



ChemCo  
Safety & Health Rating



## CONTENTS

	PAGE
A. INTRODUCTION	3
B. GENERAL	5
C. SAFETY AND HEALTH QUESTIONNAIRE	7
1. Leadership and administration	8
2. Training of management and supervision	11
3. Planned inspections	13
4. Critical task control	16
5. Accident/incident analysis/statistics	18
6. Emergency preparedness	21
7. Safety and health rules	23
8. Employee induction and training	25
9. Personal protective equipment	28
10. Occupational health control	29
11. Program evaluations	31
12. Design engineering and risk assessment	32
13. Purchasing	34
14. Safety and health/loss control meetings	35
15. New process/products introductions	36
16. Environmental controls	37
D. SUBJECT DESCRIPTIONS	38 - 47



## INTRODUCTION

Safety, Health and Environmental control (together sometimes covered by the term "Loss Control") are receiving ever increasing attention from industry, governmental agencies, politics, the press and the public in general. In particular this draws the attention to chemical industry and the way risks are being controlled in its individual companies.

This increased attention is not something we can expect to disappear within a few years. Rather, due to the environmental issues confronting us and the increasing realization that safety, health and environmental aspects are, in the final analysis, not separable from each other and from a quality organization, we believe that it is in our interest to assure that a certain level of control over these aspects must be obtained. The Safety and Health Rating is intended to assist organizations to do just that.

The rating will be carried out by a third party (not belonging to the location being reviewed) and following a visit to the premises concerned.

A major tool in the rating is a questionnaire related to safety and health control aspects.

The rating process will include the following steps:

1. filling out of questionnaire by the location being reviewed.

The location will be requested to answer the questions of the questionnaire. In principle an answer should only be affirmative if clear evidence can be provided of the related activity. In all other cases the answer should be "no".

While returning the questionnaire it is not necessary to provide evidence. However, during the visit by the third party, the documentation/information requested as identified below certain questions, should be provided for review. If such documentation cannot be provided during the visit a possible "yes" answer may be changed to "no". Only "yes" answers will be counted for arriving at the final rating which will be done by the third party.

The filled out questionnaires should be returned to ChemCo Safety & Health office at least two weeks prior to visit by the third party.

2. a visit from a third party to the location being reviewed. Main purpose of the visit is to review the questionnaire and the documentation that has been requested below relevant questions.

During the visit of the third party two other items will receive attention:

- a. presentation should be provided by the location to the third party commenting on the following questions:
  - which are the risks identified or related to the operations concerned? Risks should include both internal as well as external risks, risks during normal operation as well as during abnormal process conditions.
  - how have these risks been assessed, by whom and when?
  - what controls have been implemented and how are these controls maintained?



Purpose of this presentation is to provide an opportunity to the location to positively present their risk control efforts. At the same time it will provide the third party with information about the operations and the potential risks involved.

The presentation should not take more than one hour and take place at the start of the visit. Preferably this should be a small group presentation to allow for necessary discussion, questions, etc.

- b. an tour will be made by the third party around the premises.

Purpose of the tour is to familiarize the third party with the physical conditions of the location and to allow him to observe, as far as possible, the way operations take place.

During this tour substandard (or unsafe) acts and conditions will be noted when observed. This is for the preparation of another rating which will be based on the number and the severity of substandard acts and conditions. Value points then will be given to each item as follows:

- potential for serious injury, damage or other loss - 3 points
- potential for less serious injury, damage, etc - 1 point
- potential for non serious injury, damage, etc - 1/3 point

The total score will be obtained by adding the points provided to the substandard acts/conditions noted. The final score will be calculated on a one hour observation basis.

A score of less than 5 is normally acceptable and should be the target at all times. A score less than 10 but higher than 5 indicates that some improvement will be necessary. A score above 10 indicates an undesirable situation and attention needed by plant management for further control.

In principle this tour will take 1 to 2 hours (depending on the size of the location) and take place at the end of the visit.

After the visit, a short report will be forwarded to the location involved. This report will include:

- the third parties assessment of the safety and health control level of the location.
- main suggestions to improve this level. This will be in addition to the assessment report which will, due to its nature, already include directions for further improvement.
- a score concerning the observed substandard acts and conditions.

For questions, please contact the ChemCo Safety and Health Coordinator.



**GENERAL**

If insufficient space for writing please provide additional pages.

1. name of facility: \_\_\_\_\_

2. location: \_\_\_\_\_

3. if on larger site, indicate:  
\_\_\_\_\_  
\_\_\_\_\_

4. products manufactured:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. number of personnel: \_\_\_\_\_

6. name of general manager: \_\_\_\_\_

7. name of safety and health coordinator: \_\_\_\_\_

assistance: \_\_\_\_\_  
\_\_\_\_\_

8. number and size of accidents/incidents over last 3 years:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. please provide plot plan of location, showing main roads, waterways, dwellings, etc.

10. please provide site plan showing location of plants, storage of chemicals, etc.



11. distance to local fire brigade in km: \_\_\_\_\_

type of fire brigade: full-time professional/volunteer/mixed

any bridges, tunnels, railroad crossings, etc between fire brigade and plant

\_\_\_\_\_

availability of water: \_\_\_\_\_ m3 at \_\_\_\_\_ bar

12. please provide last 5 accident/incident reports for review..

13. please provide brief description of emergencies during the last 5 years.



ChemCo  
Safety & Health Questionnaires



## 1. **LEADERSHIP AND ADMINISTRATION (130)**

### 1.1. **General policy (5)**

1.1.1. Does the organization have a policy statement reflecting local management's commitment and support to safety/health/loss control? (2) yes/no \_\_\_\_\_

1.1.2. Has the policy been communicated to all concerned? (3) yes/no \_\_\_\_\_

Please provide copy of General Safety and Health Policy

### 1.2. **Program Coordinator (10)**

1.2.1. Has a person been designated as safety and health/loss control coordinator? (10) yes/no \_\_\_\_\_

### 1.3. **Senior and middle management participation (15)**

1.3.1. Does senior and middle management make planned periodic safety and health tours? (15) yes/no \_\_\_\_\_

Please provide planning for Safety and Health tours for this year

### 1.4. **Established Management Performance Standards (50)**

1.4.1. Do written Safety and Health performance standards exist for any of the following activities:

1. Leadership and Administration? (3) yes/no \_\_\_\_\_
2. Safety/Health Training Management/Supervision?(3) yes/no \_\_\_\_\_
3. Safety/Health related Planned Inspections? (3) yes/no \_\_\_\_\_
4. Safety/Health control of Critical Tasks? (4) yes/no \_\_\_\_\_
5. Accident/Incident Analysis/Statistics? (4) yes/no \_\_\_\_\_
6. Emergency Preparedness? (3) yes/no \_\_\_\_\_
7. Safety/Health Rules and regulations? (3) yes/no \_\_\_\_\_
8. Employee Induction and Training as related to Safety/Health? (3) yes/no \_\_\_\_\_
9. Personal Protective Equipment? (3) yes/no \_\_\_\_\_
10. Occupational Health Control? (3) yes/no \_\_\_\_\_
11. Systematic Safety/Health Program Evaluation? (3) yes/no \_\_\_\_\_
12. Engineering Controls as related to Safety/Health? (3) yes/no \_\_\_\_\_
13. Purchasing Controls as related to Safety/Health? (3) yes/no \_\_\_\_\_
14. Safety/Health related Group Communications? (3) yes/no \_\_\_\_\_
15. New Process/products Introductions? (3) yes/no \_\_\_\_\_
16. Environmental Controls? (3) yes/no \_\_\_\_\_

Please provide copy of relevant standards/guidelines for performance of Management, Supervision and Staff-functions,as related to Safety and Health





## 1.5 Safety and Health/Loss Control at Management Meetings (10)

- 1.5.1. Are regular meetings held at various levels of management, of which an extensive part is devoted to safety and health? (10) yes/no \_\_\_\_\_

Please provide minutes of meetings.

## 1.6. Safety and Health audits conducted by Management (10)

- 1.6.1. Do middle and senior management levels conduct at least annual safety and health audits of the departments in their organization? (10) yes/no \_\_\_\_\_

Please provide reports of audits carried out

## 1.7. Individual Responsibility for Safety/Health & Loss Control? (20)

- 1.7.1. Are safety and health/loss control responsibilities clearly defined and described for:

- all management levels? (2) yes/no \_\_\_\_\_
- relevant staff-functions? (2) yes/no \_\_\_\_\_
- workers? (1) yes/no \_\_\_\_\_

Please provide representative descriptions of Safety and Health/Loss Control responsibilities of the various functions.

- 1.7.2. Is safety and Health/loss control a clearly defined part of the periodic appraisals for:

- all management levels? (2) yes/no \_\_\_\_\_
- relevant staff-functions? (2) yes/no \_\_\_\_\_
- workers? (1) yes/no \_\_\_\_\_

Please provide copy of appraisal forms/reports.

- 1.7.3. Have all employees been informed about their responsibility to report substandard conditions? (5) yes/no \_\_\_\_\_

- 1.7.4. Does a formalized system exist for reporting substandard conditions/situations by employees? (5) yes/no \_\_\_\_\_

Please provide description of system for reporting by employees of unsafe/substandard acts/conditions.



**1.8. Establishment of Annual Safety/Health/Loss Control and environmental Objectives (10)**

1.8.1. Have clear safety and health objectives been established for:

- the total organization or unit? (2) yes/no \_\_\_\_\_
- important parts of this organization or unit? (3) yes/no \_\_\_\_\_

Please provide description of objectives.

1.8.2. Have plans been prepared to obtain objectives? (5) yes/no \_\_\_\_\_

Please provide copy of (annual) plans for Safety and Health activity.



## 2. TRAINING OF MANAGEMENT AND SUPERVISION (70)

### 2.1. **Orientation/induction program for Management/supervision (5)**

2.1.1. Is formal safety and Health/Loss Control induction or orientation given to all new members of management and supervision? (3) yes/no \_\_\_\_\_

2.1.2. Is there an adequate plan to guide the orientation or induction? (2) yes/no \_\_\_\_\_

Please provide "guide plan" for Safety and Health induction/orientation of Management and Supervision.

### 2.2. **Formal training of management/supervision (25)**

2.2.1. Indicate which of the following subjects are part of the formal safety and health training of management and supervision.

1. management control of loss? (1) yes/no \_\_\_\_\_
2. causes and effects of accidents? (1) yes/no \_\_\_\_\_
3. risk management? (1) yes/no \_\_\_\_\_
4. measurement of safety? (1) yes/no \_\_\_\_\_
5. planned inspections? (1) yes/no \_\_\_\_\_
6. critical tasks control? (1) yes/no \_\_\_\_\_
7. safety/health controls in engineering? (1) yes/no \_\_\_\_\_
8. safety/health controls in purchasing? (1) yes/no \_\_\_\_\_
9. behavior observations? (1) yes/no \_\_\_\_\_
10. accident/incident analysis/statistics? (1) yes/no \_\_\_\_\_
11. employee induction and training? (1) yes/no \_\_\_\_\_
12. rules and regulations/permit systems? (1) yes/no \_\_\_\_\_
13. introduction to occupational health? (1) yes/no \_\_\_\_\_
14. fire loss control? (1) yes/no \_\_\_\_\_
15. personal and group communications? (1) yes/no \_\_\_\_\_
16. safety and health appraisals of subordinates? (1) yes/no \_\_\_\_\_
17. emergency preparedness? (1) yes/no \_\_\_\_\_
18. obtaining and maintaining desired performance levels? (1) yes/no \_\_\_\_\_
19. obtaining compliance with safety and health rules? (1) yes/no \_\_\_\_\_

2.2.2. Are formal lesson plans available to guide this training? (2) yes/no \_\_\_\_\_

Please provide "lesson plans" for course and/or subjects indicated.

2.2.3. Are adequate hand-outs provided during training? (2) yes/no \_\_\_\_\_

Please provide course hand-outs.

2.2.4. Have all management/supervision presently in function received this training? (2) yes/no \_\_\_\_\_



### 2.3. Formal Training of relevant staff functions (10)

2.3.1. Have relevant staff functions received a Management Safety training in safety and health/loss control methods and techniques? (6) yes/no \_\_\_\_\_

2.3.2. Did this training include the engineering functions? (4) yes/no \_\_\_\_\_

### 2.4. New process Introductions (20)

2.4.1. Are formalized instructions given for each introduction of new processes/products? (12) yes/no \_\_\_\_\_

Please provide new process/products introduction procedures.

2.4.2. Are these instructions provided to:

- management? (2) yes/no \_\_\_\_\_
- supervision? (2) yes/no \_\_\_\_\_
- staff-functions? (2) yes/no \_\_\_\_\_
- workers? (2) yes/no \_\_\_\_\_

Please provide instruction programme or meeting minutes of last new process/product introduction.

### 2.5. Formal training of Safety & Health Program Coordinator (10)

2.5.1. Has the Safety and Health program coordinator received a basic safety and health training from a recognized organization? (6) yes/no \_\_\_\_\_

Please provide course material, lesson plans, hand-outs, etc.

2.5.2. Has program coordinator received any up-date training during the last two years? (4) yes/no \_\_\_\_\_



### 3. PLANNED INSPECTIONS (75)

#### 3.1. **Inspection Guidelines (20)**

3.1.1. Is clearly identified which type of inspections should be carried out:

- general (housekeeping inspections)? (1) yes/no \_\_\_\_\_
- middle and senior management tours? (1) yes/no \_\_\_\_\_
- critical item inspections? (1) yes/no \_\_\_\_\_
- preventive maintenance inspections? (1) yes/no \_\_\_\_\_
- predictive maintenance inspections? (1) yes/no \_\_\_\_\_
- pre-use inspections? (1) yes/no \_\_\_\_\_
- legally required inspections? (1) yes/no \_\_\_\_\_
- vendor inspections? (1) yes/no \_\_\_\_\_
- inspections during construction? (1) yes/no \_\_\_\_\_
- pre-start-up inspections? (1) yes/no \_\_\_\_\_
- inspections after process/installation modifications? (1) yes/no \_\_\_\_\_
- inspections after shut-down? (1) yes/no \_\_\_\_\_
- permit system related inspections? (1) yes/no \_\_\_\_\_

Please provide description of guidelines for inspections indicated.

3.1.2. Do these inspection guidelines include:

- who is responsible for initiating the inspections? (1) yes/no \_\_\_\_\_
- who should carry out the inspections? (1) yes/no \_\_\_\_\_
- who supervises the actual inspection being carried out? (1) yes/no \_\_\_\_\_
- the frequency of the inspections? (1) yes/no \_\_\_\_\_
- reporting on inspection findings? (1) yes/no \_\_\_\_\_
- use of hazard classification system? (1) yes/no \_\_\_\_\_
- follow-up on inspections? (1) yes/no \_\_\_\_\_

Please provide relevant guidelines with aspects indicated.



### 3.2. General Inspections (10)

3.2.1. Are General Inspections carried out for all areas? (3) yes/no \_\_\_\_\_

Please provide General Inspection procedure and/or planning of inspections carried out

3.2.2. Has the frequency of these inspections been established? (1) yes/no \_\_\_\_\_

3.2.3. Is responsibility for inspections established? (1) yes/no \_\_\_\_\_

3.2.4. Are workers involved in this type of inspection? (2) yes/no \_\_\_\_\_

3.2.5. Are report forms used for reporting substandard conditions? (1) yes/no \_\_\_\_\_

Please provide sample copies of reports filled out during recent inspections.

3.2.6. Has a proper follow-up procedure been established? (2) yes/no \_\_\_\_\_

Please provide description of General Inspection follow-up

### 3.3. Critical Parts Inspections (15)

3.3.1. Have critical parts been identified? (4) yes/no \_\_\_\_\_

3.3.2. Are identified critical parts periodically inspected? (3) yes/no \_\_\_\_\_

Provide Critical Parts Inspection procedures, planning and sample copies of reports.

3.3.3. Does a system exist for reporting substandard conditions? (3) yes/no \_\_\_\_\_

3.3.4. Has a follow-up procedure been established to correct reported substandard conditions? (5) yes/no \_\_\_\_\_

### 3.4. Maintenance (15)

3.4.1. Are maintenance activities analyzed to indicate those repairs and maintenance works which can be considered abnormal? (10) yes/no \_\_\_\_\_

3.4.2. Are these abnormal maintenance/repair activities periodically analyzed? (5) yes/no \_\_\_\_\_

Please provide copies of last analyses.



### 3.5. Hazardous Conditions Reporting (10)

3.5.1. Is there a system for all employees to report substandard conditions/acts to a central point? (4) yes/no \_\_\_\_\_

Please provide description of Hazardous Conditions Reporting system

3.5.2. Is this procedure known to all employees? (3) yes/no \_\_\_\_\_

3.5.3. Is there an adequate system to ensure proper follow-up of conditions/acts reported? (3) yes/no \_\_\_\_\_

Please provide description of follow-up system

### 3.6. Regular Evaluation of Inspection Activities (5)

3.6.1. Is there a regular evaluation of inspection activities? (2) yes/no \_\_\_\_\_

3.6.2. Does this evaluation include:

- number of inspections carried out? (1) yes/no \_\_\_\_\_
- quality of inspections carried out? (1) yes/no \_\_\_\_\_

Please provide last evaluation reports.

3.6.3. Are evaluation results reported to senior management for proper follow-up? (1) yes/no \_\_\_\_\_



#### 4. **CRITICAL TASK CONTROL** (55)

##### 4.1. **Critical Task Control Guideline** (5)

4.1.1. Is there a management guideline on Critical Task Control? (5) yes/no \_\_\_\_\_

Please provide copy of guideline on Critical task Control

##### 4.2. **Critical Task Control Training** (5)

4.2.1. Have appropriate personnel been trained in the control of Critical Tasks and did this training include:

- Critical Task Identification? (2) yes/no \_\_\_\_\_
- Task Analysis? (1) yes/no \_\_\_\_\_
- Task Procedure preparation? (1) yes/no \_\_\_\_\_
- Task Observation? (1) yes/no \_\_\_\_\_

Please provide lesson plan and hand-out used during training

##### 4.3. **Inventory of Critical Tasks** (15)

4.3.1. Have critical Tasks been identified through a systematic process including:

- listing of all functions in the operations? (5) yes/no \_\_\_\_\_
- listing of Tasks per function? (5) yes/no \_\_\_\_\_
- identifying the critical Tasks? (5) yes/no \_\_\_\_\_

##### 4.4. **Controls Established** (10)

4.4.1. Have controls been established for Critical Tasks identified? (5) yes/no \_\_\_\_\_

4.4.2. Have critical steps in operating procedures been identified? (5) yes/no \_\_\_\_\_

Provide sample copies of operating procedures with critical steps identified

##### 4.5. **Task Observation Program** (15)

4.5.1. Does a system exist for periodic planned observation of the execution of Critical Tasks and critical steps in operating procedures? (10) yes/no \_\_\_\_\_

Please provide description of observation activities, including planning of observations.

4.5.2. Are reports made for each observation carried out? (5) yes/no \_\_\_\_\_

Please provide sample copies of observation reports carried out during last six (6) months.





#### 4.6. Critical Tasks Control System Evaluation (5)

4.6.1. Is there a regular evaluation of Critical Task Control activities and does this include:

- review of existing procedures? (3)
- observations carried out according to planning? (2)
- feedback from accident reports? (1)

yes/no \_\_\_\_\_

yes/no \_\_\_\_\_

yes/no \_\_\_\_\_

Please provide copies of last evaluation reports



## 5. ACCIDENT/INCIDENT ANALYSIS/STATISTICS (45)

### 5.1. Procedure for investigating/analyzing accidents/incidents (8)

5.1.1. Is there a procedure for reporting and analysis of accidents/incidents? (2) yes/no \_\_\_\_\_

Please provide copy of accident/incident reporting/analysis procedures

5.1.2. Does this procedure include:

- reporting of accidents/incidents by employees? (1) yes/no \_\_\_\_\_
- system for evaluation of accidents in terms of potential severity and frequency of occurrence? (1) yes/no \_\_\_\_\_
- methods to be used for analysis? (1) yes/no \_\_\_\_\_

Please provide lesson plan and course material subject accident/incident analysis/investigation.

5.1.3. Is this procedure made known to all managers, supervisors and workers? (2) yes/no \_\_\_\_\_

5.1.4. Does the procedure include worker involvement in the analyzing/investigation process? (1) yes/no \_\_\_\_\_

### 5.2. Training in accident analysis/investigation (5)

5.2.1. Have all people involved in accident/incident analysis/investigation been trained for this purpose? (5) yes/no \_\_\_\_\_

### 5.3. Reporting/registration of accidents/incidents (8)

5.3.1. Is there a procedure for registration of accidents and incidents? (2) yes/no \_\_\_\_\_

Please provide procedure for registration of accidents/incidents.

5.3.2. Does this registration include the form of a "log" to register all deviations from normal? (4) yes/no \_\_\_\_\_

Please provide samples of "logs" filled out.

5.3.3. Is there an adequate form to guide the analysis and reporting of accidents/incidents identified for that purpose? (2) yes/no \_\_\_\_\_

Please provide form(s) used to report and investigate accidents/incidents.

### 5.4. Action-plan and Follow-up (6)

5.4.1. Is there a procedure to properly follow-up on actions suggested to remedy the situation? (3) yes/no \_\_\_\_\_

Please provide description of procedure.



5.4.2. Does this procedure indicate:

- who is responsible for follow-up being carried out? (1) yes/no \_\_\_\_\_
- regular reporting on outstanding actions? (1) yes/no \_\_\_\_\_
- final check on actions being completed? (1) yes/no \_\_\_\_\_

## 5.5. Central reporting of accidents/incidents (2)

5.5.1. Are accidents/incidents identified for this purpose reported to a central point on corporate level? (2) yes/no \_\_\_\_\_

## 5.6. Injury Type Accidents (4)

5.6.1. Are injury type accidents identified and recorded? (1) yes/no \_\_\_\_\_

Please provide records identifying injury type accidents.

5.6.2. Are these registrations or records periodically analyzed? (2) yes/no \_\_\_\_\_

Please provide copies of last analyses.

5.6.3. Are problem solving teams used to cope with identified problems? (1) yes/no \_\_\_\_\_

Please provide reports of problem solving teams used.

## 5.7. Damage Type Accidents (4)

5.7.1. Are repair and maintenance jobs other than normal wear and tear identified and recorded? (1) yes/no \_\_\_\_\_

Please provide records indicating "abnormal" maintenance jobs carried out.

5.7.2. Are these registrations or records periodically analyzed? (2) yes/no \_\_\_\_\_

5.7.3. Are problem solving teams used to cope with identified problems? (1) yes/no \_\_\_\_\_

Please provide reports of problem solving teams used.

## 5.8. Near-miss incidents (4)

5.8.1. Are near-miss incidents identified and recorded? (1) yes/no \_\_\_\_\_

Please provide record of near-miss incidents.

5.8.2. Are these registrations or records periodically analyzed? (2) yes/no \_\_\_\_\_

5.8.3. Are problem solving teams used to cope with identified problems? (1) yes/no \_\_\_\_\_

Please provide reports of problem solving teams used.



## 5.9. Evaluation of accident/incident activities (4)

5.9.1. Is there a regular evaluation of the accident/incident report system? (2)      yes/no \_\_\_\_\_

Please provide last evaluation reports.

5.9.2. Does this include quantitative as well as qualitative criteria? (1)      yes/no \_\_\_\_\_

5.9.3. Are evaluation results shared with senior management for proper follow-up? (1)      yes/no \_\_\_\_\_



## 6. **EMERGENCY PREPAREDNESS (75)**

### 6.1. **Emergency Program coordination (5)**

6.1.1. Has a person been appointed for overall coordination of the emergency activities? (3) yes/no \_\_\_\_\_

6.1.2. Have persons been appointed to coordinate the actual emergency activities? (2) yes/no \_\_\_\_\_

### 6.2. **Emergency plan (15)**

6.2.1. Is there an Emergency Plan, including:

- evacuation of people to a safe place? (1) yes/no \_\_\_\_\_
- emergency shutdown of equipment? (1) yes/no \_\_\_\_\_
- notification of proper emergency aid? (1) yes/no \_\_\_\_\_
- search and rescue activities? (1) yes/no \_\_\_\_\_
- notification of public in case of toxic releases? (1) yes/no \_\_\_\_\_
- control of hazardous materials? (1) yes/no \_\_\_\_\_
- control of energy sources? (1) yes/no \_\_\_\_\_
- designation of a command post? (1) yes/no \_\_\_\_\_
- salvage of vital equipment or documentation? (1) yes/no \_\_\_\_\_
- "All clear" and safe re-entry procedure? (1) yes/no \_\_\_\_\_

Provide copy of emergency plan.

6.2.2. Are there periodic exercises to test the effectiveness of the Emergency Plan? (5) yes/no \_\_\_\_\_

Please provide minutes or reports of emergency plan exercises.

### 6.3. **Rescue Equipment (5)**

6.3.1. Has adequate rescue equipment been provided and is this readily available to persons in need for this? (3) yes/no \_\_\_\_\_

6.3.2. Have relevant personnel been instructed in the proper use of such equipment? (2) yes/no \_\_\_\_\_

### 6.4. **Emergency Power (5)**

6.4.1. Is there adequate Emergency Power for:

- evacuation of people (including emergency lighting)? (1) yes/no \_\_\_\_\_
- shutdown of equipment? (2) yes/no \_\_\_\_\_
- use of emergency equipment (such as fire fighting pumps)? (2) yes/no \_\_\_\_\_



## 6.5. Plant Emergency Teams (15)

- 6.5.1. Are there sufficient (Plant) Emergency Teams to cope with the probable or possible emergencies? (5) yes/no \_\_\_\_\_
- 6.5.2. Are these teams properly trained? (5) yes/no \_\_\_\_\_
- 6.5.3. Are these teams properly equipped to fight the emergencies expected? (5) yes/no \_\_\_\_\_

## 6.6. External Help (10)

- 6.6.1. Are external Emergency Services provided with up-to-date information covering the possible emergencies at this location? (5) yes/no \_\_\_\_\_
- 6.6.2. Are these services familiar with the location and the areas where goods of particular hazardous nature are kept? (3) yes/no \_\_\_\_\_
- 6.6.3. Are the systems to notify these external services regularly tested for proper operation? (2) yes/no \_\_\_\_\_

## 6.7. Emergency Communication (10)

- 6.7.1. Are adequate means available to communicate an emergency to:
- own personnel? (3) yes/no \_\_\_\_\_
  - internal emergency services? (3) yes/no \_\_\_\_\_
  - external emergency services? (2) yes/no \_\_\_\_\_
  - the neighborhood? (2) yes/no \_\_\_\_\_

## 6.8. Medical assistance and First Aid (10)

- 6.8.1. Is adequate medical assistance available to cope with emergencies? (3) yes/no \_\_\_\_\_
- 6.8.2. Are sufficient number of First Aiders available at all work hours? (2) yes/no \_\_\_\_\_
- 6.8.3. Are these services familiar with special first aid needs, including treatment of exposure to special chemicals as required, and equipped to cope with those needs? (3) yes/no \_\_\_\_\_
- 6.8.4. Are these services located such as to enable prompt response to an emergency? (2) yes/no \_\_\_\_\_

Indicate location of First Aid services on site plan.



## 7. SAFETY AND HEALTH RULES (50)

### 7.1. General Safety and Health Rules (7)

7.1.1. Are there general safety and health rules to guide behavior of people? (7)      yes/no \_\_\_\_\_

Please provide General Safety and Health Rule booklet or publication.

### 7.2. Specific Safety and Health Rules (23)

7.2.1. Has the need for specific safety and health rules been identified in relation to specific hazards and tasks? (3)      yes/no \_\_\_\_\_

7.2.2. Do these rules include (as applicable):

- working with chemical products? (2)      yes/no \_\_\_\_\_
- hot work? (2)      yes/no \_\_\_\_\_
- cold work? (2)      yes/no \_\_\_\_\_
- vessel entry? (2)      yes/no \_\_\_\_\_
- excavation? (2)      yes/no \_\_\_\_\_
- working at heights? (2)      yes/no \_\_\_\_\_
- electrical lock-out? (2)      yes/no \_\_\_\_\_
- opening of tanks, vessels and pipes? (2)      yes/no \_\_\_\_\_
- hoisting? (2)      yes/no \_\_\_\_\_
- any others? (2)      yes/no \_\_\_\_\_

Please provide samples of specific Safety and Health rules and forms used, as indicated.

### 7.3. Review and up-dating of Rules (5)

7.3.1. Are rules reviewed at least annually and at each process and installation modification? (5)      yes/no \_\_\_\_\_

### 7.4. Rules Instruction (10)

7.4.1. Are people instructed in relevant rules:

- general rules at day of employment? (2)      yes/no \_\_\_\_\_
- specific rules during task instruction? (3)      yes/no \_\_\_\_\_

Please provide records of instruction.

7.4.2. Is knowledge of rules maintained and up-dated:

- through annual instructions? (2)      yes/no \_\_\_\_\_
- through safety meetings/presentations? (3)      yes/no \_\_\_\_\_

Please provide records of annual instruction and/or minutes of safety meetings.



## 7.5. Rules compliance Efforts (5)

7.5.2. Is compliance with general and specific rules supported:

- through planned task observations? (2)
- through periodic behavioral observations? (3)

yes/no \_\_\_\_\_

yes/no \_\_\_\_\_

Provide records of planned Task Observation.

Provide reports on periodic behavioural observations.





## 8. EMPLOYEE INDUCTION AND TRAINING (70)

### 8.1. Induction of new employees (10)

8.1.1. Do new employees receive a safety and health induction before being put to work? (4) yes/no \_\_\_\_\_

Please provide copy of guideline for this induction.

8.1.2. Is there a guideline to standardize this induction? (2) yes/no \_\_\_\_\_

8.1.3. Does this induction include:

- general safety and health aspects and rules? (1) yes/no \_\_\_\_\_
- duty to report unsafe or substandard acts/conditions? (1) yes/no \_\_\_\_\_
- security? (1) yes/no \_\_\_\_\_
- fire safety? (1) yes/no \_\_\_\_\_

Please provide any material normally given to new employees during Safety and Health induction.

### 8.2. Instruction of new employees (10)

8.2.1. Do new and transferred employees receive specific safety and health instruction related to their job? (6) yes/no \_\_\_\_\_

8.2.2. Have people providing this instruction been trained in instructional techniques? (4) yes/no \_\_\_\_\_

Please provide hand-out of instructional technique training provided to persons giving Safety and Health instruction to new and transferred employees.

### 8.3. Training need inventory (15)

8.3.1. Has an inventory been made, per function or occupation to identify the need for:

- pre-hiring education and experience? (1) yes/no \_\_\_\_\_
- additional (in-company) theoretical training? (2) yes/no \_\_\_\_\_
- additional (in-company) practical training? (2) yes/no \_\_\_\_\_

Please provide records identifying educational and training needs per function.



8.3.2. Does this inventory at least include:

- all normal work procedures? (1) yes/no \_\_\_\_\_
- all special procedures, permit system, etc? (1) yes/no \_\_\_\_\_
- procedures for abnormal work, such as emergencies, shut-downs, etc? (1) yes/no \_\_\_\_\_
- use of safety equipment? (1) yes/no \_\_\_\_\_
- working with chemicals? (1) yes/no \_\_\_\_\_

8.3.3. Does this inventory also include:

- members of safety committees? (1) yes/no \_\_\_\_\_
- safety coordinator? (1) yes/no \_\_\_\_\_
- first aiders? (1) yes/no \_\_\_\_\_
- other emergency services? (1) yes/no \_\_\_\_\_

8.3.4. Is this inventory regularly reviewed and, if necessary, up-dated? (1) yes/no \_\_\_\_\_

#### 8.4. Training Programs (20)

8.4.1. Are training programs set up for all jobs or occupations requiring such? (4) yes/no \_\_\_\_\_

Provide list of occupations or functions with relevant educational requirement and training programmes.

8.4.2. Do these programs include:

- lesson plans? (1) yes/no \_\_\_\_\_
- relevant text material? (1) yes/no \_\_\_\_\_
- task procedures? (1) yes/no \_\_\_\_\_
- visual aids, drawings, etc? (1) yes/no \_\_\_\_\_

Provide samples of lesson plans, text materials used, task procedures to guide training, etc.

8.4.3. Do these training programs highlight:

- safety aspects of work to be carried out? (2) yes/no \_\_\_\_\_
- health aspects of the work to be carried out? (2) yes/no \_\_\_\_\_
- personal protection under normal work conditions? (2) yes/no \_\_\_\_\_
- personal protection in case of emergency? (2) yes/no \_\_\_\_\_
- permit systems? (2) yes/no \_\_\_\_\_
- emergency actions? (2) yes/no \_\_\_\_\_



## 8.5. Re-training of employees (8)

8.5.1. Do employees receive regular re-training? (3) yes/no \_\_\_\_\_

8.5.2. Is re-training directed at the "critical" tasks or parts of the job? (5) yes/no \_\_\_\_\_

Provide samples of re-training programmes.

## 8.6. Training Program Evaluation (7)

8.6.1. Are training activities periodically evaluated and does this evaluation include at least:

- initial training given? (1) yes/no \_\_\_\_\_
- re-training given? (1) yes/no \_\_\_\_\_
- training quality? (1) yes/no \_\_\_\_\_
- training effectiveness? (1) yes/no \_\_\_\_\_

8.6.2. Do evaluation activities include:

- task observations? (1) yes/no \_\_\_\_\_
- feed-back from accident/incident analysis? (1) yes/no \_\_\_\_\_

8.6.3. Are evaluation results communicated to top-management? (1) yes/no \_\_\_\_\_

Please provide last evaluation reports.



## 9. PERSONAL PROTECTIVE EQUIPMENT (35)

### 9.1. Personal Protective Equipment Rules (5)

9.1.1. Are PPE rules provided in writing and made known to all employees at their time of hiring? (2) yes/no \_\_\_\_\_

9.1.2. Does this include:

- general PPE rules? (1) yes/no \_\_\_\_\_
- PPE rules for specific tasks or occupations? (1) yes/no \_\_\_\_\_
- use of PPE under emergency situations? (1) yes/no \_\_\_\_\_

Please provide General and Specific PPE rules.

### 9.2. Provision of Personal Protective Equipment (8)

9.2.1. Is PPE adequately made available to all employees? (8) yes/no \_\_\_\_\_

### 9.3. Maintenance of Personal Protective Equipment (4)

9.3.1. Is PPE properly maintained? (2) yes/no \_\_\_\_\_

9.3.2. Is use and maintenance of PPE registered and periodically analyzed? (2) yes/no \_\_\_\_\_

Please provide records covering issuance, maintenance and use of PPE.

### 9.4. Obtaining Compliance with rules (8)

9.4.1. Do supervisory training programs include guidelines on how to obtain compliance with PPE rules? (8) yes/no \_\_\_\_\_

Provide training programme and materials covering "how to obtain rule compliance".

### 9.5. Evaluation of PPE rule compliance (10)

9.5.1. Are regular observations/evaluations made to measure compliance with PPE rules? (7) yes/no \_\_\_\_\_

Provide last observation/evaluation report.

9.5.2. Do accident/incident analyses provide feed-back on proper compliance with PPE rules? (3) yes/no \_\_\_\_\_

Provide accident investigation forms indicating relation to PPE rule compliance.



## 10. OCCUPATIONAL HEALTH CONTROL (60)

### 10.1. Health Hazard Identification (10)

10.1.1. Have occupations and tasks been analyzed to identify existing and potential health hazards? (5) yes/no \_\_\_\_\_

10.1.2. Has a standard form or checklist been used for this inventory? (2) yes/no \_\_\_\_\_

Please provide form used in analysis.

10.1.3. Are all occupations analyzed for occupational health hazards? (3) yes/no \_\_\_\_\_

### 10.2. Chemical Products Exposure Inventory and Control (15)

10.2.1. Does a recent list of all chemical products used, stored or manufactured exist at this location to identify possible health exposures? (5) yes/no \_\_\_\_\_

Provide list of all chemical products handled, used, stored, manufactured and their main properties related to risks, occupational hazards, etc.

10.2.2. Is this list reviewed regularly and, if needed, up-dated? (3) yes/no \_\_\_\_\_

10.2.3. Have adequate controls been established for the health hazards identified? (5) yes/no \_\_\_\_\_

10.2.4. Do these controls include proper labeling of hazardous chemicals stored, manufactured and used in this location? (2) yes/no \_\_\_\_\_

Please provide system for identifying and labelling chemicals on site.

### 10.3. Health Hazard Information (10)

10.3.1. Are Managers and Supervisors properly informed of, and aware of the hazards associated with products used, manufactured and stored in their departments? (5) yes/no \_\_\_\_\_

Please provide samples of documentation used to inform Managers/Supervisors.

10.3.2. Are employees properly instructed in the use of products and or equipment with potential health hazards? (3) yes/no \_\_\_\_\_

10.3.3. Is knowledge on how to deal with potential health hazards regularly tested and/or up-dated? (2) yes/no \_\_\_\_\_



#### 10.4. Monitoring (5)

10.4.1. Does occupational hygiene monitoring for health hazard exposures take place on a need basis? (2) yes/no \_\_\_\_\_

10.4.2. Does this monitoring include:

- general work-place monitoring? (1) yes/no \_\_\_\_\_
- personal monitoring? (1) yes/no \_\_\_\_\_
- biological monitoring? (1) yes/no \_\_\_\_\_

Please provide monitoring results of last 12 months.

#### 10.5. Medical Examinations (12)

10.5.1. Are pre-employment medical checks carried out in relation with job exposures? (5) yes/no \_\_\_\_\_

10.5.2. Is routine health surveillance carried out periodically depending on the potential exposure to health hazards, including those due to handling of chemicals? (7) yes/no \_\_\_\_\_

#### 10.6. Medical Assistance (8)

10.6.1. What medical assistance does this location have (highest score only):

- full-time medical assistance on site? (5) yes/no \_\_\_\_\_
- part-time medical assistance on site? (4) yes/no \_\_\_\_\_
- contract with outside medical assistance? (2) yes/no \_\_\_\_\_
- informal relation with external office? (1) yes/no \_\_\_\_\_

10.6.2. Is this assistance available at all work hours? (3) yes/no \_\_\_\_\_



## 11. SAFETY AND HEALTH PROGRAMME EVALUATIONS (70)

### 11.1. Evaluation of Organizational Aspects (20)

11.1.1. Are evaluations of organizational safety and health aspects carried out on a regular basis? (15) yes/no \_\_\_\_\_

11.1.2. Are these evaluations carried out by unbiased persons? (5) yes/no \_\_\_\_\_

Provide checklists used in evaluation and last evaluation reports.

### 11.2. Evaluation of General Technical Aspects (18)

11.2.1. Are evaluations of general technical safety and health aspects carried out on a regular basis? (10) Yes/no \_\_\_\_\_

11.2.2. If so, do these evaluations include:

- general technical safety aspects? (2) yes/no \_\_\_\_\_
- fire safety aspects? (2) yes/no \_\_\_\_\_
- occupational health aspects? (2) yes/no \_\_\_\_\_

Please provide samples of checklists used in such evaluations.

11.2.3. Are these evaluations carried out by unbiased persons? (2) yes/no \_\_\_\_\_

Provide copy of last evaluation report.

### 11.3. Evaluation of Process Safety Aspects (32)

11.3.1. Are evaluations of process and installation safety and health aspects carried out periodically? (10) yes/no \_\_\_\_\_

11.3.2. Which of the following methods or aspects are included in these evaluations:

- P & I diagram reviews? (3) yes/no \_\_\_\_\_
- Full HAZOP? (3) yes/no \_\_\_\_\_
- Failure Mode and Effect Analysis? (3) yes/no \_\_\_\_\_
- Evaluation Plant Fitness for Purpose? (3) yes/no \_\_\_\_\_
- other? \_\_\_\_\_ (3) yes/no \_\_\_\_\_

11.3.3. Are these evaluations carried out by unbiased persons? (7) yes/no \_\_\_\_\_



## 12. DESIGN ENGINEERING, RISK ASSESSMENT AND CONSTRUCTION (100)

### 12.1. Risk Assessment (26)

12.1.1. Have risks involving this location been assessed through a systematic approach of risk identification and evaluation? (7) yes/no \_\_\_\_\_

Please provide copy of Risk Assessment records/reports.

12.1.2. Did this include both "internal" and "external" risks, including Environmental impact? (5) yes/no \_\_\_\_\_

12.1.3. Which of the following techniques or methods are, or have been used, in the design of processes and installations:

- Full Hazop? (2) yes/no \_\_\_\_\_
- Hazan? (2) yes/no \_\_\_\_\_
- Failure Mode and Effect Analysis? (2) yes/no \_\_\_\_\_
- other? \_\_\_\_\_ (2) yes/no \_\_\_\_\_

12.1.4. Have these methods/techniques been used by qualified persons in a team approach? (4) yes/no \_\_\_\_\_

12.1.5. Did this team include managers, supervisors and workers as well as staff-functions? (2) yes/no \_\_\_\_\_

Please provide records indicating persons involved in Risk Assessment.

### 12.2. Risk Control (18)

12.2.1. Have proper controls been set up for the risks assessed? (10) yes/no \_\_\_\_\_

12.2.2. Do these include the control of containment loss? (8) yes/no \_\_\_\_\_

### 12.3. Work Method/Operating Procedures (16)

12.3.1. Have work methods or operating procedures been analyzed for potential hazards or operating failures? (10) yes/no \_\_\_\_\_

12.3.2. Has this been done by qualified persons in a multi-disciplinary approach? (4) yes/no \_\_\_\_\_

12.3.3. Did this team include managers, supervisors and workers as well as staff-functions? (2) yes/no \_\_\_\_\_

### 12.4. Construction Procedures (14)

12.4.1. Do procedures for construction and process/installation modifications including regular inspection to check construction against (approved) plan? (14) yes/no \_\_\_\_\_





## 12.5. Process/Installation Modification Procedures (18)

12.5.1. Is there a procedure to guide process and installation modifications and to control potential risks? (8) yes/no \_\_\_\_\_

Please provide of construction/modification procedures.

12.5.2. Does this procedure include the use of techniques or methods such as mini-Hazops, etc? (6) yes/no \_\_\_\_\_

12.5.3. Does the application of this procedure involve a multi-disciplinary approach including managers, supervisors, workers and staff-functions? (4) yes/no \_\_\_\_\_

## 12.6. Evaluation of Procedures Application (8)

12.6.1. Is there a regular evaluation to check proper application of:

- design engineering procedures? (2) yes/no \_\_\_\_\_
- work method/procedures preparation? (2) yes/no \_\_\_\_\_
- process/installation modification procedures? (2) yes/no \_\_\_\_\_
- construction procedures? (2) yes/no \_\_\_\_\_



### 13. **PURCHASING** (60)

#### 13.1. **Purchasing of materials/equipment** (36)

13.1.1. Are safety and health specifications set up for all regularly purchased materials, goods, etc.? (10) yes/no \_\_\_\_\_

Please provide samples of purchasing specifications for regular purchases.

13.1.2. Has the safety and health functions been involved in setting up these specifications? (8) yes/no \_\_\_\_\_

13.1.3. Is the safety and health function involved in all non-regular purchases? (12) yes/no \_\_\_\_\_

13.1.4. Are Material Safety Data Sheets obtained for all purchases requiring such? (6) yes/no \_\_\_\_\_

Please provide sample copies of Material Safety Data Sheets.

#### 13.2. **Selection and Control of Contractors/services** (24)

13.2.1. Are safety and health criteria established for the selection of contractors? (7) yes/no \_\_\_\_\_

13.2.2. Has the safety and health function been involved in setting up these criteria? (5) yes/no \_\_\_\_\_

13.2.3. Do contractor selection criteria include contractor safety program activities? (4) yes/no \_\_\_\_\_

Please provide checklist used in contractor selection.

13.2.4. Do these criteria include selection of sub-contractor firms by the main contractor? (2) yes/no \_\_\_\_\_

13.2.5. Are contractor activities regularly monitored and does this include at least:

- contractor site inspections? (2) yes/no \_\_\_\_\_
- contractor safety meetings? (2) yes/no \_\_\_\_\_
- contractor accident reports? (2) yes/no \_\_\_\_\_

Please provide relevant records of last major construction.



**14. SAFETY AND HEALTH/LOSS CONTROL MEETINGS (40)**

**14.1. Safety and Health/Loss Control Meetings (25)**

14.1.1. Are regular Safety and Health/Loss Control Meetings held with all personnel at an established frequency? (12) yes/no \_\_\_\_\_

14.1.2. Are subjects for these meetings planned well in advance? (8) yes/no \_\_\_\_\_

Please provide subject planning for next six (6) months.

14.1.3. Are minutes made of meetings held? (5) yes/no \_\_\_\_\_

Please provide samples of meeting minutes.

**14.2. Evaluation of Meetings held (15)**

14.2.1. Are periodic evaluations made of meeting effectiveness? (8) yes/no \_\_\_\_\_

14.2.2. Does this evaluation at least include:

- number of meetings held? (3) yes/no \_\_\_\_\_
- quality of meetings held? (4) yes/no \_\_\_\_\_

Please provide copy of last evaluations.



**15. NEW PROCESS/PRODUCTS INTRODUCTIONS (50)**

**15.1. System for New Process Introductions (50)**

15.1.1. Is there a system for the introduction of new processes, installations, product? (20)

yes/no \_\_\_\_\_

Please provide description of system to introduce new products/processes.

15.1.2. Does this system include:

- assessment of risks involved? (10)
- provision of relevant MSDS? (10)
- training of managers, supervisors and workers? (10)

yes/no \_\_\_\_\_

yes/no \_\_\_\_\_

yes/no \_\_\_\_\_

Please provide records of last new process/product introduction.



## 16. ENVIRONMENTAL CONTROLS (80)

### 16.1. Assessment of Environmental exposures (25)

16.1.1. Have environmental risks been assessed? (8) yes/no \_\_\_\_\_

Please provide copy of environmental risk assessment report.

16.1.2. Has a systematic approach been used for this purpose? (5) yes/no \_\_\_\_\_

16.1.3. Did the assessment include:

- potential for pollution of the air? (2) yes/no \_\_\_\_\_
- potential for pollution of ground and surface water? (2) yes/no \_\_\_\_\_
- potential for pollution of the soil? (2) yes/no \_\_\_\_\_

16.1.4. Did the assessment include:

- risks during normal operation? (2) yes/no \_\_\_\_\_
- risks during abnormal of process? (2) yes/no \_\_\_\_\_
- risks during emergency situations? (2) yes/no \_\_\_\_\_

### 16.2. Environmental Controls Established (35)

16.2.1. Are proper controls established for risks identified? (10) yes/no \_\_\_\_\_

Please provide description of controls to prevent and limit damage to the environment.

16.2.2. Do these controls include (as needed):

- regular monitoring for typical agents? (5) yes/no \_\_\_\_\_
- procedures for removal of normal process waste? (6) yes/no \_\_\_\_\_
- procedures for removal of waste during emergencies? (4) yes/no \_\_\_\_\_
- prevention of containment loss? (6) yes/no \_\_\_\_\_
- control of spills/leakages? (4) yes/no \_\_\_\_\_

### 16.3. Environmental Emergency Procedures (20)

16.3.1. Have emergency procedures been set up in case of a (potential) threat to the environment? (5) yes/no \_\_\_\_\_

Please provide environmental emergency plan.

16.3.2. Do these procedures include the prompt notification of authorities and neighborhood? (5) yes/no \_\_\_\_\_

16.3.3. Do these procedures include adequate actions to limit exposure during environmental emergencies? (10) yes/no \_\_\_\_\_



## **Subject Descriptions**

Following are short descriptions of the subjects contained in the Safety and Health Questionnaires. These descriptions are intended to provide some insight in the subject and to indicate their importance for Safety and Health/Loss Control.

These descriptions are not intended to serve as a reference text. As needed further information may be necessary and may be obtained from or through TopChem Safety and Health Coordinator.

### **1. LEADERSHIP AND ADMINISTRATION**

Performance, also in Safety and Health, is determined largely by the top-down guidelines and support given by the management of the organization. This is true also for other important aspects of business such as quality, environmental control, cost control, etc.

Basic to the support from top-management is the establishment of a clear policy on Safety, Health and Environmental Control. This policy should be positive to have a proper effect and should be substantiated by further support and actions. The policy should be communicated to all concerned which would include own personnel but could be extended to contractors, suppliers and customers as well as governmental agencies.

The support and intentions of top-management towards Safety, Health and Environmental Control is further evidenced by proper assignment of coordination of the relevant activities and visually for example through periodic Safety and Health management tours. Basic to the entire program is a set of clear guidelines on relevant subjects or activities such as those mentioned in 1.4.1. These guidelines are intended to direct the performance of others in the organization to reach the common goal of acquiring a certain level of control over safety, health and environmental aspects.

The safety audits mentioned under 1.6. are intended to be (brief) reviews by management against the guidelines set under 1.4.1. In fact it is here where higher management levels personally verify the operation of their own program and share their management experience and support with peers as well as lower levels of management.

To reach and maintain a certain level of performance and control, it is necessary to set objectives. This is normally done on an annual basis. Such objectives should concentrate on things to do and not merely reflect good intentions. Departmental objectives could (and should) be following the guidelines set for the organization under 1.4.1. but would normally also include such items as major technical improvements requiring substantial financial funds. The objectives should not be limited to "no accidents" or "zero frequency rates".

### **2. TRAINING OF MANAGEMENT AND SUPERVISION**

What happens in an organization is mainly influenced by what management does, top-down. It is their example and behavior and their beliefs that stimulate others who work for them.

Training of management and supervision is most important in this respect. It provides a common philosophy towards important items, provides insight in the matter and makes clear why and how certain activities should be carried out to get to the objectives desired.

The training meant here should be directed at management action and performance and at how to obtain and maintain a desired level of safety and health performance throughout the organization. This training should be supplemented with technical training when and as needed.



This training basically falls into two categories:

- a first orientation or induction upon entering the organization. This will set the new manager or supervisor off to a good start and will make clear what the organization's philosophy is towards safety, health and environmental control. The quality and contents of this orientation is important - it is the only first impression one can make. The orientation should preferably be guided by a plan or guideline to provide consistency and to serve as a memory jogger to the person providing the orientation. This orientation would normally take 1/2 to 1 day.
- a more in-depth training on Safety, Health and Environmental aspects and control. This type of training can be done within the company but could also be obtained from outside services. What is important is that it supports the philosophy and activities of the organization. This type of training could vary with the type of organization and the risks involved and last between 2 and 5 days or longer if specific subjects are treated more in-depth.

Training should not be done on an ad-hoc basis but should be structured. Management and Supervisory training should preferably be in line with the guidelines set in 1.4.1. which forms the basis for safety and health performance in the organization. Training could and should include such subjects as indicated in 1.2.1. and be extended whenever necessary. Such training should include lesson plans and hand-outs to also serve as reference material.

Training should be extended to include staff-functions and other personnel on a need basis. Staff-functions with an important relations to Safety and Health would include design engineering, maintenance, purchasing, etc.

An important part of risk control training should relate to changes from normal operations such as the introduction of new processes and products which could introduce new risks and potential problems into the organization. All relevant personnel should receive appropriate training and a thorough plan should be set up to guide the introduction of new processes/products.

### **3. PLANNED INSPECTIONS**

Materials, machines, installations, etc., they all are subject to change, to wear and tear. Change that is either due to their use or forced due to man-made alterations to the (process or production) system. Such changes can, and do occasionally, lead to unacceptable situations creating loss, injuries, damage and, sometimes, disaster.

Inspections of various types are intended to consciously observe situations and to uncover substandard conditions or situations for correction. In principle such inspections can be divided in:

- general inspections, directed mainly at housekeeping and carried out normally by the supervisor with one or more of his/her operators.
- management tours intended to support the departmental inspections and to provide management's visual support to the safety and health program.
- critical item inspections directed at identified items, machines, installation parts, etc. and normally carried out by persons with particular expertise.
- inspections triggered by special circumstances such as shut-down, construction or plant modification, start-up, permit system operation, etc.

Inspections should be guided by criteria such as mentioned in 3.1.2. to enable proper and effective operation.

Very important to inspection is the use of a hazard classification system (the question "what could happen if we let the condition continue as it is?") for priority setting and proper follow-up on individual substandard conditions.



Equally important is it to register all substandard conditions, even smaller ones, for periodic analysis. Such analysis are directed at finding important and repetitive conditions which should receive special attention, possibly through a problem solving team approach (this could be a "quality circle"-like approach).

Maintenance records could greatly contribute to problem solving through inspections, provided "abnormal" maintenance jobs are registered and, periodically, analyzed. Such abnormal jobs could be identified through work-order forms.

Inspections are not intended to take the place of the day-to-day care of the department by its supervision and personnel. Proper day-to-day care for installations, machinery, etc. would limit the number of items found during the formal inspections. Consequently, if inspections produce long lists of substandard items for correction, a good look at the day-to-day operation may be required. To further facilitate this daily concern, a system for reporting hazardous conditions (3.5.) should be established. This would support and formalize the verbal the reporting via the supervisor and facilitate the supervisor's job in this respect.

Evaluation of inspection activities, once guidelines have been set up, concludes the proper management of this important item. Such evaluations (3.6.) should preferably be done by unbiased people, not directly interested in the results of the evaluation.

#### **4. CRITICAL TASK CONTROL**

Critical Tasks are those which could lead to unacceptable consequences (injury, fire, explosion, quality problems, damage, loss) if not properly carried out.

Such tasks need to be identified and controlled because they are likely to cause problems in the future. These may be the "critical few" (ref. Pareto's law) tasks in the organization.

The Critical Tasks identification and control process not only directs attention to the potential problems involved. The process also assists in many other activities and forms an input to employee training, the use of personal protective equipment, selection of personnel and the setting up of rules, but would also assist in the proper selection of machinery and materials, improvement of plant lay-out and organization etc. and thus help to reduce risks. All these improvements can come from the "efficiency check" which is part on the task analysis process.

Since the process of controlling critical tasks is rather time consuming, it often needs a management guideline in support of this important activity.

Critical Task identification is normally done per occupation or function and breaking those down in the work or tasks that have to be carried out. A simple risk quantification or hazard classification method can help to set priorities for selection of critical tasks for further analysis and control.

Once critical tasks have been identified and analyzed, the "efficiency check" should be carried out and measures should be taken to control the remaining potential problems. Preference should be given to technical solutions. If problems can be engineered out of our (production) systems, we do not (or less, at least) have to rely on human actions and interventions. Often, however we cannot, for one reason or the other, solve the problem technically and will have to resort to procedures to guide human actions to control problems. Such procedures then also assist in the training of people and in the periodic observation of workers performing these critical tasks.

Task Observation is a process of periodic reviewing the way critical tasks are being carried out by the persons performing them. The observations are also intended as a feedback on the effectiveness of training and instruction,





purchasing and maintenance and enable the supervisor to verify and improve the procedures involved. Basic to the Task Observation activities is the knowledge that there are only two fundamental ways to find out how critical tasks are being carried out: do nothing and wait for the problem to occur, or ..... carry out Task Observations.

Here again, as with inspections and other activities, once guidelines are set up (1.4.) it is only proper management to have periodic evaluations carried out to see if everything works as it should.

## **5. ACCIDENT/INCIDENT ANALYSIS/STATISTICS**

No matter what we do, accidents - one way or the other - will occur. This is just a matter of statistics, if we cannot reduce the risks to zero. However bad this may be, it is worse if we do not take full advantage of accidents and other losses or problems by investigating and analyzing them and learning what we should do to prevent the same or similar things from happening again.

Basic to good accident analysis activities is a good procedure in which guidelines are set about which accidents/incidents should be reported and analysed, by whom, how, etc.

Training again is essential for proper insight in the analysis of accidents and problems. Practice indicates that people often jump to conclusions and the use of a proper analysis method can be a great help to limit prejudice. Registration of accidents, damage, etc. should preferably be done on a departmental basis in "logs" containing deviations from normal. Such "logs" could then be supplemented by accident/incident analysis forms for those requiring further investigation/analysis. These registration can also be reviewed from time to time to see how well control is exercised over the activities in the department.

As with inspections, a proper follow-up procedure should regulate the execution of remedial actions according to plan.

Analysis of individual accidents/incidents form the basis for reviews on a periodic basis. These reviews would also generate required statistics but should not be limited to merely indicating how many accidents/incidents occurred during a certain period. These analyses and statistics should preferably be oriented to enable problem solving, possibly through a team approach.

Once guidelines have been set up for the reporting and analysis of accidents/incidents, periodic evaluations should take place to verify proper operation.

## **6. EMERGENCY PREPAREDNESS**

Since not all accidents/incidents can be excluded, it is necessary to prepare for necessary actions in case of emergency.

This preparation would not only require putting out the fire or rescuing people, it also requires management decisions on making materials and people available for that purpose, to train them, etc., requiring finances. Emergency preparedness normally also require activities to assure delivery of products to the market after a disaster. This may require contracts with other companies to help out in case of need. Finally proper insurances or other risk financing techniques are required to cover financial losses involved. All these are reasons why the overall planning of emergency actions should be coordinated on a high management level.

The emergency plan should first of all include evacuation of people to a safe place and provide assistance to aid any victims. At the same time the plan should provide procedures to call in assistance from internal and external services and, as need may be, enable notification of the neighborhood.



All aspects of the emergency plan should be tested periodically on their proper functioning, including proper training of emergency teams. This should include providing and up-dating of information to outside services about potential emergencies requiring special attention or medical care. The information to emergency services should include the location of hazardous products requiring special attention under emergency situations. This item has become even more important after the well known pollution of the Rhine river following disposal of water used to fight a fire in a chemical operation.

## **7. SAFETY AND HEALTH RULES**

Rules are intended to guide the behavior of people to prevent problems. In principle two kind of rules are being considered here:

- general rules affecting most or all people working in an organization, such as speed limits, wearing foot protection, etc.
- specific rules affecting specific departments, occupations or tasks. Such as wearing face shields when pouring chemicals or following a vessel entry permit system when cleaning a tank.

The need for safety and health rules depends on the potential exposures and is closely related to the identification of critical tasks (subject nr. 4) as one of the potential ways to control problems.

Once rules have been established, they have to be periodically reviewed to see that they are still valid and up-to-date. Such reviews could very well be an shared effort of supervision and operators and enhances knowledge of rules.

Rules should be instructed when starting employment, either during a more general orientation, as well as (in relation to specific work) task instruction. Once this knowledge has been transferred to the new (or transferred) employee, periodic review should take place to assure maintenance of rule knowledge of a desired level. This is particularly true for the more complex rules such as permit systems, particularly when these rules are not part of the normal work routine. This can be done through regular safety and health meetings or otherwise.

Rule review should be part of the process/installation modification procedures.

Rule compliance should be evaluated on a periodic basis and behavioral observations are intended for this purpose.

## **8. EMPLOYEE INDUCTION AND TRAINING**

Proper training of personnel not only seeks to provide skilled and knowledgeable people, it also helps to motivate them when they know how to do the job properly. It also helps to control problems and deliver the quality products required by the customer.

As with management, employees should be trained as required by the work to be done and their previous level of knowledge and skills.

Training here can also be divided into two categories:

- a first orientation or induction upon employment (or transfer). This would normally cover general items as related to safety, health, etc. and be included in a more general introduction of the employee to the organization.



- a more in-depth training or instruction preparing the employee for doing his or her work. The Critical Task Inventory (subject nr. 4) can be of assistance here to identify those tasks requiring special attention.

Training need identification should be done per occupation or function. Training should bridge the gap between pre-hiring education and experience and the knowledge and skill required to do the particular work in the organization. This training should not only be directed at normal work procedures but should also include special procedures and what to do in case things go wrong, emergencies, etc.

Since they play specific roles in Safety and Health, specific attention should be given also to the training needs of safety committee members, first aiders, emergency services and the safety/health coordinator.

Once the training need inventory has been prepared it should be reviewed periodically and updated if necessary. Such reviews/updates should be part of procedures involving the introductions and of new processes/products and the modification of existing ones.

Once training needs have been established, programs should be set up including lesson plans, textbooks, test, etc. to provide for proper trained personnel. Such training could be done externally but should, in such cases, be supplemented by in-company exposure in relation to specific processes, machines, installations, etc.

Training would often include on-the-job training by experienced employees. This should, as needed, be backed up by adequate theoretical education. The on-the-job training should preferably be done by persons who have received instruction technique training.

After initial training the level of knowledge and work quality should be maintained through Task Observations (see 4.5.) and periodic re-training involving the critical aspects of the task or job.

Training programs once set up should be evaluated periodically to assure that people have received the training required.

## **9. PERSONAL PROTECTIVE EQUIPMENT**

The use of PPE can often not be avoided since potential exposures cannot be completely eliminated. The use, however, of PPE should be limited to the extent possible since most of this equipment limits movement of people and is not comfortable.

PPE should be provided on a need basis, depending on exposures which can be identified through the Critical Task Inventory (4.3.), the listing of all chemicals handled, work-place analysis, physical capability analyses, etc.

Upon hiring people should be instructed in existing PPE rules and the use of the equipment. Although instructions seem unnecessary for items such as safety helmets, shoes, etc. people should still be know their limitations and proper care.

PPE should be maintained as needed, including periodic inspections, possibly done by the supervisor.

Since PPE cannot be avoided, care should be taken to obtain proper compliance with relevant PPE rules. Supervisors should be instructed on how to obtain compliance and regular (behavioral) observations should be carried out to verify compliance with relevant rules.



## **10. OCCUPATIONAL HEALTH CONTROL**

Work conditions may contribute to deterioration of health of people and occupational hazards should be identified and controlled to prevent this.

Control of occupational health is often associated with the handling of chemicals but, while they are an important part to consider, they are not all that should be taken into account when identifying exposures to health in the work-place.

Aspects that could or should be considered include:

- . physical stress, lifting, bending, working at heights, etc
- . mental stress, work pressure under normal and emergency conditions
- . climatological conditions, heat, cold, draft, humidity
- . exposure to chemical and physical conditions, chemicals, radiation,

Identification of health exposures could be from the Critical Task Inventory (4.3.), the listing of all chemicals used, work-place analysis, physical capability analyses, etc. Preferably, this identification should be done with the assistance of supervision and operators to use their expertise, to familiarize them with the potential exposures, and to obtain their cooperation in the execution of control measures.

Important to health control is a proper appreciation amongst managers and supervisors of the hazards in the work place and knowledge about how these hazards can be controlled. These people should therefore be properly informed about the hazards. Of particular importance is the information when new products and processes are being introduced. Managers and supervisors should also know which hazardous products may be formed under abnormal process conditions. Obviously employees, who are often the first targets (and victims when it comes to accidents) for occupational health exposure need to be instructed properly about the hazards of the work and how problems can be prevented or controlled. This could include such items as the proper handling of chemicals or how to work with radiation sources but also include such "simple" things as proper lifting and bending.

The knowledge of work related hazards should be kept up-to-date through periodic special attention to the health hazards involved.

One way to determine the effectiveness of health hazard control measures is through monitoring for typical agents. This can be done through more general monitoring for chemicals, dusts, noise, etc. but also through personal monitoring measuring individual exposures during work conditions as well as biological monitoring measuring the effect on persons through, for example, blood tests, hearing tests, etc.

Health control obviously includes a large number of medical aspects and medical checks prior to employment as well as during employment are often part of proper control where potential exposures to health hazards exist.

## **11. SAFETY AND HEALTH PROGRAMME EVALUATIONS**

Safety and Health activities are intended to reach a certain level of control over risks. To identify their effectiveness and to maintain the level reached it is necessary to periodically evaluate critical aspects. These evaluations should preferably be done by persons not belonging to the location. Obviously persons should have expertise in the areas indicated.



The effectiveness of Safety and Health activities should be evaluated in the following areas:

- organizational aspects. These evaluations would be guided by questionnaires such as the one used at present. This provides valuable information about the continuing efforts to control safety and health related problems.
- general technical aspects. These evaluations would be using checklist related to technical aspects including general safety, fire safety and occupational health. Other aspects should be included on a need basis. These evaluations use visible items to further evaluate the effectiveness of such activities as purchasing, design, maintenance, etc. These evaluations should also indicate if equipment is still in line with actual legislation, industry standards, etc. This evaluation is not a housekeeping inspection. The expertise of the persons doing these evaluations is critical for their quality.
- process safety aspects. These evaluations or reviews are normally carried out by a team of people familiar with the specifics of the process under review. Review techniques would include P & I diagram reviews (including comparison of Piping and Instrument diagrams with the actual situation), full or partial HAZOP (Hazard and Operability) studies, Failure Mode and Effect Analysis (for example in combination with HAZOP), Plant Fitness for Purpose Evaluations, and other methods including checklists, etc.

## **12. DESIGN ENGINEERING, RISK ASSESSMENT AND CONSTRUCTION**

One of the most important ways to control risks (including safety and health hazards) is through proper engineering controls. If potential problems can be solved through design, compliance with rules and procedures may be prevented or limited. Care, however, should be taken that no other hazards are being introduced through design and the entire process sequence should be considered, from the blue print phase till, and including, the disposal phase of the process or installation.

Engineering controls are involved in the initial design of installations, process and operating procedures as well as in the modifications that will take place during the operational phase of the process.

Basis for the engineering controls is the proper identification of the risks involved in process and installation. To obtain the best results, this risk identification should be performed systematically and through a team approach. Techniques used for this purpose include: Hazop (HAZard and OPerability studies), Hazan (HAZard ANalysis), Failure Mode and Effect Analysis, Fault tree, What if?, etc.

After identification of risks (qualitative as well as quantitative) controls should be established to either eliminate the risks or control them. One of the important aspects in chemical industry today would include control of containment loss to prevent escape of large quantities of dangerous materials to the environment.

One of the ways to control hazards is through proper operating procedures. These procedures in themselves, however, may present a hazard if not properly formulated or prepared such that continuing compliance would be doubtful or difficult. Since operating procedures would normally include certain parts which are more "critical" than others, these steps should be indicated for proper attention and control.

Proper design engineering should end in construction according to design criteria and procedures should exist to carry out frequent inspections during construction periods (initial construction as well as modification construction) for that purpose. Process and installation modifications should be guided by an effective procedure to control risks which could be introduced during such modifications.



Finally, to be effective, regular evaluations should be carried out in relation with the use of existing procedures to control risks through engineering design, operating procedure development and modification of process/installations.

### **13. PURCHASING**

Purchasing, next to design, is one of the main activities to control risks from entering into the organization. To do this, criteria or purchasing specifications should be set up for the purchasing function.

Basically we can identify two broad categories of purchases:

- regular purchases. For these safety and health specifications should be set up which would then act as criteria for the buying department(s) when purchasing the goods on an on-going basis.
- non-regular purchases. For these purchases specifications should be set up on an individual basis.

It is important that safety and health aspects are considered by experts. These experts are often found under safety and health professionals but could also include other engineering disciplines.

Attention should also be given to the buying of services, including contractors. Selection criteria should be set up which should not be limited to accident frequency rates but which should explore to establish the level of safety and health assurance in the contractor firms. In this context attention should also be given to the criteria used by contractors to select sub-contractors.

Control over contractors would normally include on-site monitoring such as inspection of contractor sites and work areas, contractor safety meetings and quality of accident reports (if any).

### **14. SAFETY AND HEALTH/LOSS CONTROL MEETINGS**

Maintaining a certain level of safety and health/loss control awareness is important for continued success and regular group meetings are amongst the most important tools for this purpose. These meetings should include presentations of specific safety and health/loss control subjects with relevance to the department concerned.

Preferably the subject of the meetings should be presented by the department supervisor but other people could also be involved, including department heads, staff-functions (safety and health) and operators. The presentations could be combined with discussion of actual safety and health/loss control problems as necessary.

To be effective, subjects for these meetings should be planned well in advance to allow for proper preparation. Meeting minutes could act for registration of meeting subject, presence of people, etc., as well as tool for follow-up actions.

Effectiveness of meetings can greatly be advanced by periodic evaluation of meeting quantity and quality.

### **15. NEW PROCESS/PRODUCTS INTRODUCTIONS**

Special attention should be given to the introduction of changes such as new products and processes into the organization, to control risks and potential problems (safety and health, costs, quality, etc) and a system should be set up to guide these introductions.



New product/process introductions should include:

- assessment of potential problems
- establishment of proper controls
- training and instruction
- increased task observation efforts during introduction period
- increased emphasis on accident/incident reporting and analysis and problem solving during the introduction period.

## **16. ENVIRONMENTAL CONTROLS**

One of the major problems facing industry, and particular chemical industry, today is the control of environmental problems. There is an ever increasing attention towards the deterioration of environmental conditions. This is not likely to fade away in time but rather more legislation can be expected to regulate industrial activities.

Identification of environmental risks is the basis for the establishment of control activities. Identification should include the potential for the pollution of air, water and soil during normal operation as well as during abnormal operation and emergency situations, including fire. Consideration should be given to the formation of hazardous materials during fire. A systematic risk identification process should be used as also mentioned under subject 12. This should include all chemical products which are being produced, or could be produced through malfunctioning of process, contamination or deliberate (criminal) actions of workers or third parties.

Controls should preferably be technical. Operating and Task procedures should be assessed for possible causes of environmental damage and the formation and escape of hazardous materials. Ergonomics should be used to limit the accidental operation of process controls which could lead to adverse conditions. Controls should include regular monitoring for relevant agents.

Procedures should be set up to control disposal of regular process waste and loss of hazardous materials (from normal and abnormal process conditions) during emergency situations. Emergency procedures should be set up including the availability of adequate materials or means to control spills and escape of gaseous and water solvable products. These procedures should include prompt notification of authorities as well as neighborhood.