended. At least three forced expirations were made, with the average of three acceptable measurements being taken. All measurements were corrected to body temperature, ambient pressure, and saturated water vapour (BTPS).

Environmental monitoring was carried out using a high volume sampler (flow rate 1.13 to 1.70 cu m/min) to determine the total dust levels in all the various work sections of the rice mills. Personal monitoring was carried out using MSA portable pumps, fitted with Millipore PVC membrane filters (0.5 µm pore size, 37 mm diameter) in three piece cassettes, using a cyclone unit (flow rate 2.0 l/min). Three to five workers from each of the various work sections were randomly selected for monitoring.

Table 2 Smoking habits of rice millers and controls

| | Rice millers | | Controls | |
|-------------|--------------|-------|----------|-------|
| | No | % | No | % |
| Smokers | 68 | 55.7 | 26 | 61.9 |
| Ex-smokers | 13 | 10.7 | 2 | 4.8 |
| Non-smokers | 41 | 33.6 | 14 | 33.3 |
| Total | 122 | 100.0 | 42 | 100.0 |

No significant difference, $\chi^2 = 1.39$, $p > 0.05$.

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Table 3 Positive clinical symptoms present in rice millers and controls

| Symptom or symptom complex | Rice millers | | Controls | |
|---|--------------|-------|----------|-------|
| | No | % | No | % |
| Irritant cough with phlegm | 51 | 41.8* | 1 | 2.4* |
| Irritant cough without phlegm | 26 | 21.3* | 2 | 4.8* |
| Eye irritation | 80 | 65.6* | 3 | 7.1* |
| Nasal catarrh | 59 | 48.4* | 0 | 0.0* |
| Pruritus | 80 | 65.6* | 11 | 26.2* |
| Rashes | 36 | 29.5 | 11 | 26.2 |
| Tightness of chest | 32 | 26.2* | 3 | 7.1* |
| Tightness of chest on particular day | 1 | 0.8 | 0 | 0.0 |
| Chronic cough or phlegm ≥2 years | 8 | 6.6 | 0 | 0.0 |
| Periods of increased cough or phlegm ≥3 months | 17 | 13.9 | 3 | 7.1 |
| Chronic asthma (developing after starting work) | 6 | 4.9 | 0 | 0.0 |
| Dyspnoea of grade 2 or higher | 6 | 4.9 | 2 | 4.8 |

*Significant difference, $p < 0.05$.

Results

There was no significant difference between the mean age of the subjects (30.6 years) and the controls (27.6 years), ($t = 1.86$, $p > 0.05$) (table 1). The smoking habits of the workers and controls are compared in table 2; there was no significant difference ($\chi^2 = 1.39$, $p > 0.05$).

Table 3 shows the clinical symptoms of which the rice millers and controls complained. A significantly greater proportion of the rice millers complained of irritant cough with or without phlegm, eye irritation, nasal catarrh, pruritus, and tightness of chest. A greater proportion of the rice millers (although not statistically significant at the 0.05 level) also complained of chronic cough or phlegm exceeding two years' duration, increased cough or phlegm lasting longer than three months within a one year period, and chronic asthmatic episodes that developed after starting work in the rice mills. Cases of asthma that started during childhood or before starting work were excluded from the analysis.

Table 4 shows the clinical signs detected in the

Table 4 Positive clinical and haematological signs in rice millers and controls

| | Rice millers | | Controls | |
|---------------------|--------------|-------|----------|------|
| | No | % | No | % |
| Clinical: | | | | |
| Conjunctivitis | 39 | 32.0* | 0 | 0.0* |
| Pterygium | 30 | 24.6* | 0 | 0.0* |
| Corneal scar | 3 | 2.5 | 1 | 2.4 |
| Dermatosis | 2 | 1.6 | 2 | 4.8 |
| Rhynchoprepitations | 7 | 5.7 | 1 | 2.4 |
| Haematological: | | | | |
| Eosinophilia | 27 | 22.1* | 3 | 7.1* |

*Significant difference, $p < 0.05$.

Preliminary analysis of the ventilatory function results showed that there were four cases with obstructive airway defects among the rice millers (low FEV₁ with reduction in the FEV₁/FVC ratio) but none with restrictive defects even among those with opacities in the chest radiographs.

The environmental dust concentrations in the mills were found to vary among the different work sections as well as with the season of the year. During the low season (April-May), the mean dust exposure levels in the three mills ranged from 2.3 to 5.4 mg/m³ (for total dust) and from 0.5 to 1.2 mg/m³

(for respirable dust). In the peak season (around November) the corresponding dust levels were found to have increased by as much as tenfold. It should be noted that there are currently no threshold limit values (TVLs) for rice husk dust.

Discussion

Findings from the present study have shown significant associations of various clinical signs and symptoms and haematological and radiological changes, with occupational exposure to rice husk

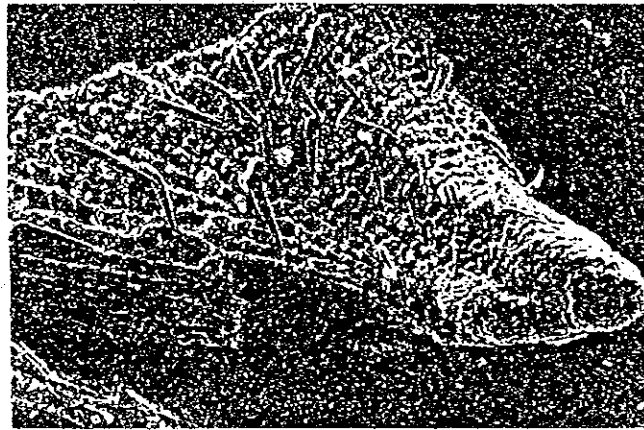


Fig 4 Electron micrograph showing a fragmented piece of rice husk. Note elongated spikes projecting from husk surface. (Bar = 100 μ .)

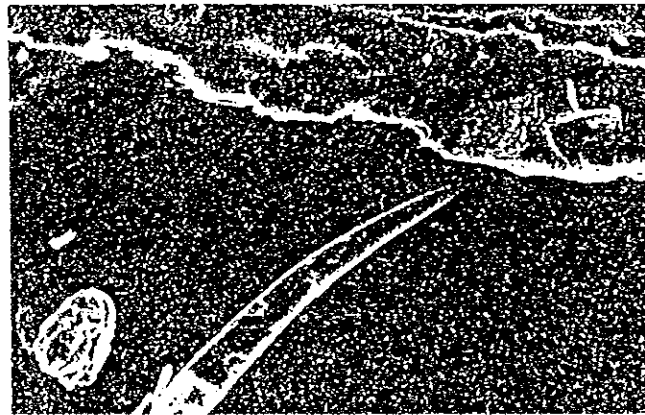


Fig 5 Electron micrograph showing one of the elongated spikes detached from rice husk surface. (Bar = 100 μ .)

dust. The clinical and haematological findings suggest that the harmful effects may be linked to both non-specific irritation and allergic responses to rice husk dust. Under the electron microscope, the rice husk is shown to be covered with small needlelike hairs that project outwards as sharp, elongated spines (figs 4 and 5). These spikes are about 200-300 μ in length, and about 30-40 μ in diameter at the base, tapering into sharp ends. The structure of these spikes suggests that they may be responsible for the irritant effects of the rice husk dust exposure, which manifest acutely as irritant cough with or without phlegm, keratoconjunctival irritation, and pruritus. The end results of such non-specific irritation are seen in the corneal scars, chronic conjunctival inflammation, and pterygium formation.

The nasal catarrh, respiratory difficulties such as tightness of chest, and eosinophilia are, however, probably allergic responses, either to a protein constituent of the rice husk or to some microbiological contaminant. Occupational asthma is known to occur in rice workers so that the cases of bronchial asthma seen in the present study may be associated with an allergic aetiology.

Possibly the most striking finding in the current study is the demonstration of chest opacities on radiological examination. The predominant pattern was of fine nodulation and increased reticulation, mainly in the lower and midzones of the lungs, with diffuse haze in some cases. Rice husk has been known to have a high silica content, which has been used for its abrasive action as detergents, dyes, and even as cleansing agents for jet engines.^{1,4} The nodular shadows may thus represent the early stages of silicosis, although the distribution appears uncharacteristic of classical silicosis. On the other hand, extrinsic allergic alveolitis may also produce these radiological features, although there were no complaints of fevers or pains in the limbs in the rice mill

workers. No lung biopsy was performed to identify the pathological features.

It seems that a distinctive clinical syndrome may be associated with exposure to rice husk dust at work for which we propose the term "rice millers' syndrome." Both non-specific irritant and allergic responses seem to be involved, manifesting acutely as irritation of the eyes, skin, and upper respiratory tract in some cases, as well as allergic nasal catarrh, respiratory difficulty, and eosinophilia in others. Chronic irritant effects are seen predominantly in the eyes, whereas cases of occupational asthma are probably found in hypersensitive individuals. Radiological opacities in the chest may either represent the early stage of silicosis or extrinsic allergic alveolitis.

We express our sincere thanks to all those who have helped to make this study possible, in particular the management and workers of the rice mills (National Rice Authority), the heads and staff of the Department of Social and Preventive Medicine and Department of Environmental Sciences, and the director general and staff of the Factories and Machinery Department. The study was supported by a grant from the China Medical Board.

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THIRD SCHEDULE
NOTIFIABLE INDUSTRIAL DISEASES
(Section 32)

(former act.)
'69

1. Dust diseases of the lungs:
 - (a) Silicosis—*inhalation of (SiO₂) silica containing dust.*
 - (b) Stannosis—*inhalation of tin dusts or fumes.*
 - (c) Siderosis or sidero-silicosis *inhalation of dust containing iron and silica, haematite.*
 - (d) Asbestosis—*inhalation of asbestos dust or fibres.*
 - (e) *Conditions of respiratory allergy of asthma or chronic bronchitis, or byssinosis resulting from inhalation of dusts of plant origin as cotton, wood, flax, jute, rice husks, cork, spices, hemp, sisal, tobacco, tea, flour and the like and mineral dusts as cements, copper, zinc, or animal dusts as bone or hair.*
 - (f) *Other pneumoconioses or fibrotic diseases of the lungs resulting from inhalation of aluminium or talc, or coal.*
2. *Systematic intoxication by any of the following metals or their compounds, lead, mercury, manganese, phosphorous, antimony, chromium, nickel, beryllium.*
3. *Intoxication resulting from the use of solvents as benzene and other aromatic hydrocarbons, carbon disulphide, chlorinated hydrocarbons, and petroleum and its derivatives.*
4. *Pulmonary irritation resulting from inhalation of nitrogen oxides, sulphur oxides, chlorine, phosgene, ammonia, etc.*
5. *Intoxication resulting from handling of insecticides, or herbicides or fungicides as organic phosphate compounds, nitrogenous and chlorinated compounds.*
6. *Conditions of occupational dermatosis resulting from handling of mineral oils, acids, alkalis, dusts, and other irritants.*
7. *Occupational infections as anthrax, glanders, and leptospirosis, tuberculosis, leprosy (where occupational exposure to the last two is evident).*
8. *Malignant disease resulting from handling or inhalation or contact with carcinogenic tars, or radioactive dusts.*
9. *Eye conditions resulting from physical trauma as heat cataract, radiation cataract and from irritants.*
10. *Toxic jaundice resulting from nitro or amino derivatives of benzene or other substances.*
11. *Subcutaneous or acute bursitis of knee or hand or wrist resulting from manual labour causing severe or prolonged friction or pressure.*
12. *Conditions resulting from severe heat exposure such as heat cramps or heat stroke.*
13. *Hearing loss due to excessive exposure to industrial noise of high sound pressure level.*
14. *Conditions resulting from exposure to ionizing and non-ionizing radiation.*
15. *Decompression sickness (caisson disease) and conditions resulting from working under water.*

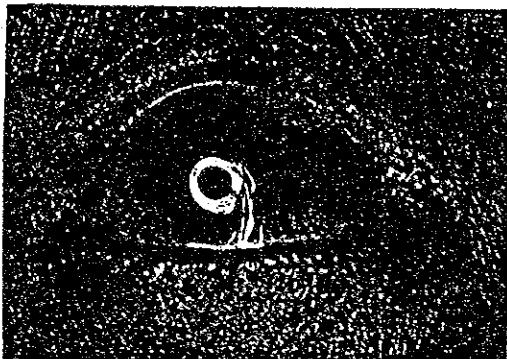


Fig 1 Photograph of right eye in a rice miller, showing conjunctival injection and a pterygium extending from medial angle of eye on to cornea. (Bright ring in centre is a reflection of camera lens.)

two groups. A significantly greater proportion of rice millers was found to have conjunctivitis, pterygium (fig 1), and eosinophilia. There were also three cases with corneal scars among the rice millers compared with one among the controls that had resulted from accidental trauma in childhood. Seven cases with chest signs suggestive of obstructive airway disease (decreased air entry and rhonchi) were detected among the rice millers compared with only one case among the controls.

The proportions of workers with chest abnormalities detected on radiological examination are given in table 5, from which it may be seen that a significantly greater proportion of rice millers (14.8%) had chest opacities with or without increased reticulation. The opacities consisted mainly of fine nodulation in the lower and midzones of the lungs (figs 2 and 3) but one worker also had a large nodule measuring 1½ cm in diameter in the left midzone. Four cases had a diffuse haze that made recognition of the lung parenchyma difficult. Fine calcification was also seen in two cases; one

Table 5 Radiological findings in chest radiographs of rice millers and controls

| | Rice millers | | Controls | |
|--|--------------|-------|----------|------|
| | No | % | No | % |
| Nodular opacities with/without reticulation | 18 | 14.8* | 0 | 0.0* |
| Increased reticulation (without opacities) | 1 | 0.8 | 0 | 0.0 |
| Fibrotic and calcified opacities of old tuberculosis | 1 | 0.8 | 2 | 4.8 |
| Generalised haze | 4 | 3.3 | 0 | 0.0 |
| Other abnormalities | 1 | 0.8 | 0 | 0.0 |
| No abnormalities | 101 | 82.8 | 40 | 95.2 |

*Significant difference, $z = 2.66$, $p < 0.05$.

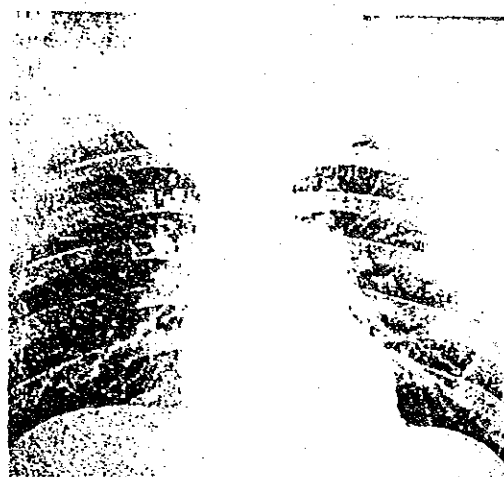


Fig 2 Chest radiograph of a rice miller, showing reticular changes and fine nodulation in lower and midzones of both lungs. There is also a bulla in right midzone.

further case had cystic changes in the right midzone and another had an emphysematous bulla in the right midzone. Apical changes probably due to pulmonary tuberculosis were found in one rice miller and two controls. One rice miller had a dilated main pulmonary artery with pulmonary plethora, suggestive of a small left to right shunt.



Fig 3 Chest radiograph of another rice miller, showing extensive reticulation and nodulation predominantly in lower and midzones. There is also thickening of the right transverse fissure.

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