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INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS  
A cooperative agreement among UNEP, ILO, FAO, WHO, UNIDO, UNITAR and OECD



# *National Chemicals Management Profile*

## **MONGOLIA**

*Second Edition  
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## ACRONYMS

ADB – Asian Development Bank  
EU – European Union  
EIA – Environmental Impact Assessment  
FAO – Food and Agricultural Organization  
GHG – Greenhouse Gas Emission  
GEF – Global Environmental Facility  
GoM – Government of Mongolia  
LDC – Least Developed Country  
MNE – Ministry of Nature and Environment  
MPRP – Mongolian People’s Revolutionary Party  
MAP-21 – Mongolia Action Plan – 21  
MDGs – Millennium Development Goals  
MESC – Ministry of Education, Science and Culture  
MFA – Ministry of Foreign Affairs  
MFA - Ministry of Food and Agriculture  
MIC- Ministry of Industry and Commerce  
MoH-Ministry of Health  
MoD-Ministry of Defense  
MoF – Ministry of Finance  
HOB – Heat –only-boilers  
NEMA - National Emergency Management Agency  
SAICM – Strategic Approach to International Chemicals Management  
SPIA - State Professional Inspection Agency  
UB – Ulaanbaatar  
UNITAR – United Nations Institute for Training and Research  
WB – World Bank

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The National Council in charge of Policy Regulation of Toxic and Hazardous Chemicals, acknowledges with gratitude the support of the United Nations Institute for Training and Research (UNITAR), and the Government of Switzerland. As a result of collaboration among all concerned agencies in the public and private sectors, the second Mongolian Chemicals Management Profile has been successfully established. We would like to express our gratitude to all concerned parties for their valuable contributions towards this initiative. In particular, the cooperation and commitment of Ministry of Health / Food and Agriculture, National Emergency Management Agency, State Professional Inspection Agency, Chemistry and Chemical Technological Institute, and Mongolian National University as key partners to the development of the National Profile and further utilization.

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## EXECUTIVE SUMMARY

National activities to support implementation of the Strategic Approach to International Chemicals Management (SAICM) during 2008-2009 in Mongolia were undertaken in the context of the projects “Updating National Chemicals Management Profiles, Development of a National SAICM Capacity Assessment, and Holding of a National SAICM Priority Setting Workshop”, with the financial support of the SAICM Quick Start Programme Trust Fund, and “Strengthening Governance, Civil Society Participation and Partnerships within an Integrated National Chemicals and Waste Management Programme”, with the financial support of the Federal Office for the Environment (FOEN) of the Government of Switzerland. The United Nations Institute for Training and Research (UNITAR) provided technical assistance for the projects.

A National Profile provides a comprehensive overview and assessment of the existing national legal, institutional, administrative, and technical infrastructure related to the sound management of chemicals. In Mongolia National Profiles have served as a useful basis for identifying national chemicals management priorities and for initiating targeted and coordinated follow-up actions. Mongolia has joined the international initiative for developing the National Chemicals Management Profile since 2006, with the UNITAR / IOMC support. The first Mongolian Profile was produced in 1999. Current Profile offers an update of information gathered and presented according to the guidelines suggested by the United Nations Institute for Training and Research (UNITAR) and Supplementary Note in April 2008. UNITAR has extensively provided technical and commentary support for the preparation of the chapters of informative content and focuses. The current national profile was made possible by the effort of a national coordinating team, comprising members representing various organizations from government and private sectors as well as non-governmental and civil society organizations. The main coordinator of the national profile preparation is Ministry of Nature and Environment, the official national focal point for SAICM, working in collaboration with the National Council. However, the updating process of National Profile should be regularly conducted to keep abreast of the latest information for further improvement of national chemical management scheme.

The National Profile development process has significantly facilitated the exchange of current information and created constructive alliances between governmental agencies, research institutions, industry and civil societies. This is very important for further efforts to strengthen the national chemical management scheme through active involvement of all concerned parties.

“The Updating a National Chemicals Management Profile, Development of a National SAICM Capacity Assessment, and Holding of a National SAICM Priority Setting” project was signed in September 2007 and goal of the project is to update a National Profile – the comprehensive assessment of the national infrastructure, relating to the legal, institutional, administrative, and technical aspects of chemicals management. Project team was appointed in January 2008 and put a goal to develop profile on basis of making

analyse on already collected data and information, if necessary to collect and renew information by using effective survey methodologies. Project team was key personnel representing competent institutions. Brainstorming, questionnaire and face-to-face meeting were used in the methodology. The draft profile was circulated to all members of the National Coordinating Team in order to obtain necessary comments.

## CHAPTER 1

### NATIONAL BACKGROUND INFORMATION

#### 1.1 Physical and Demographic Context

Mongolia ( $41^{\circ}35'$  -  $52^{\circ}09'N$  and  $87^{\circ}44'E$ - $119^{\circ}56'E$ ) is located in Northeast Asia covering an area of 1,564,000 km<sup>2</sup>. It borders with the Russian Federation and the People's Republic of China, and stretches for 2,392 km from west to east and 1,259 km from north to south . Mongolia is one of the largest land-locked countries in the world.



The northwest and central parts are high mountainous regions, while the eastern part is a vast steppe region. The southern part of the country is covered with semi-desert and desert area (the Mongolian Gobi). Forests cover 7.8% of the country and mainly consist of larch and pine. Certain areas in the Gobi are occupied by saxaul forests. There are four natural zones in the country: forest steppe, steppe, semi desert and desert. The territory is surrounded by high mountains that form a barrier from both the northern and eastern cold air mass and from the Pacific moisture air mass. The climate is harsh continental with sharply defined seasons, high annual and diurnal temperature fluctuations and low rainfall. Because of the high altitude, Mongolia's climate is generally colder than other countries of the same latitude. The extreme minimum temperature is  $-31.1^{\circ}C$  to  $-52.9^{\circ}C$  in January and the extreme maximum temperature is  $+28.5^{\circ}C$  to  $+42.2^{\circ}C$  in July. The annual precipitation amount is averaging 200-220 mm, ranging from 38.4 mm in the extreme south (Gobi desert region) to 389 mm in limited areas in the north. About 90.1% of precipitation evaporates, only 9.9% forms surface runoff, partially recharging into ground water aquifers. Most precipitation occurs in June, July and August; the driest months are from November to March. Mongolia has an annual average of 3,000 hours of sunshine, which is well above the amount received by other countries of the same latitude.

#### ***Form of the Government***

Mongolia until 1989 was communist state modeled on Soviet political and government institution. After the democratic revolution in 1990 form of the government and legal system were changed and governance power was moved to the State Great Khural, which is elected from voters. Thus Mongolia is Parliamentary republic. An election of State Great Khural (Parliament) takes place once in every four years and 76 Parliament members are elected. Local elections also take place once in every four years. By the local elections, the voters elect representatives to the Citizens Representative Khural

(Assembly) of aimags, Capital city, districts and soums. President of Mongolia is directly elected by public once in every four years. The official language is Mongolian. The traditional religion in Mongolia is Lamaist Buddhism. The Capital city is Ulaanbaatar.

### ***Population***

The population of the country was 2.635.100 at the end of 2007, with an average population density of about 1.6 persons per km<sup>2</sup>. Although the population has more than doubled since 1960, the average population density remains the lowest in Asia. The urban and rural population accounts for 40.0 % and 60% respectively (2007). The capital Ulaanbaatar, with a population of 1,601,000 and birth 1.000.000<sup>th</sup> was registered in April 2007.

Table 1.A. POPULATION, by sex, urban and rural  
(thous.persons)

| Indicators                                  | 2006   | 2007   |
|---------------------------------------------|--------|--------|
| <b>Number of population, by sex</b>         |        |        |
| total                                       | 2594.8 | 2635.2 |
| Male                                        | 1265.3 | 1284.4 |
| Female                                      | 1329.5 | 1350.8 |
| <b>Number of urban and rural population</b> |        |        |
| Urban                                       | 1579.5 | 1601.0 |
| of which;                                   |        |        |
| (In Ulaanbaatar)                            | 994.3  | 1031.2 |
| Rural                                       | 1015.3 | 1034.2 |

/Statistical Year Book 2007/

Table 1.B Distribution of population by age group in the year 2007

| Age group    | 2006          |               | 2007          |               |
|--------------|---------------|---------------|---------------|---------------|
|              | total         | female        | total         | female        |
| <b>total</b> | <b>2594.8</b> | <b>1329.5</b> | <b>2635.2</b> | <b>1350.8</b> |
| under 1      | 44.7          | 22.0          | 53.1          | 26.2          |
| 1 to 14      | 695.3         | 345.2         | 700.1         | 346.8         |
| 15 to 39     | 1197.8        | 614.4         | 1219.8        | 626.1         |
| 40 to 54     | 427.2         | 222           | 433           | 226           |
| 55 to 69     | 165.2         | 87.6          | 164.6         | 87.4          |
| 70+          | 64.6          | 38.3          | 64            | 38.3          |

/Statistical Year Book 2007/

Table 1.C. Population, by administrative units

| Aimags and the Capital | Territory thous km2 | Population |
|------------------------|---------------------|------------|
| <b>TOTAL</b>           | 1564.1              | 2627.688   |
|                        |                     |            |
| <b>West region</b>     | 415.3               | 411.147    |
| Bayan-Olgii            | 45.7                | 100.997    |
| Govi-Altai             | 141.4               | 60.802     |
| Zavkhan                | 82.5                | 80.85      |
| Uvs                    | 69.6                | 80.736     |
| Khovd                  | 76.1                | 88.276     |
|                        |                     |            |
| <b>Khangai region</b>  | 384.3               | 557.235    |
| Arkhangai              | 55.3                | 92.904     |
| Bayankhongor           | 116.0               | 84.68      |
| Bulgan                 | 48.7                | 60.388     |
| Orkhon                 | 0.8                 | 80.088     |
| Ovorkhangai            | 62.9                | 115.736    |
| Khovsgol               | 100.6               | 122.732    |
|                        |                     |            |
| <b>Central region</b>  | 473.6               | 435.712    |
| Govisumber             | 5.5                 | 12.54      |
| Darkhan-Uul            | 3.3                 | 87.582     |
| Dornogovi              | 109.5               | 55.845     |
| Dundgovi               | 74.7                | 48.555     |
| Omnogovi               | 165.4               | 46.312     |
| Selenge                | 41.2                | 100.528    |
| Tov                    | 74.0                | 85.84      |
|                        |                     |            |
| <b>East region</b>     | 286.2               | 200.34     |
| Dornod                 | 123.6               | 72.924     |
| Sukhbaatar             | 82.3                | 55.141     |
| Khentii                | 80.3                | 71.467     |
|                        |                     | 0          |
| <b>Ulaanbaatar</b>     | 4.7                 | 1031.18    |

/Statistical Year Book 2007/

Birth per 1000 population is 21.2, mortality per 1000 population is 5.9 and natural increase per 1000 population is 15.3 comparing with previous year (sources of National Center for Health Development Ministry of Health). Life expectancy is 65.9 years, literacy rate (% aged 15 and older) is 97.8 % (Human development Report 2007). Average income per family, per month is 223.7 thous tug /192.8 USD/ in 2007.

### ***Average education level of population***

Legacies of the socialist system are high levels of adult literacy and educational attainment. Although ground was lost during the early years of the economic transition, levels of education and literacy have now reached new highs. Statistic data show us that only 1 out of 20 adults had not completed primary school and more than 8 out of 10 had finished at least lower secondary school (Grade 8). However, considerable differences exist in rates of enrolment and completion according to geographical area and quintile groups based on household poverty, with gaps between rural and urban areas, remote areas and the capital, and rich and poor.

**Table 2. Gross enrolment rates and drop outs, Mongolia, 2003-2007**

| indicators                       | 2003-2004 | 2004-2005 | 2005-2006 | 2006-2007 |
|----------------------------------|-----------|-----------|-----------|-----------|
| gross enrolment rates percentage |           |           |           |           |
| general education                | 98.0      | 97.6      | 92.3      | 93.7      |
| primary education                | 103.5     | 102.4     | 93.3      | 93.5      |
| secondary education              | 93.1      | 93.4      | 91.2      | 93.8      |
|                                  |           |           |           |           |
| Number of drop-outs per thousand |           |           |           |           |
| Total                            | 12.0      | 10.8      | 9.0       | 12.3      |
| of which female                  | 4.9       | 4.3       | 3.6       | 4.8       |
| drop-out ratio                   | 2.3       | 2.0       | 1.6       | 2.2       |

Source: Mongolian Statistical Yearbook 2007

### ***Employment***

**Table 3. Employment**

|                                                        |                          |                        |
|--------------------------------------------------------|--------------------------|------------------------|
| <b>Population of working age:</b><br><i>including,</i> | 1 642.2<br>848.8 females | 100.0%<br>51.6% female |
| Economically active population:<br><i>including,</i>   | 1054.0<br>536.9 females  | 64.4%<br>51.0% female  |
| of which:                                              |                          |                        |
| Employed total                                         | 1024.1<br>519.9 females  | 62.1%<br>50.9% female  |
| <i>including,</i>                                      |                          |                        |
| Unemployed                                             | 29.9<br>17.0 females     | 3.6%<br>55.1% female   |
| Labor force participation rate                         |                          | 63.2%                  |
| Employment rate                                        |                          | 61.2%                  |
| Unemployment rate                                      |                          | 3.2%                   |

/Mongolian Statistical Year Book/

Unemployment has remained stable at around 3.2-3.5% for the last five years. At the end of 2007, the number of registered unemployed was 32.3 thous. Among them a number of unemployed women were 18.1 thous, which is 56.3 percent of total registered unemployed.

## 1.2. Political/Geographic Structure of the Country

Legally, Mongolia has a type of federal system wherein the power to govern is legally divided by constitution between central and local governments. The local governments are divided into Aimag, Soum and Bag. The capital Ulaanbaatar is similarly divided into Duureg and khoroo. It says that Mongolia has 21 aimags (provinces) 340 soums and 9 duureg, which are, in turn divided into 132 khoros.

**Table 4. Administrative units, by regions, aimags and the Capital, in 2007**

| Aimags and the Capital | Number of soums and district | Number of Bags and Khoros | Territory thous km2 | Population density people per.sq.km |
|------------------------|------------------------------|---------------------------|---------------------|-------------------------------------|
| <b>TOTAL</b>           | 340                          | 1670                      | 1564.1              | 1.68                                |
| <b>West region</b>     | 92                           | 463                       | 415.3               | 0.99                                |
| Bayan-Olgii            | 14                           | 84                        | 45.7                | 2.21                                |
| Govi-Altai             | 18                           | 83                        | 141.4               | 0.43                                |
| Zavkhan                | 24                           | 113                       | 82.5                | 0.98                                |
| Uvs                    | 19                           | 92                        | 69.6                | 1.16                                |
| Khovd                  | 17                           | 91                        | 76.1                | 1.16                                |
| <b>Khangai region</b>  | 100                          | 514                       | 384.3               | 1.45                                |
| Arkhangai              | 19                           | 99                        | 55.3                | 1.68                                |
| Bayankhongor           | 20                           | 100                       | 116.0               | 0.73                                |
| Bulgan                 | 16                           | 72                        | 48.7                | 1.24                                |
| Orkhon                 | 2                            | 19                        | 0.8                 | 100.11                              |
| Ovorkhangai            | 19                           | 103                       | 62.9                | 1.84                                |
| Khovsgol               | 24                           | 121                       | 100.6               | 1.22                                |
| <b>Central region</b>  | 95                           | 354                       | 473.6               | 0.92                                |
| Govisumber             | 3                            | 10                        | 5.5                 | 2.28                                |
| Darkhan-Uul            | 4                            | 24                        | 3.3                 | 26.54                               |
| Dornogovi              | 14                           | 57                        | 109.5               | 0.51                                |
| Dundgovi               | 15                           | 64                        | 74.7                | 0.65                                |
| Omnogovi               | 15                           | 53                        | 165.4               | 0.28                                |
| Selenge                | 17                           | 49                        | 41.2                | 2.44                                |
| Tov                    | 27                           | 97                        | 74.0                | 1.16                                |

|                    |    |     |       |        |
|--------------------|----|-----|-------|--------|
| <b>East region</b> | 44 | 207 | 286.2 | 0.70   |
| Dornod             | 14 | 58  | 123.6 | 0.59   |
| Sukhbaatar         | 13 | 66  | 82.3  | 0.67   |
| Khentii            | 17 | 83  | 80.3  | 0.89   |
|                    |    |     |       |        |
| <b>Ulaanbaatar</b> | 9  | 132 | 4.7   | 219.40 |

The central government maintains the authority to administer national needs and affairs. The local governments are accorded a certain amount of authority to control local affairs. The Constitution defines local governments as administrative, territorial, and socio-economic complexes with their functions and administrations provided by law. It further states that the “self-governing body” of Aimag, Capital city, Soum and Duureg shall consist of Citizen’s Representative Khurals. At Bag and Khoroo levels, this body shall comprise General Meetings of Citizens. One of the major functions of these Khurals is to discuss and make decision on the affairs of governance within their territory including economic and social development, finances, nomination of the recommendations for the removal of the same level Governor, inspection of the Governor’s work. In this sense, the local Khurals acts as a legislative authority for the local area. In the framework of environmental protection, Khurals have right to enact certain measures for environmental protection, to fix maximum limits for the use of natural resources, to take land within their territory under local protection, to establish boundaries for special zones to meet sanitary requirements, etc.

Executive governance is implemented by local government, which is chaired by Governors. Aimag and City Governors, which are laid in the higher level of the local government, have more than hundreds of responsibilities pursuant to the laws. For instance:

- Organize implementation of the laws and Cabinet Ministry decisions.
- Develop and implement measures for environmental protection, proper use and restoration of natural resources within their territory
- Submit all statistics and data to the central administrations.
- Control any activities of the local business entities. If necessary, temporarily enjoin any activities which have adverse environmental and health impacts
- Coordinate activities of local environmental organizations
- Equip chief inspector with required tools and transportation
- Define land possession and issue land claim and organize in putting control any activities in prospecting, exploration and mining in accordance with related laws.
- Submit proposal in issuing mining or exploration license to the Citizen’s Representative Khural

Soum and Duureg Governors have responsibilities more than for Aimag and City Governors. Some of these are overlapped with Governors of Aimag and City. Responsibilities include:

- Organize implementation of related laws and decisions of higher level organizations within their territory
- Issue licenses for the use of natural resources pursuant to the law
- Control the use of natural resources and establish areas of utilization
- Control any activities of local business entities. If necessary, temporarily enjoin any activities which have adverse environmental and health impacts
- Direct the work of rangers
- Designate garbage and waste disposal locations and take measures to mitigate pollution
- Control land possessors and users are in using and protecting land and land resources efficiency, rationally and accordance with law and contract.
- Support by his/her proposal in issuing mining and exploration licenses in respective local area.
- Organize implementation of the Government Programme and submit proposal to develop programme on adequate use of land resources, supporting agricultural activities
- Based on Khural's decision, issue land possession of citizen and economic entities for special need.
- Issue underground land resources in purposes of construction for local needs.
- Organize implementation of Khural's decision in using and possessing natural resources to the citizen and business entities.
- Control implementation of mining, prospecting and exploration operation, and land usage and possession of economic entities and citizen, and their rehabilitating activities, if necessary take measure on violation of the laws
- Issue land owning, possession and utilization to the Mongolian citizen and economic entity pursuant to the related laws.
- Based on exploration and mining licenses to issue land claim

Central government is headed by Prime Minister is the highest executive authority in Mongolia. There are 13 ministries in authority are as follows:

- Office of the Prime Minister
- Ministry of Food and Agriculture
- Ministry of Industry and Commerce
- Ministry of Education, Culture and Science
- Ministry of Construction and Urban Development
- Ministry of Defense
- Ministry of Fuel and Energy
- Ministry of Finance
- Ministry of Foreign Affairs
- Ministry of Justice and Internal Affairs
- Ministry of Social Welfare and Labor
- Ministry of Nature and Environment
- Ministry of Health
- Ministry of Roads, Transportation and Tourism

### 1.3. Industrial and Agricultural Sector

**Table 1.3.A: Overview of National Economic Sectors**

| ISIC Rev.4<br>(Draft)<br>Code <sup>1</sup>         | Economic Sectors and Related Activities                                                | Contribution to Gross Domestic Product (%) | Output Value (mln.USD) in 2007 | Growth rate over past two years /2006 and 2007/ (by average %) |
|----------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------|----------------------------------------------------------------|
| <b>Sector of Agriculture, forestry and fishing</b> |                                                                                        | <b>22.84</b>                               | <b>919.79</b>                  | <b>11.65</b>                                                   |
| A 01/ A 02 /                                       | Crop and animal production, hunting and related service activities /Forestry/ and      |                                            | 919.71                         |                                                                |
| A 03                                               | Fishing                                                                                |                                            | 0.08                           |                                                                |
| <b>Sector of Mining and Extraction</b>             |                                                                                        | <b>27.96</b>                               | <b>891.549</b>                 | <b>3.98</b>                                                    |
| B 04-09                                            | Coal/Oil/Natural Gas/Minerals/Metals                                                   |                                            | 891.549                        |                                                                |
| <b>Sector of Manufacturing/Industry</b>            |                                                                                        | <b>4.61</b>                                | <b>448.92</b>                  | <b>22.85</b>                                                   |
| C 10/C11                                           | Food products                                                                          |                                            | 134.82                         |                                                                |
| C 12                                               | Tobacco products                                                                       |                                            | 0.95                           |                                                                |
| C 13-15                                            | Textiles/wearing apparel/leather                                                       |                                            | 131.54                         |                                                                |
| C 16                                               | Wood and of products of wood and cork                                                  |                                            | 3.02                           |                                                                |
| C 17                                               | Paper and paper products                                                               |                                            | 1.51                           |                                                                |
| C 18                                               | Printing and recorded media                                                            |                                            | 7.85                           |                                                                |
| C 19-22                                            | Coke, refined petroleum products, chemicals, pharmaceutical products, plastic products |                                            | 4.83                           |                                                                |
| C 23                                               | Non-metallic mineral products                                                          |                                            | 0.73                           |                                                                |
| C 24-25                                            | Basic metals and fabricated metal products                                             |                                            | 14.51                          |                                                                |
| C 26                                               | Computer, electronic, and optical products                                             |                                            | 143.89                         |                                                                |
| C 27                                               | Electrical equipment                                                                   |                                            | 1.12                           |                                                                |
| C 28-30                                            | Machinery and equipment, motor-vehicles, other transport equipment                     |                                            | 2.24                           |                                                                |
| C 30-33                                            | Furniture                                                                              |                                            | 1.84                           |                                                                |
|                                                    |                                                                                        |                                            |                                |                                                                |
| <b>Sector of Services</b>                          |                                                                                        | <b>27.02</b>                               | <b>171.74</b>                  | <b>6.62</b>                                                    |
| D                                                  | Electricity, gas, steam and air conditioning supply                                    |                                            | 153.80                         |                                                                |
| E                                                  | Water supply, sewerage, waste management                                               |                                            | 17.33                          |                                                                |

| ISIC Rev.4<br>(Draft)<br>Code <sup>1</sup> | Economic Sectors and Related Activities                                                                                                              | Contribution to Gross Domestic Product (%) | Output Value (mln.USD) in 2007 | Growth rate over past two years /2006 and 2007/ (by average %) |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------|----------------------------------------------------------------|
| F                                          | Construction                                                                                                                                         |                                            | 0.06                           |                                                                |
| G                                          | Wholesale and retail trade, repair of vehicles and motorcycles                                                                                       |                                            | 0.22                           |                                                                |
| H                                          | Transportation and storage                                                                                                                           |                                            | 0.31                           |                                                                |
| I                                          | Accommodation and food services activities                                                                                                           |                                            | 0.02                           |                                                                |
|                                            |                                                                                                                                                      |                                            |                                |                                                                |
|                                            |                                                                                                                                                      |                                            |                                |                                                                |
|                                            | others                                                                                                                                               | 17.57                                      | 193.40                         | 13.21                                                          |
|                                            | public administration & defense, compulsory social security, real estate, renting, education, other community social and personal service activities |                                            | 193.40                         |                                                                |
| <b>TOTAL</b>                               |                                                                                                                                                      |                                            | <b>2625.399</b>                | <b>11.66</b>                                                   |
|                                            |                                                                                                                                                      |                                            |                                |                                                                |

The major products of the agricultural sector are; meat (beef, mutton and goat), hide and skin (horse, cattle, sheep and goat) and cashmere, sheep wool, milk, wheat, eggs, potato and vegetables (cabbage, carrot, onion, cucumber, tomato etc)

For mining and quarrying sector the majors are coal, crude oil, copper concentrate, molybdenum concentrate, gold, flour spar, iron ore, zincium concentrate, salt mining.

For manufacturing sector, major products are; copper, copper foundries, metal steel, metal foundries, cement, lime, installed metal, Khurmen block, combed down, scoured wool, carpet, knitted goods, meat, dairy products etc.

**Table 13.B. Structure of the Manufacturing/Agricultural sector**

| sector           | construction | manufacturing | mining | agricultural |
|------------------|--------------|---------------|--------|--------------|
| <b>Employees</b> |              |               |        |              |
| 1 to 9           | 40.4         | 66.6          | 22.3   | 78.7         |
| 10 to 19         | 50           | 23.5          | 50     | 20.3         |
| 50 to 100        | 9.6          | 7.8           | 0.0    | 0.0          |
| 101 to 250       | 0.0          | 2.0           | 5.6    | 1.1          |

But it would be mentioned that mining is the fastest growing industry, accounting 27.96% GDP and more than half the value of all exports, mostly copper and gold. 30% of

the country has been licensed for exploration. Thus mining sector is booming in Mongolia today, with foreign and domestic investment pouring into it and output, employment and wages are growing rapidly. However, despite the leading role played by mining as the engine of growth in recent years, concerns have been raised about its capacity for generation of productive employment. Between 1994 and 2006 the number of workers in mining increased from 14,600 to 41,900, a far greater percentage increase than in any other sector – but as of 2006 this still represented only 4.1 percent of the total work force. Virtually all of this increase has occurred since 2000, during which time the average annual increase has been 20.9 percent. Clearly, mining opens opportunities for both formal and informal employment. Along with the increase of formal employment in the mining sector, informal employment has been growing intensively in recent years. There are about 20000 small miners are belonged in this category. Mostly they are working by all family members involving children. Informal employment in the mining sector is a new phenomenon that emerged in Mongolia after the transition to the market economy. In the early years of transition, informal coal mining started in such mines as Nalaikh, formerly large state-owned operations that had stopped their activities, but since 1998 informal gold mining has become widespread. Informal mining of other minerals also has spread rapidly. At present informal miners mine not only coal, but gold and fluorspar. Some data suggest that informal employment in the Mongolian mining sector equals formal employment in the sector, or even exceeds it.

**Table 13.C. Breakdown of Agricultural Production by Regions**

| <b>aimags and the Capital</b> | <b>major crops</b>                 | <b>total value of crop /ton/</b> | <b>size of productive areas /hectares/</b> |
|-------------------------------|------------------------------------|----------------------------------|--------------------------------------------|
| <b>Total</b>                  |                                    | <b>319249.6</b>                  | <b>202729.3</b>                            |
| <b>west region</b>            |                                    | <b>38532.9</b>                   | <b>8639.5</b>                              |
| Bayan-Olgii                   | potato, vegetables, fodder crops   | 5081.6                           | 684.3                                      |
| Govi-Altai                    | potato, fodder crops, cereals      | 4100.1                           | 1308.2                                     |
| Zavkhan                       | potato, vegetables                 | 4098.6                           | 608.7                                      |
| Uvs                           | cereals, vegetables, potatoes      | 5831.3                           | 3390.7                                     |
| Khovd                         | vegetables, potatoes, fodder crops | 19421.3                          | 2647.6                                     |
|                               |                                    |                                  |                                            |
| <b>khangai region</b>         |                                    | <b>59271.2</b>                   | <b>34511.6</b>                             |
| Arkhangai                     | potatoes, fodder crops, vegetables | 5551.9                           | 1631.3                                     |
| Bayankhongor                  | potatoes, vegetables               | 3479.5                           | 407.1                                      |
| Bulgan                        | cereals, potatoes, vegetables      | 25071.6                          | 17640.3                                    |
| Orkhon                        | potatoes, vegetables, cereals      | 9223.1                           | 3280.3                                     |
| Ovorkhangai                   | potatoes, vegetables               | 3609.7                           | 2353.4                                     |
| Khosgol                       | cereals, potatoes                  | 12335.4                          | 9199.2                                     |
|                               |                                    |                                  |                                            |
| <b>central region</b>         |                                    | <b>202456.2</b>                  | <b>147864</b>                              |
| Govisumber                    | potatoes, vegetables               | 107.9                            | 28.7                                       |
| Darkhan-Uul                   | vegetables, potatoes, cereals      | 16686.8                          | 10781.9                                    |
| Dornogovi                     | Vegetables                         | 287.2                            | 32.9                                       |

|                    |                                             |               |                |
|--------------------|---------------------------------------------|---------------|----------------|
| Dundgovi           | fodder crops                                | 868.9         | 43.0           |
| Omnogovi           | potatoes, vegetables                        | 2089          | 229.0          |
| Selenge            | cereals, vegetables, potatoes, fodder crops | 132725.5      | 101322.9       |
| Tov                | potatoes, cereals, vegetables               | 49690.9       | 35425.6        |
|                    |                                             |               |                |
| <b>east region</b> |                                             | <b>9082.1</b> | <b>10521.9</b> |
| Dornod             | potatoes, vegetables                        | 2979.4        | 2701.9         |
| Sukhbaatar         | potatoes, vegetables                        | 487.4         | 64.1           |
| Khentii            | cereals, potatoes, vegetables               | 5615.3        | 7755.9         |
|                    |                                             |               |                |
| Ulaanbaatar        | vegetables, potatoes                        | <b>9907.2</b> | 1192.3         |

Agriculture is the mainstay of Mongolia's 2.6 million people. It contributes about 22.84 % of gross domestic product almost equal with mining sector. In 2002, the government passed legislation allowing long-term land leasing, strengthening sector institutions, and privatizing service delivery wherever possible, and continuing with the privatization process. In terms of categories the potatoes are placed equal with cereals by its volume as about 114.5 thous.ton (34% of total crops harvested). Cereals are the most important agricultural product of the nation. It is grown over 84.4% of the agricultural land, particularly in the central and khangai region. But cereals consumption is increased year by year and it is not sufficient even about 114.8 thous ton cereals were harvested last year. Thus one of the main importing goods is wheat from Kazakhstan.

Table 1.3.D. Breakdown of Industrial Production by Region

| Region                | Major products                                                                                                                                                | Total value of production /mln. tog/ |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
|                       |                                                                                                                                                               |                                      |
| <b>West region</b>    | flour spar                                                                                                                                                    | <b>15653.7</b>                       |
|                       |                                                                                                                                                               |                                      |
| <b>khangai region</b> | copper, gold, flour spar,                                                                                                                                     | <b>1168080.9</b>                     |
| <b>central region</b> | coal, gold, flour spar,                                                                                                                                       | <b>190926.8</b>                      |
|                       |                                                                                                                                                               |                                      |
| <b>east region</b>    | zinc, iron ore, gold, silver,                                                                                                                                 | <b>147152.2</b>                      |
| <b>Ulaanbaatar</b>    | food products and beverages, textile, wearing apparel, dressing and dyeing fur, tanning, dressing of leather, rubber and plastic, publishing and printing etc | <b>1081121.6</b>                     |

/1USD=1160 tug by 2006/

## 1.4. Releases of Concern by Major Economic Sectors

**Table 1.4.E: Releases by Type and Media for Major Economic Sectors**

| ISIC Rev.4<br>(Draft) <sup>1</sup>                 | Economic Sectors and Related Activities                                                | Major<br>Pollution<br>Emissions<br>by Chemical<br>Type | Media to<br>which<br>Emissions<br>are<br>Released:<br>Air, Water,<br>Soil | Wastes<br>Emitted as:<br>Solids,<br>Liquids or<br>Gases by<br>Volume or<br>Weight if<br>known |
|----------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Sector of Agriculture, forestry and fishing</b> |                                                                                        |                                                        |                                                                           |                                                                                               |
| A 01                                               | Crop and animal production, hunting and related service activities                     | POPs                                                   | Soil                                                                      | Liquid<br>Solid                                                                               |
| A 02                                               | Forestry and logging                                                                   | -                                                      | -                                                                         | -                                                                                             |
| A 03                                               | Fishing and aquaculture                                                                | -                                                      | -                                                                         | -                                                                                             |
| <b>Sector of Mining and Extraction</b>             |                                                                                        |                                                        |                                                                           |                                                                                               |
| B 04-09                                            | Coal/Oil/Natural Gas/Minerals/Metals                                                   | Mercury,<br>Cyanide                                    | Water, soil,<br>air                                                       | Solids,<br>liquids<br>gases                                                                   |
| <b>Sector of Manufacturing/Industry</b>            |                                                                                        |                                                        |                                                                           |                                                                                               |
| C 10                                               | Food products                                                                          | -                                                      | -                                                                         | -                                                                                             |
| C 11                                               | Beverages                                                                              | -                                                      | -                                                                         | -                                                                                             |
| C 12                                               | Tobacco products                                                                       | -                                                      | -                                                                         | -                                                                                             |
| C 13-15                                            | Textiles/wearing apparel/leather                                                       | Tanning<br>chemicals                                   | Soil, water                                                               | Liquid<br>solid                                                                               |
| C 16                                               | Wood and of products of wood and cork                                                  | -                                                      | -                                                                         | -                                                                                             |
| C 17                                               | Paper and paper products                                                               | -                                                      | -                                                                         | -                                                                                             |
| C 18                                               | Printing and recorded media                                                            | -                                                      | -                                                                         | -                                                                                             |
| C 19-22                                            | Coke, refined petroleum products, chemicals, pharmaceutical products, plastic products | Industrial<br>chemicals<br>POPs                        | Soil, water,<br>air                                                       | Liquids,<br>gases, solids                                                                     |
| C 23                                               | Non-metallic mineral products                                                          | Industrial<br>chemicals                                | Soil, water,<br>air                                                       | Liquids,<br>gases, solids                                                                     |
| C 24-25                                            | Basic metals and fabricated metal products                                             | Industrial<br>chemicals<br>and POPs                    | soil                                                                      | liquids                                                                                       |
| C 26                                               | Computer, electronic, and optical products                                             | -                                                      | -                                                                         | -                                                                                             |
| C 27                                               | Electrical equipment                                                                   | -                                                      | -                                                                         | -                                                                                             |
| C 28-30                                            | Machinery and equipment, motor-vehicles, other transport equipment                     | Industrial<br>chemicals<br>and POPs                    | soil                                                                      | liquids                                                                                       |
| <b>Sector of Services</b>                          |                                                                                        |                                                        |                                                                           |                                                                                               |

| ISIC Rev.4<br>(Draft) <sup>1</sup> | Economic Sectors and Related Activities                        | Major<br>Pollution<br>Emissions<br>by Chemical<br>Type | Media to<br>which<br>Emissions<br>are<br>Released:<br>Air, Water,<br>Soil | Wastes<br>Emitted as:<br>Solids,<br>Liquids or<br>Gases by<br>Volume or<br>Weight if<br>known |
|------------------------------------|----------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| D                                  | Electricity, gas, steam and air conditioning supply            | ODS                                                    | air                                                                       | gas                                                                                           |
| E                                  | Water supply, sewerage, waste management                       | Industrial chemicals                                   | Air, water                                                                | Gases, solids                                                                                 |
| F                                  | Construction                                                   | -                                                      | -                                                                         | -                                                                                             |
| G                                  | Wholesale and retail trade, repair of vehicles and motorcycles | -                                                      | -                                                                         | -                                                                                             |
| H                                  | Transportation and storage                                     | ODS and POPs                                           | air                                                                       | gas                                                                                           |
| I                                  | Accommodation and food services activities                     | -                                                      | -                                                                         | -                                                                                             |
| <b>TOTAL (if applicable)</b>       |                                                                |                                                        |                                                                           |                                                                                               |

### ***1.5. Comments/Analysis***

Mongolia belongs to the group of Land-locked Developing Countries (LLDCs), one of the Economies in Transition (EIT). Mongolia began in 1990 the difficult process of democratizing its governance and transforming its economy from one directed by central planning to one guided by the open market. Since 1991, Mongolia has followed a policy of economic liberalization, including privatization, financial liberalization and capital account convertibility. At the same time, the total private sector share of GDP increased from being nearly absent to 75% in 2002. Since then some increases were shown in period of 2004-2007. The GDP per capita in 2007 was estimated as 1742.8 thous tugrigns (or about US\$ 1502.4), compared to 854.5 thous tugrigns in 2004.

Economic development faces serious challenges as Mongolia is navigating the difficult transition from a centrally planned to a market oriented economy, and overcoming considerable geographical obstacles to development, including being super-landlocked with an extreme continental climate. Under these tough circumstances, the Government has committed itself to market reform through an active privatization programme, trade and investment liberalization and the unification of exchange rates. These policies have borne fruit to a certain extent: declining growth rate of 1990 to 1993 has been reversed since 1994. During the last 3 years period inflation rate has radically declined and macroeconomic stability can be observed as a result of the private sector encouraging Government towards enhancing structural adjustment measures, improving banking, finance, budget, tax, social insurance, price liberalization and social security systems. Exports are concentrated in mineral-based commodities, accounting for 57.9% in 2006, 66.8% in 2007 of total exports, while natural or cultured pearls, precious metal

and jewelry accounts for 12.1%, and textiles and related articles account for 13.5% in 2007. Mongolia is dependant from its import; particularly about 70% of consumption is based on import. Most importing commodities are mineral products including fuel and energy, placed about 27.8% of total commodities, and food products including wheat, flour, potato and fruits are placed about 7.3% of total commodities.

Figure 1. Industrial composition of GDP by percentage

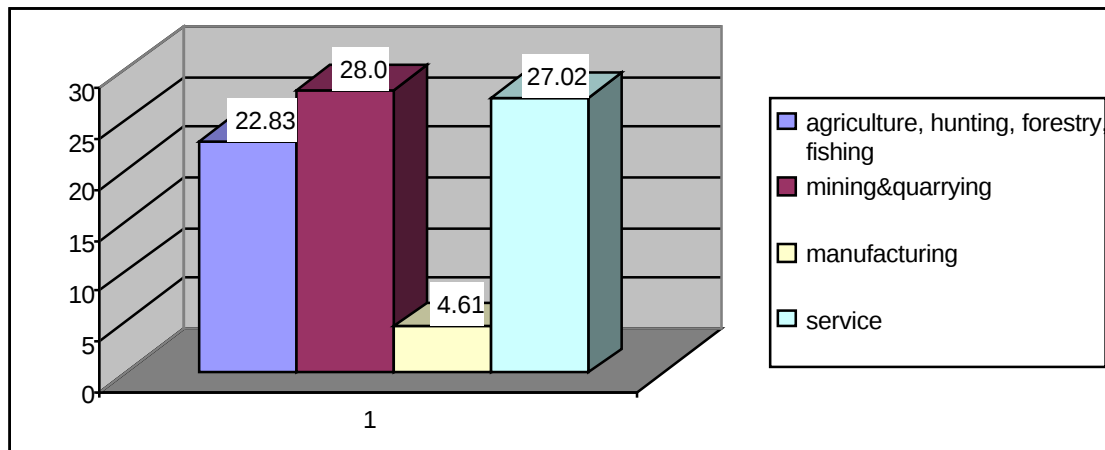
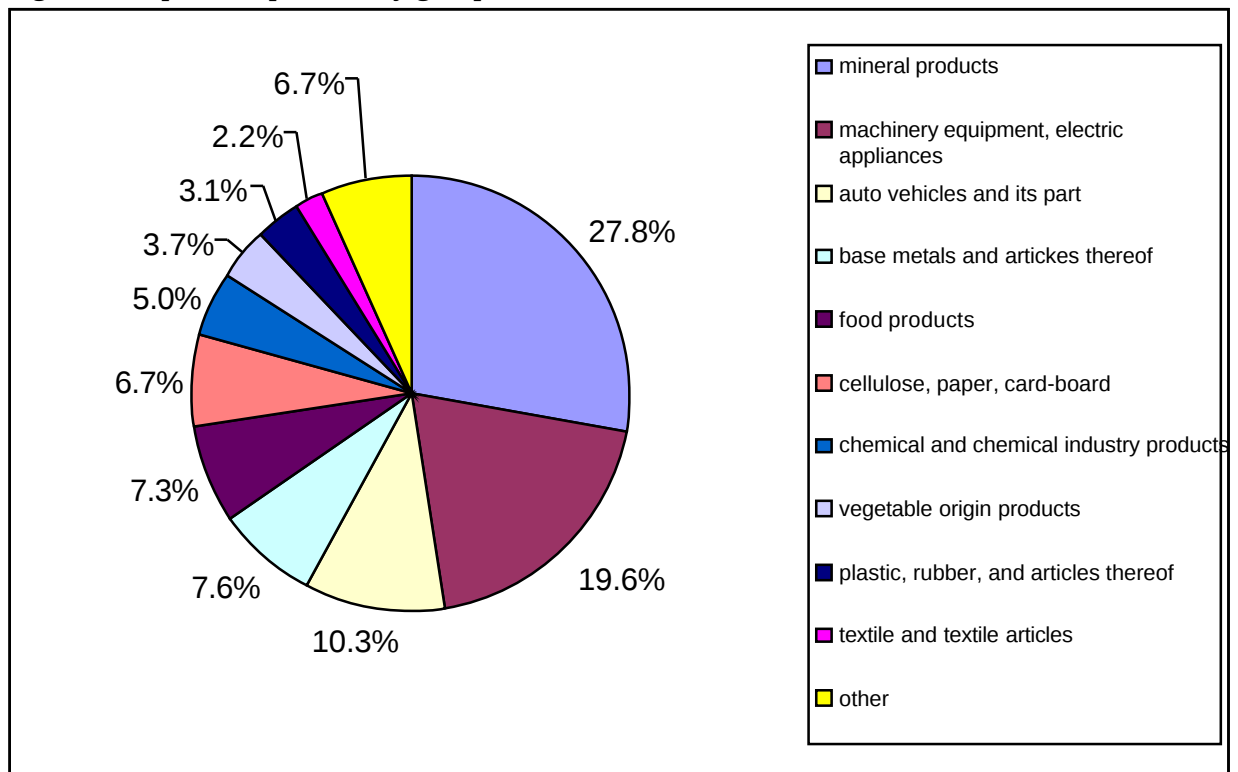


Figure 2. Import composition by groups of commodities



The proportion of population below the national poverty line decreased from 36.3 percent in 1990 to 32.2 percent in 2006. The depth of poverty, which shows average deficiency in consumption of the poor from the national poverty line, also decreased from 11.0 percent in 2002-2003 to 10.1 percent in 2006. The level of poverty is, however, higher in rural areas compared to urban areas. While urban poverty decreased from 30.3 percent in 2002-2003 to 27.9 percent in 2006, rural poverty decreased from 43.4 percent to 37.0 percent during the same period. However due to poverty in rural areas, informal mining and migration to the mining site are increased. Between 1994 and 2006 the number of workers in mining increased from 14,600 to 41,900, a far greater percentage increase than in any other sector – but as of 2006 this still represented only 4.1 percent of the total work force. Virtually all of this increase has occurred since 2000, during which time the average annual increase has been 20.9 percent. Along with the increase of formal employment in the mining sector, informal employment has been growing intensively in recent years. There are about 20000 small miners are belonged in this category. Mostly they are working by all family members involving children in illegal gold mining and illegal use of chemicals with mercury and cyanide.

The climate is harsh continental with sharply defined seasons, high annual and diurnal temperature fluctuations and low rainfall. Because of the high altitude, Mongolia's climate is generally colder than other countries of the same latitude. The extreme minimum temperature is -31.1OC to -52.9OC in January and the extreme maximum temperature is +28.5OC to +42.2OC in July. In addition same time of migration to the mining site at rural area, another migration to the UB city is increased as shown in the table. It becomes a major cause of increasing of air pollution at UB city. In UB about 5 million ton of coal are used and approximately 380,000-420,000 ton/year of coal are consumed in the ger district. There are also 230 coal-fueled heating boilers in UB, consuming 1 million ton of coal per year. 3 central power stations are now consuming approximately 3.5 million t/year of coal.

Agriculture is the mainstay of Mongolia's 2.6 million people. It contributes about 22.84 % of gross domestic product almost equal with mining sector. The major products of the agricultural sector are; meat (beef, mutton and goat), hide and skin (horse, cattle, sheep and goat) and cashmere, sheep wool, milk, wheat, eggs, potato and vegetables (cabbage, carrot, onion, cucumber, tomato etc). Due to that feature in Mongolia, tanneries are important enterprises of the industry in Mongolia. There has been increased number of tanneries that discharge yellowish untreated wastewater directly to the central wastewater treatment plant, causing serious ground water contamination.

## **CHAPTER 2**

### **CHEMICAL PRODUCTION, IMPORT, EXPORT AND USE**

Past issues related to chemicals production, import, export, storage, transport, use, and disposal were generally belonged to the MNE. According to Law on Toxic Chemicals adopted in 1995 only the chemicals in toxic categorization were regulated that law and MNE was main body who shall implement state policy on toxic chemicals. Chemicals and substances which influence human health, environment, livestock and wild animals and pose a risk of death or extermination (except radioactive, intoxicating and tranquillizing chemicals and chemicals used for households, food ingredients, and medical preparations) belong to the category of toxic chemicals according to the law. Depending upon their impact and toxicity on human health and the environment, toxic chemicals are classified as highly toxic, toxic and mildly toxic. The list of chemicals in classification was being determined by MNE and MoH. Basic regulation in production, export, import, trade, disposal and use toxic chemicals was issued by local Aimag or Capital City governor, not from MNE. Only highly toxic chemicals production, export, import, trade, disposal and use were issued by MNE based on appropriate assessment. In framework of storage the procedure were determined by MNE and governors were indicating storage places for toxic chemicals. Trades of toxic chemicals were only in an authorized location separated from food or other goods or products and only to citizens, economic entities or organizations with a permission to trade toxic chemicals. In transport of chemicals the routes to transport flammable, explosive or extremely toxic chemicals were authorized by Police Office. Chemical waste and unusable toxic chemicals shall be disposed in a place indicated by the local governors consistent with established procedures.

Since 2006 Government has taken several measures after a number of chemical accidents and incidents. First of all in 2006, Law on Hazardous and Toxic chemicals was approved by the Parliament and chemical management procedure fully changed. Also list of banned and severely restricted chemicals are renewed, therefore, mercury and cyanide are included into list of severely restricted chemicals. In order to improve chemical regulation and requirements Minister of Nature and Environment, Minister of Health and Minister in charge of Emergency Management are issued Ordinance "Regulation on storing, transporting, using and disposing of toxic and hazardous chemicals" in 2007. Moreover procedure in export, import, transport, production, trade, use and disposal of chemicals is changed by governance centralized system approach. Previously, only highly toxic chemicals were permitted by MNE and others are permitted by Governors of aimag and city. Also all import and use of chemicals, except explosives shall be permitted by MNE by new regulation. Generally, chemical management was out of integrated consideration by the government. By Government Resolution in 2006, the borders to pass chemicals have decreased from 18 to 4 and business entities to import cyanide are decreased. Therefore significance of the new law is the government has taken chemical management in its hand and has potential to manage in integrated way and to create database on chemical management.

## 2.1. Chemical Production, Import and Export

Chemicals are important raw materials because chemical substances are involved in every production not only for agricultural and industrial but also for consumers sectors. Mongolia imports most primary chemicals for producing products that relate to upstream and downstream industries, which increases the value added to products. Chemical substances in Mongolia are used for a wide range of purposes, from those bought over the counter for personal care, to medical uses and cleaning, through to agricultural and industrial chemicals, particularly in mining process. Although chemical substances are tremendously useful, their application without due care, appropriate maintenance, and effective protection can bring about disastrous consequences. Mongolia has realized health and environmental problems posed by chemicals and wastes. With regard to chemicals management, involving waste issues, there are many agencies involved. All of them have their own information and data collecting strategy. Their recording systems are not harmonized; therefore, there are some overlaps and gaps in chemicals management information. In order for better chemical waste management scheme, greater attentions should be placed on the search and analysis of available waste information.

In terms of chemicals, until 1990 Mongolia imported all chemicals from former Soviet Union and since 1990s with the transition to the market economy the importation of chemicals from countries such as the Russian Federation, Germany, China and the Republic of Korea becoming to prevail. Mongolia produces bio-fertilizers in small amount, however, does not produce mineral fertilizers.

Major part of total required chemicals for agriculture and industry is imported and only a slight portion is produced in the country. For example:

1. Petroleum products
2. Consumer chemicals (soap, washing powder, shampoo and cosmetics)
3. Pharmaceutical products

**Table 2.A. Chemical Production and Trade 2006-2007**

| Chemical Type                                                | Production/<br>Manufacturing<br>(tonnes/year) | Imports<br>(tonnes/year<br>and value) | Formulation/<br>Packaging<br>(tonnes/years) | Exports<br>(tonnes/years) |
|--------------------------------------------------------------|-----------------------------------------------|---------------------------------------|---------------------------------------------|---------------------------|
| Pesticides<br>(agricultural, public<br>health, consumer use) | 58,882                                        | 1035.28                               | No                                          | No                        |
| Fertilizers<br>Chemical<br>Biological                        | 174.2                                         | 18700.0                               | No                                          | No                        |
| Petroleum Products                                           | 139204.7<br>barrel                            | 7832.0                                | No                                          | 129.4 barrel              |
| Industrial (used in                                          |                                               |                                       |                                             |                           |

|                                                                             |                                 |              |    |    |
|-----------------------------------------------------------------------------|---------------------------------|--------------|----|----|
| manufacturing/<br>Processing facilities)                                    | No                              | 200903.8     | No | No |
| Consumer chemicals                                                          | No                              | 11250.2      | No | No |
| Ozone depletion<br>substances                                               | No                              | 9.36         | No | No |
| Other chemicals<br>Liquid medicine<br>Medical tablets<br>Drug for livestock | 191.6 t<br>8611.0<br>thouspacks | 1109.6<br>33 |    |    |
| total                                                                       |                                 | 240873.24    |    |    |

Source: MNE, Ozone National Authority and Ministry of Food and Agriculture, Statistical Office

**Table 2.A.1: Raw Materials for Chemicals and Related Industries**

| Raw Materials                                                                   | Import<br>(tonnes or<br>volume/year) | Exports<br>(tonnes or<br>volume/year) | Extracted Locally<br>(tonnes or volume/year) |
|---------------------------------------------------------------------------------|--------------------------------------|---------------------------------------|----------------------------------------------|
| petroleum                                                                       | 7832.0                               | -                                     |                                              |
| Crudeoil                                                                        |                                      | 129.4 barrel                          |                                              |
| Tanning chemicals,<br>skin bleaching and<br>brightener                          | 20090                                |                                       |                                              |
| Chemicals in mining                                                             | 120542.3                             |                                       |                                              |
| Other raw materials<br>for brewery and<br>food products ,<br>coloring chemicals | 60271.14                             |                                       |                                              |

## 2.2. Chemical Use by Category

Table.2.B. Chemical use by Categories

| Type of chemicals | Number of tonnes Used per Year in the<br>Country |
|-------------------|--------------------------------------------------|
| Pesticides        | 835.28                                           |
| Bio-pesticides    | 250                                              |
| Fertilizers       | 2000                                             |

|                                                                     |        |
|---------------------------------------------------------------------|--------|
| Petroleum Products                                                  | 8000   |
| Industrial Chemicals (used in manufacturing/processing facilities ) | 200900 |
| Consumer chemicals                                                  | 11500  |
| Other chemicals                                                     | 1200   |

Source: MNE

### 2.3 . Storage of Chemicals and Related Issues

**Table 2.C: Bulk Chemical Storage and Warehousing Facilities**

| Chemical Type                                                                | Size/Capacity<br>(Volume in cubic meters or weight in tonnes) | Type of Facility <sup>1</sup> | Location Area<br>(Port, Industrial Complex, Urban, Rural) | Labeling; Health and Environment Protection Measures <sup>2</sup> |
|------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------|
| <b>Pesticides</b><br>(agricultural, public health, & consumer use)           | 8368.96 *                                                     | enclosed                      | Rural                                                     | Labeled under national system                                     |
| <b>Fertilizers</b>                                                           |                                                               | enclosed                      | Rural                                                     | Labeled under national system                                     |
| <b>Industrial Chemicals</b><br>(used in manufacturing/processing facilities) |                                                               | enclosed                      | complex                                                   | Labeled under national system                                     |
| <b>Petroleum Products</b>                                                    | Not possible to define                                        | enclosed                      | complex                                                   |                                                                   |
| <b>Consumer Chemicals</b>                                                    | Not possible to define                                        | Partly covered                | complex                                                   |                                                                   |
| <b>Chemical Waste</b>                                                        | Not possible to define                                        | Completely enclosed           | complex                                                   |                                                                   |
| <b>Other Chemicals</b><br>(unknown/mixed use)                                |                                                               |                               |                                                           |                                                                   |

\* data from chemicas inventory in 2007. MNE and Chemical Council are working on the analyse of the inventory.

## 2.4. Transport of Chemicals and Related Issues

**Table 2.D: Supply Chain for Bulk Chemical Distribution and Transportation**

| Chemical Type                                                       | Type of Transportation Facility: Maritime, Inland waterway, Rail, Road, Air | Approximate Capacity (Volume in cubic meters or weight in tons transported by year) | Labelling; Health and Environment Protection Measures <sup>1</sup> |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Pesticides (agricultural, public health & consumer use)             | Road                                                                        | n/a                                                                                 | Warning signs and labeling under national system                   |
| Fertilizers                                                         | Road                                                                        | n/a                                                                                 |                                                                    |
| Petroleum Products                                                  | Road, rail                                                                  | n/a                                                                                 |                                                                    |
| Industrial Chemicals (used in manufacturing/ processing facilities) | Road, rail                                                                  | n/a                                                                                 |                                                                    |
| Consumer Chemicals                                                  | Road                                                                        | n/a                                                                                 |                                                                    |
| Chemical Waste                                                      | Road                                                                        | n/a                                                                                 |                                                                    |

By Mongolian Law Toxic and Hazardous Chemical it is prohibited to transport toxic chemicals across state borders without a permission acquired in conformity with respective procedures and a customs agency and customs health control service shall control the transportation of toxic chemicals across state borders. After transportation of toxic and hazardous chemicals that transporting container shall be decontaminated or cleaned, disinfected. The transport of toxic chemicals together with people, livestock, animals or other goods and products is prohibited. During the transportation process Traffic Police Office shall put control on whether or not apply appropriate signs and vehicles.

Inventory related on registration of chemicals directly belongs to the MNE according to the new law. However, since 2006 MNE has taken attention to create comprehensive database on chemical management, but now still has not possible to get up-to-date inventory information or analysis on chemicals and chemical waste.

## 2.5. Chemical Waste

1997, Mongolia has adopted the Basel Convention on the Control of Transboundary movements of Hazardous Wastes and Their Disposal. There are two laws on waste management in Mongolia:

1. Law on household and industrial waste
2. Law on import, export, and cross-border transport of hazardous wastes

Legally, Mongolia has different categorization in terms of the waste. According to Law on Household and Industrial Waste of Mongolia, it is categorized by 2 classification depending on its source - household and industrial, and by its impacts to the environment and human health - hazardous. A hazardous waste is a subset of solid waste. The definition of hazardous waste in the Law on Household and Industrial Waste is: "hazardous waste shall mean that can cause in humans, flora and fauna, can cause harms to them, can have negative impacts on their offspring, can upset the natural equilibrium and contain substances with ignitable; combustible, toxic, corrosive and reactive properties". The other definition in the Law on Import, Export, and Cross-border transport of hazardous wastes is: "hazardous waste includes explosives; flammable liquids and solids; combustible or radioactive substances; substances that have toxic reactions with soil, air or water that produce combustible gases; oxidants; corrosives and organic peroxides".

The main sources of hazardous waste in Mongolia are from tanneries (Chromium salts wax), from waste of petroleum products and wastewater and from soil, containing cyanide and mercury during the operation of process gold ore. Pursuant to the Basel Convention and based on permission by Korea and China, about 3.000 ton of lead acid battery scrap was exported to the Korea in 2006. According to the Law on Prohibition of Import, Transboundary Movement of Hazardous Waste and Its Export the import of hazardous wastes for use, storage and final disposal in Mongolia is prohibited. Also hazardous waste for transboundary movement fully prohibited.

Although we are adopted some legislations for hazardous wastes, there is not disposal site and treatment facility for the hazardous waste in Mongolia. However the disposal site of toxic and hazardous waste is issued by Municipality Governor, but establishment still have waiting for financing. Moreover MNE is responsible of creating database on hazardous and solid waste, therefore now inventory on source of hazardous waste to define volume of generation under specific categories is pending.

**Table. 2.E. Chemical Waste Generation and Trade**

| Type of Chemical Waste | Generation (tonnes/year) | Export (tonnes/year) | Import (tonnes/year) |
|------------------------|--------------------------|----------------------|----------------------|
| Domestic               | 186,5 thous.t            | -                    | -                    |
| Industrial             | 15,2 thous.t             | -                    | -                    |
|                        |                          | 3000 /in 1 case/     | -                    |

## 2.6 . Technical Facilities for Recycling of Chemicals

Unfortunately, in Mongolia hasn't got any technical facilities to recover and recycle of chemicals and related waste.

## 2.7. Overview of Capacity for Disposal of Chemicals

As mentioned before Mongolia still don't have and establishment to dispose and treat of chemicals. In Mongolia, solid and hazardous wastes are disposed in the open air near the city: "Ulaanchuluut" and "Morindavaa". At rural area each aimag has disposal site and it is also in the open air. The smoke and combustion fly ash which were generated are poured on the surrounding ger cluster and township.

Wastewater is treated at a central sewage treatment plant with 230,000 m<sup>3</sup> /day capacity. 100,000 m<sup>3</sup> of domestic sewage is discharged everyday through domestic sewer pipe and 70000 m<sup>3</sup> of industry sewage is discharged everyday through industry sewer pipes. Since tanneries' waste water contains Cr and alkali (pH), it was pre-treated by neutralizing at wastewater treatment facilities within the factory. However, with the aging and running down facilities, privatization of industries, and the use of out-dated technology, there has been an increase in a number of tanneries that discharge yellowish untreated wastewater directly to the central wastewater treatment plant, causing serious malfunctioning and serious ground water contamination. Sludge containing Cr is buried in landfills after sun drying.

**Table 2.G: Facilities for Disposal of Chemicals and related Waste**

| Location of Facility/<br>Operation or Process    | Description of the Facility,<br>Operation or Process | Disposal Operation<br>(Annex IVA)<br>D code | Capacity of the Facility<br>(in metric tons) | Does the Facility Treat Wastes Imported? Yes/No |
|--------------------------------------------------|------------------------------------------------------|---------------------------------------------|----------------------------------------------|-------------------------------------------------|
| "Ulaanchuluut"<br>final disposal site in UB city | landfill                                             | n/a                                         | n/a                                          | no                                              |
| "Morin davaa"final disposal site in              | landfill                                             | n/a                                         | n/a                                          | no                                              |

## 2.8. Stockpiles, Waste Deposits, and Contaminated Sites

**Table 2.H: Obsolete Chemical Stocks, Chemical Waste Sites, and Contaminated Areas**

|                                                            | Geographical Location* (GPS Coordinates or Lat. Long.)                     | Main Content by Chemical or Groups of Chemicals/Waste                                                                        | Magnitude of the Site or Stocks; e.g. Small, Medium, and Large |
|------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <b>Obsolete Chemical Stocks</b><br>Site 1<br>Site2<br>Etc. | All aimags except Bayan-Ulgii, Dornogovi and Khentii<br><br>Khuvsgul<br>UB | 25 type of chemicals<br>Nationally banned<br><br>0.4-28131.4 kg<br><br>4 Banned Chemicals by Stockholm Convention<br>18.5 kg | Small<br><br><br><br>small                                     |
| <b>Chemical Waste Sites</b><br>Site 1<br>Site2<br>Etc.     | n/a                                                                        | n/a                                                                                                                          | n/a                                                            |
| <b>Contaminated Areas</b><br>Site1<br>Site 2<br>Etc.       | n/a                                                                        | n/a                                                                                                                          | n/a                                                            |

\*In Mongolia doesn't have any stocks of obsolete chemicals and that locations are area from which found out by inventory. Generally, illegal imported and handled chemicals are stored in the storage at the NEMA. In rural area obsolete chemicals in case of found out are sealed and controlled by inspectors on that place in respective organisation.

## 2.9. Unintentionally Generated Chemicals

From 2003 to 2006 POPs Enabling Activities Project was implemented in Mongolia and developed National Implementation Plan (NIP) on Stockholm Convention. The project made assessment in releases from unintentional production of Annex C chemicals (PCDD/PCDF, HCB and PCBs) at first time in Mongolia and after the project no any other nationwide assessment carried out. PCDD's and PCDF's, listed in Annex C of the Convention, are unintentionally formed and released from thermal processes involving organic matter and chbrine as a result of incomplete combustion or chemical reactions. According to survey, potential relaese of dioxins/furans are shown in the Table.

Table 2.9.A . Dioxins/furans potential releases

| Categories                                  | Potential source amount<br>(gTEQ/Years) | Potential source<br>amount (%) |
|---------------------------------------------|-----------------------------------------|--------------------------------|
| Waste incineration                          | 0.124                                   | 0.02                           |
| Ferrous and Non-Ferrous Metal<br>Production | 1.500                                   | 0.19                           |
| Power generation and Heating/<br>Cooking    | 39.258                                  | 5.23                           |
| Production of Mineral products              | 0.129                                   | 0.02                           |
| Transport vehicles                          | 5.683                                   | 0.76                           |
| Uncontrolled combustion (fire)<br>processes | 52.408                                  | 6.98                           |
| Chemical and consumer goods<br>production   | 6.06-0.06                               | 0.8-0.008                      |
| Miscellaneous                               | 0.001                                   | -                              |
| Waste/Landfill                              | 651.610                                 | 86.80                          |
| Total                                       | 750.713                                 | 100.00                         |

According to inventory sludge generated from households and industrial sewage treatment is the major source of dioxins and furans releases into the Mongolian environment. It was estimated that sewage sludge accounts for approximately 86% of all dioxin/furans releases. Sewage treatment facilities in Mongolia use biological treatment, plus chlorine for sterilization. Sludge is usually disposed directly into the environment, or into holding ponds, and may contaminate the surrounding environment, including soil and water resources. A proper evaluation of sewage sludge and the primary sources of contamination should be undertaken, and mitigation strategies developed.

The second main source of dioxin and furan releases to the environment is waste incineration and forest fires. These emissions are estimated to account for approximately 7% of the total. The amount of dioxins/furans released can be minimized by reducing the number of waste incinerators, and using modern pollution control devices. Forest fires can be reduced through better education and monitoring. Emissions of dioxins/furans from thermal electric stations, power plants, households heating are estimated to account for approximately 5 % of total releases. Approximately 89% of these emissions are a result of burning coal and wood.

Inventory calculations estimate annual emissions of dioxins/furans in Mongolia at 750,713 gram TEQ; air 28,341 (3.8%), water 3,242 gram TEQ (0.4%), soil 0.035 gram TEQ, products 6.06-0.06 gram TEQ, residues (ash) -719,095 gram TEQ (95.8%) TEQ.

The highest concentrations of dioxin/furans were found in ash samples from the waste incineration stove at the Child and Maternity Hospital in Ulaanbaatar city. In addition,

significant levels of dioxin and furans were found in the samples of dust collected from a scrap metal processing facility, sludge samples from the municipal sewage treatment facility in Ulaanbaatar, dust and ash samples from filters and stoves of Power Plant #4, and dust samples from filters of Khutul Cement and Lime Factories.

Table 2.9.B. Results of High Resolution Dioxins and Furans Analyses

| Concentration (pg/g, dry weight basis) |                                        |                               |                           |                          |                           |                                      |
|----------------------------------------|----------------------------------------|-------------------------------|---------------------------|--------------------------|---------------------------|--------------------------------------|
| Compound                               | Children's Hospital Waste Incineration | Metallurgical Factory Darkhan | ESP Fly Ash Power Plant#4 | Bottom Ash Power Plant#4 | Municipal sewage Sludge#2 | Hotul/Khar gal cement & Lime Factory |
| 2,3,7,8 –TCDD                          | 68.5                                   | 15.3                          | 0.26                      | 0.102                    | 1.64                      | 0.151                                |
| 1,2,3,7,8-PECDD                        | 239                                    | 24.1                          | 0.688                     | 0.090                    | 1.16                      | 0.340                                |
| 1,2,3,4,7,8-HXCDD                      | 178                                    | 11.1                          | 0.644                     | ND                       | 2.84                      | 0.301                                |
| 1,2,3,6,7,8-HXCDD                      | 421                                    | 16.4                          | 1.19                      | 0.136                    | 2.58                      | 0.297                                |
| 1,2,3,7,8,9-HXCDD                      | 592                                    | 30.8                          | 2.1                       | 0.185                    | 2.47                      | 0.443                                |
| 1,2,3,4,6,7,8-HPCDD                    | 2490                                   | 57.8                          | 7.84                      | 0.549                    | 75.6                      | 0.885                                |
| OCDD                                   | 3190                                   | 62                            | 18.9                      | 0.849                    | 753                       | 1.54                                 |
| 2,3,7,8-TCDF                           | 981                                    | 2270                          | 0.266                     | 0.284                    | 5.08                      | 0.177                                |
| 1,2,3,7,8-PECDF                        | 1140                                   | 637                           | 6.16                      | 0.332                    | 2.39                      | 0.614                                |
| 2,3,4,7,8-PECDF                        | 1690                                   | 121 0                         | 16                        | 0.724                    | 2.95                      | 0.766                                |
| 1,2,3,4,7,8-HXCDF                      | 1510                                   | 414                           | 8.72                      | 0.374                    | 4.17                      | 0.641                                |
| 1,2,3,6,7,8-HXCDF                      | 1580                                   | 266                           | 6.03                      | 0.342                    | 2.66                      | 0.596                                |
| 2,3,4,6,7,8-HXCDF                      | 1960                                   | 260                           | 10.3                      | 0.628                    | 2.63                      | 0.657                                |
| 1,2,3,7,8,9-HXCDF                      | 108                                    | 20.9                          | 0.846                     | ND                       | 0.31                      | 0.310                                |
| 1,2,3,6,7,8-HPCDF                      | 6440                                   | 368                           | 22.3                      | 1.030                    | 17.0                      | 1.40                                 |
| 1,2,3,7,8,9-HPSCDF                     | 628                                    | 55.5                          | 4.75                      | 0.205                    | 1.49                      | 0.456                                |
| OCDF                                   | 2400                                   | 110                           | 21.1                      | 0.0664                   | 38.3                      | 1.130                                |
| TOTAL TETRA-DIOXINS                    | 3720                                   | 357                           | 3.13                      | 0.414                    | 19.1                      | 0.160                                |
| TOTAL PENTRA-DIOXINS                   | 4800                                   | 264                           | 5.55                      | 0.547                    | 18.9                      | 0.599                                |
| TOTAL HEXA-DIOXINS                     | 5940                                   | 194                           | 12.6                      | 1.170                    | 30.4                      | 1.92                                 |
| TOTAL HEPTA-DIOXINS                    | 5400                                   | 119                           | 15.1                      | 0.967                    | 149                       | 1.46                                 |
| TOTAL TETRA-FURANS                     | 26900                                  | 20500                         | 102                       | 8.110                    | 67.0                      | 6.12                                 |
| TOTAL PENTRA-FURANS                    | 21600                                  | 9400                          | 86.3                      | 1.640                    | 36.5                      | 4.44                                 |
| TOTAL HEXA-FURANS                      | 16100                                  | 2680                          | 58.3                      | 2.850                    | 28.6                      | 3.17                                 |
| TOTAL HEPTA-FURANS                     | 9180                                   | 598                           | 36.6                      | 1.650                    | 29.6                      | 2.09                                 |
| 2,3,7,8-TCDD TEQs(ND=0)                | 2040                                   | 1010                          | 12.4                      | 0.681                    | 7.69                      | 1.12                                 |
| 2,3,7,8-TCDD TEQs(ND=1/2DL)            | 2040                                   | 1010                          | 12.4                      | 0.715                    | 7.69                      | 1.15                                 |

## 2.10. Comments/Analysis

According to data from MNE, Ozone National Authority and Ministry of Food and Agriculture, Statistical Office totally 240873.24 ton of chemicals were imported in 2006-2007 and most of that about 200903.8 ton of chemicals were imported for industrial use. If looking at the Table 2.A, Mongolia is not as large producer but main importer of chemicals in industrial use. However from the table we can describe capacity of chemicals, but we can't say that data shown in the table is full capacity of chemicals in Mongolia. Because there are number of illegal import of chemicals had been inspected and can't identify that how many of that were imported in hidden way.

The basic act of law for regulating relations of waste in Mongolia is the Law on Household and Industrial Wastes, which was adopted in 2003. In addition, Government resolution on Some Measures for Improving Waste Management, Government resolution (No 256 of 2001), on Classification, Collection, Packing, Temporary Storage, Decontamination, Storage and Disposal, on Guidance on classification, collection, storage, transportation and disposal of medical wastes (Minister Order No 249/201 of 2002), and Minister's Order on Methodological guidance on environmentally friendly collection, transportation and landfilling of chemical wastes were approved. /In Chapter 4 will report more detailed/

In present situation, which is regulated by the aforementioned laws and regulations, there is no specific provisions and articles on how to dispose of, and decontaminate wastes containing POPs chemicals, and how to reduce emission of POPs chemicals produced during the process of waste recycling and disposal.

Within this context, amendments and changes to the law regulations is necessary and need to carry out more activities and take measures for awareness raising among organizations and companies that produce POPs containing wastes and for the workers who handle these type of wastes. Mongolia doesn't have any appropriate facilities or equipments to treat or dispose of hazardous waste. Also does not have disposal sites and methods/technologies for eliminating POPs containing wastes, which consequently contributes to environmental pollution, by way of open dumping, re-using etc.

According to the preliminary inventory conducted in 2005 in framework of project in Stockholm Convention, the following sources were identified for the emissions and production of POPs containing wastes in Mongolia, including:

- PCBs containing equipment and obsolete oil
- sludge from treatment facilities
- residues of ashes from waste dumping areas
- ashes of medical wastes
- waste metal processors
- power and thermal plants, individual boilers and household stove ashes
- filter dusts from power and thermal plants

- filter dusts and ashes from minerals industries

Wastes from the aforementioned sources are dumped in open areas as they are not considered as a hazardous waste and they pollute soil, water and air through wind and water. Improving the waste management would have a significant impetus for reducing the environmental pollution, caused by POPs.

With regard to stockpiles, Mongolia does not have stockpiles of the chemicals. However, by inventory in 2007 obsolete chemicals were found and registered at all aimags, the all are stored in the special preserve, which is land filled and located within the territory of the particular organization. For POPs it is same and by inventory there are 17, 76 tonnes of waste oil, temporarily stored in the special preserve are registered and stored in the particular organization.

However it is difficult to define total contaminated area due to chemicals, State of Environment in 2007 prepared by MNE, has described that totally 120 illegal site in the 36 soums of 11 aimags are operating in gold extraction field and 203508.8 m<sup>3</sup> of tailings were contaminated by mercury and 53.5 hec of area under risk of giving contamination to the human and biodiversity.

After all that facts in Mongolia, there is no appropriate monitoring system in chemical management, particularly in chemical transportation, storage and disposal. In addition comprehensive research and analysis of chemical lifecycle management is needed. Data collecting mechanism is very difficult and not under integrated management.

### CHAPTER 3. PRIORITY CONCERNS RELATED TO CHEMICAL PRODUCTION, IMPORT, EXPORT AND USE

#### 3.1. Priority Concerns Related to Chemicals Import, Production, and Use

Chemicals constitute a vital part of our daily life. They provide society with a wide range of benefits, particularly for the increase of agricultural and industrial productivity and improvement in the control of disease. On the other hand, chemicals have the potential to cause considerable health and environmental problems throughout their life cycle, from production to disposal. In Mongolia, the priority concerns during chemical production, import, export and use are given to solve public problems and to ensure a living environment for safety and better quality of life. The Mongolian Government has issued various laws, regulations, standards and policies to strengthen management over the production, transportation, storage, marketing, use, import and export of chemicals. Environmental protection agencies and medical, health and epidemic-prevention bodies at various levels exercise their supervision and monitoring of chemicals, as well as make appraisals, tackle pollution problems, and prevent and solve health problems. Table 3.A reviews problems in the fields of health and environment and reports the current status of management. Table 3.B provides additional information on prioritization of the potential problems identified in Table 3.A.

**Table 3.A. Description of Problem Areas**

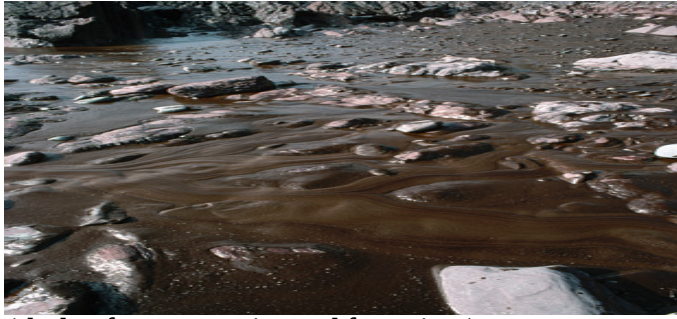
| <i>Nature of problem</i> | <i>City/region</i> | <i>Brief description of Problem</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <i>Chemicals Pollutants</i>                                                                                                                 |
|--------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Air pollution</b>     | Ulaanbaatar /UB/   | <p>Air pollution has been a serious problem in Mongolia for many years. Air pollution in UB is caused by 4 main sources: polluting gases and dust emitted by coal burning, small coal-fueled boilers (HOB-heat only boilers), central heating and power stations (there are 3 plants), and increased number of second-handed vehicles (over 100.000). In UB around 5 million ton of coals are used. In ger district, consuming coals approximately 380,000-420,000 ton/year. There are also 230 coal-fueled heating boilers in UB, consuming 1 million ton of coal per year. 3 central power stations are now consuming approximately 3.5 million t/year of coal.</p> <p>Main source of dioxin/furan releases to the environment is waste incineration and forest fires. These emissions are estimated to account for approximately 7% of the total. The amount of dioxins/furans released can be minimized by reducing the number of waste incinerators, and using modern pollution control devices. Forest fires can be reduced through better education and monitoring.</p> <p>Emissions of dioxins/furans from thermal electric stations, power plants, households heating are estimated to account for approximately 5 % of total releases. Approximately 89% of these emissions are a result of burning coal and wood.</p> <p>Inventory calculations estimate annual emissions of</p> | <p>Ozone<br/>SO<sub>2</sub><br/>NO<br/>Carbon monoxide<br/>cadmium<br/>mercury<br/>Dioxins/furans<br/>PM<sub>10</sub>, PM<sub>2.5</sub></p> |

|                                   |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                  |
|-----------------------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   |          | dioxins/furans in Mongolia at 750,713 gram TEQ; air 28,341 (3.8%), water 3,242 gram TEQ (0.4%), soil 0.035 gram TEQ, products 6.06-0.06 gram TEQ, residues (ash) -719,095 gram TEQ (95.8%) TEQ.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                  |
| <b>Soil contamination</b>         | National | <p>The soil contamination is caused by reasons i) by the drainage and refinement which are generated in the factory using the tanning skin and chemical substance, ii) exhaust fume and oil of cars, iii) mining process and iv) pesticides and herbicides in agricultural process. By the inspection at local areas covering 21 aimags, the over 145 mills, using mercury and sodium cyanide were confiscated. Besides, heavy metals from industrial operations to some extent pollute the soil.</p> <p>According to POPs inventory in 2006, households and industrial sewage treatment is the major source of dioxins and furans releases into the Mongolian environment. It was estimated that sewage sludge accounts for approximately 86% of all dioxin/furans releases. Sewage treatment facilities in Mongolia use biological treatment, plus chlorine for sterilization. Sludge is usually disposed directly into the environment, or into holding ponds, and may contaminate the surrounding environment, including soil and water resources. Inventory calculations estimate annual emissions of dioxins/furans in Mongolia at 750,713 gram TEQ; air 28,341 (3.8%), water 3,242 gram TEQ (0.4%), soil 0.035 gram TEQ, products 6.06-0.06 gram TEQ, residues (ash) -719,095 gram TEQ (95.8%) TEQ.</p>                                                                                                                                   | <p>Insecticides<br/>Herbicides:<br/>Heavy metals:<br/>lead,<br/>cadmium,<br/>arsenic,<br/>mercury,<br/>nickel and<br/>chromium<br/>dioxins/furans</p>                                                                            |
| <b>Chemical residues in food</b>  | National | <p>Monitoring of chemical contamination in foods in Mongolia has been routinely conducted by the State Professional Inspection Agency. A study conducted by SPIA, using laboratory tests, revealed that during 2006-2007, 11-17% samples of vegetables and fruits had pesticide residues over Maximum Residue Limits (MRLs). But statistics say that in 2007 about 40.1 ton of vegetables and fruits were imported from China.</p> <p>Moreover about 30 kinds of diseases which have impacts to the human health via food are diagnosed at the livestock origin products in Mongolia. The problem of veterinary drug residues in animal products, both for domestic consumption and exportation, has been in attention of the Government since 2006.</p> <p>Mongolia has allowed exporting animals' origin product, which is processed sheep entrails to EU. But according to inspection in the sampled goods exported to EU contained residue of antibiotics-screening of chemical residues in foodstuffs has shown that over 35.5% of total sampled food has contamination by 22.7% of microbe, mildew, fungus, by 14.1% of chemical, and by 6% of lead. Moreover inspection in sausage products in Mongolia shows that 4.4% of sampled products have exceeded safety limit of nitride.</p> <p>In some cases, food suppliers still have stored foods into container for purpose of keeping chemical substances and plastic sacks and bags.</p> | <p>Pesticides,<br/>Chemicals:<br/>coloring<br/>chemicals not<br/>allowed in<br/>foods, lead,<br/>cadmium,<br/>nitride</p> <p>Veterinary<br/>drugs:<br/>clenbuteral,<br/>salbutamol,<br/>chloramphenicol, and<br/>nitrofurans</p> |
| <b>Ground water contamination</b> | National | Effluent from factories, tanneries, processing plant, households, waste disposal sites and road runoffs has polluted the main rivers where people and industry are concentrated, particularly the Tuul, Yuroo, Selenge and Orkhon Rivers. The pollution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | fluoride<br>Chromium, lead<br>and cadmium<br>Phosphorus,                                                                                                                                                                         |

|                                           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                            |
|-------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|                                           |          | problem is due to not just domestic waste effluent, but also to the high levels of heavy metal chromium used in tannery process. As of fluorite mining operations, the main environmental issues are groundwater and mineralized areas containing fluorite, that are harmful for health concentrations when used for drinking water.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                            |
| <b>Drinking water contamination</b>       | National | Drinking water supplied to apartment building in the central city, ger district through distribution network. Ger district with no pipes connected obtain potable water from water tank trucks. At local level drinking water supplied from wells without any treatment. Depending on difference of water resource spreading,, about 99 soums have been accessed water with exceed content of Mg <sup>+</sup> , and about 27 soums exceed of alkali (pH), about 47 soums exceed of dissolved salts. Drinking water contamination is associated with ground and stream water, which is locally, tainted with lead, cadmium, and arsenic in some industrial area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Lead, alkali (pH), chromium, cadmium and arsenic sulfate                                                                                   |
| <b>Hazardous waste treatment/disposal</b> | National | In same time intensification of mining development, impacts from use of chemical substances and pesticides in industrial and agricultural sector are increased. Actually, Mongolia has no comprehensive study on hazardous waste. There is only classification on waste- industrial and household waste. However a number of regulations have been made by Government, due to weak enforcement, hazardous waste treatment/disposal is still in problem. However in 2007 from Municipality issued disposal site for hazardous waste, due to lack of financial capacity, treatment building hasn't yet established. There has been increased number of tanneries that discharge yellowish untreated wastewater directly to the central wastewater treatment plant, causing serious ground water contamination. Sludge containing chromium is buried in landfills after sun drying. Moreover hazardous waste from mining operation almost isolated from state concern. According to nationwide inspection (covering 21 aimags) done by MNE in field of chemical usage in gold mining in 2006, showed that about 37.3 hec areas were contaminated by mercury and over 200 thous.ton of tailngs were resulted from informal mining process. | Pesticide:<br>Dioxins/furan<br>s<br>Chemicals:<br>chromium (Cr), alkali (pH), mercury, cyanide<br>infectious waste                         |
| <b>Occupational health: agriculture</b>   | Local    | However occupational health in agricultural sector is smaller than in industrial sector, the considerable number of disease from livestock animal has been diagnosed according to survey.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Organic solvents<br>Pesticides                                                                                                             |
| <b>Occupational health industrial</b>     |          | According to survey in occupational health in industrial sector, the top 4 occupational health problems were pneumoconiosis, petroleum poisoning, lead poisoning, gas vapor poisoning. Generally, about 652 diseases from 8669 occupational diseases are dealing with chemical substances. In 2007, about 33.8% of diseases belonged to the petroleum poisoning, 29.6% to the vapor poisoning and 18, and 8% to the lead poisoning. Over 56.9% of total diseases in mining sector and 10.4% in fuel and energy sector. Most occupations are: solder painter, repairman, driver, mechanics, and fuel man. However most percentage of occupational disease were occurred in Capital city (56.6%), in local area particularly mining area potential to have more occupational health disease. But in this field comprehensive research hasn't yet conducted. By research in mining sector,                                                                                                                                                                                                                                                                                                                                                | Chemical fertilizers<br>Heavy metals:<br>lead, arsenic, cadmium, mercury, cyanide, and chromium<br>Gas:<br>ammonia<br>Smoke<br>TSP<br>PM10 |

|                                               |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                            |
|-----------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                               |          | there are about 122 children are working on the informal mining and 37.7% of them using mercury. Among them 18.2% of girls working on and using mercury for gold wash. After an accident in Darkhan-Uul Khongor soum, from WHO studied on the samples from people living in Khongor soum, Bornuuar Soum and Tal Bulag Bag in Jargalan Soum and has indicated that the local population has been recently exposed to mercury. It is strongly recommended to take necessary action to address this important health issue in both Bornuuar Soum and Tal Bulag Bag in Jargalan Soum. Furthermore, it is also recommended to further investigate and mitigate the health risks in small scale gold mining communities throughout the whole country. | Liquid nitrogen, ethylene oxide and oxygen Organic solvents: benzene, toluene, trichloroethylene, ethyl alcohol, methyl alcohol, acetone, chloroform, etc. |
| <b>Chemical accident; industrial</b>          | National | There are several chemical accidents are registered in the 2006. For example: In the city, 1 person has dead and a lot people poisoned from the fumes due to a company has conducted experiment using improper tools and place on waste petroleum products in order to re-distill. In addition, loss of chemicals and poisons are registered in the rural area such as Darkhan-Uul, Bayankhongor, Umnugovi, Selenge, Orkhon and in the City, therefore, at least 132 people have been poisoned and 13 head of livestock animal have been dead. Totally, 9 accidents of explosives have been registered and 3 people dead and 11 people injured.                                                                                                 | Mercury Cyanide Organic solvents: benzene, toluene, trichloroethylene, ethyl alcohol, methyl alcohol, acetone, chloroform, etc.                            |
| <b>Unknown chemical imports</b>               | National | Frequency that attempting to pass (import) unknown chemicals has been increased in recent years according to information from Customs Agency. Due to lack of awareness on chemicals, citizens and economic entities haven't knowledge about importing chemicals, how to take permission, how to make customs registration. In some cases they don't aware about chemicals name which going to pass through border.                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                            |
| <b>Storage/disposal of obsolete chemicals</b> | National | According to inventory made in the 2007, about 25 kind of chemicals already banned before in state level have been revealed. The volume of those chemicals was about 28131 kg and of which 18.5 kg of aldrin, Hexachlorobenzene, Dieldrin were inspected. According to POPs inventory made in 2006, some pesticides already banned, still have been used in agricultural sector.<br><br>By contrast, from people want to dispose obsolete chemicals on their hand, used to in their business operation such as in laboratories, dry cleanings etc. But due to lack of disposal site obsolete chemicals and waste haven't disposed yet.                                                                                                          | Aldrin Chlordane Dieldrin Heptachlor Hexachlorobenzene (HCB) Polychlorinated Biphenyls (PSBs)                                                              |
| <b>Chemical poisoning / suicide</b>           | National | According to survey made by Poison's Center, poisons by medicine are most dominated factor in chemical poisoning. About 51.4% of total poisons were occurred due to use of medicine. By composition of medicine, to cause of poison,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Medicines Pesticides Cleansing products                                                                                                                    |

|                                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                   |
|------------------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
|                                    |          | <p>drugs under prescription such as to sleep and antibiotics are most dominating. By composition of poisons:</p> <ol style="list-style-type: none"> <li>1. Medicine – 51.4%</li> <li>2. Chemical substances – 38.4% (vapor poisoning- 13%, chemicals to burn-48%, household sanitary chemicals-18.2%)</li> <li>3. alcohol – 1.5%</li> <li>4. food – 7.2%</li> <li>5. other – 1.5%</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |
| <b>Impacts to the biodiversity</b> | Local    | <p>In Mongolia, not many chemicals are used for rodent control. From 2001, Bromadiolone has been used against rodents even such rodenticide used in limited volume by government decision. Bromadiolone proved itself as a deadly rodenticide: it killed over non - targeted birds and mammals, several livestock such as birds- Demoiselle Crane (<i>Anthropodidesv virgo</i>), Herring Gull (<i>Larus argentatus</i>), Ruddy Shelduck (<i>Tadorna ferruginea</i>), Whooper Swan (<i>Cygnus cygnus</i>), Black Kite (<i>Milvus migrans</i>), Upland Buzzard (<i>Buteo hemilasius</i>), Saker Falcon (<i>Falco cherrug</i>), Daurian Jackdaw (<i>Corvus dauricus</i>) and mammals - Corsac Fox (<i>Vulpes corsac</i>), Manul or Pallas'Cat (<i>Felis manul</i>), Domestic sheep. Moreover some livestock animals have drink water near gold mining area using cyanide and mercury for gold wash. Therefore in some local area livestock animals' foot have been burnt by chemicals.</p> | <p>Rodenticide<br/>Mercury<br/>Cyanide</p>        |
| <b>Forest fire</b>                 | National | <p>In recent years, huge damage due to forest fire have been increased. About 164 fores fire ocured in 15 aimags and 63 soums and 6 district of Capital City and totally 5593.9 thous hec area affected in 2006. In 2007 fire has been increased and about 228 forest fire were ocured in 15 aimags, 81 soums and 7 district of capital city. Along with giving impacts physical damages to the environment, forest fire also have negative impacts to atmosphere by emmitting dioxins/furans and GHG emission.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>PCB<br/>(dioxin/furan<br/>s)<br/>GHG</p>       |
| <b>Illegal import of chemicals</b> | National | <p>According to data on MNE,over 20000 ton of chemicals have been imported in 2007 and 134 economic entities been permitted to import, sell and use of chemicals in that year. Due to lack of border control illegal import of chemicals have been increased recent years. A lot of illegal storing of chemicals have been inspected by NEMA and Police Office. For example: Chinese company in Govisumber aimag, Bayankhongor aimag and UB city have stored explosive chemical, radioactive chemical and mercury.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>Zincium,<br/>ammonite<br/>Cs-137<br/>NaSO4</p> |
| <b>Chemicals in toys</b>           | National | <p>From SPIA defined that toys imported from China have chemical contents to impact children's health. According to inspection, lead content have exceeded by 0.003-0.76 mg/l from safety limit, and zinc content exceeds by 0.52-25.3 mg/l, Cu+ by 0.003-0.13mg/l.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>Lead<br/>Zn, Cu+</p>                           |



/sludge from tanneries and factories /



**Table. 3.1.1. Waste water from the factories (picked up 6 factories from 16)**

| Industry      | pH   | COD-C | KiN  | BOD  | SS    | SO4  | CL    | Cr(YI) | TOD   | COD/BOD |
|---------------|------|-------|------|------|-------|------|-------|--------|-------|---------|
|               |      | g/m3  | g/m3 | g/m3 | g/m3  | g/m3 | g/m3  | g/m3   | g/m3  |         |
| Armonia       | 12.2 | 15060 | 1506 | 4975 | 11413 | 1048 | 11151 | 0.07   | 21947 | 3.2     |
| Arildii       | 12.5 | 6191  | 619  | 2490 | 3716  | 1577 | 4098  | 41.6   | 9020  | 2.5     |
| Buligar       | 11.6 | 6015  | 602  | 2930 | 2193  | 2284 | 82.5  | 59.4   | 8764  | 2.8     |
| Sor           | 9.5  | 5467  | 547  | 2250 | 3615  | 1106 | 470   | 100    | 7966  | 2.5     |
| Mongol Shevro | 11.5 | 3551  | 355  | n.d  | 1426  | 528  | 130   | 7.5    | 5174  | 2.8     |
| Ikh asar      | 11.2 | 1968  | 197  | n.d  | 756   | 499  | 2075  | 4.9    | 2868  | 2.2     |

**Table 3.1.2 Areas, contaminated by chemicals and confiscated equipments  
2007-2008**

| No    | Name of the Aimag | Confiscated mills | Contaminated area/hect/ | Tailings M <sup>3</sup> | Confiscated mercury | Confiscated cyanide |
|-------|-------------------|-------------------|-------------------------|-------------------------|---------------------|---------------------|
| 1.    | Bayankhongor      | 32                | 19                      | 1241                    | 21 kg               | 950 kg              |
| 2.    | Dornogovi         | 7                 | 3.669                   | 1549                    | 16 kg               | -                   |
| 3.    | Sukhbaatar        | 5                 | 1.21                    | 153                     | 100 gr              | -                   |
| 4.    | Uvurkhangai       | 2                 | -                       | -                       | -                   | -                   |
| 5.    | Darkhan-Uul       | 2                 | 1.9                     | -                       | -                   | -                   |
| 6.    | Umnugovi          | 51                | 21.27                   | 26030.2                 | -                   | -                   |
| 7.    | Tuv               | 32                | 2.62                    | 20700                   | 1.250 gr            | 32 kg               |
| 8.    | Selenge           | 17                | 5.81                    | 4558                    | 3.39 kg             | -                   |
| 9.    | Bulgan            | 2                 | 0.04                    | -                       | -                   | -                   |
| 10.   | Govi-Altai        | -                 | 0.04                    | -                       | -                   | -                   |
| TOTAL |                   | 150               | 55.5                    | 54213.2 ì <sup>3</sup>  | 41.74 kg            | 982 kg              |



***Umnugovi aimag Khanbogd soum  
Livestock animals have drink waste water  
from informal gold mining***



***Selenge aimag, Bayangol soum  
Livestock animal taken ill near gold  
extraction area using cyanide***

**Table 3.B. Priority Concern Related to Chemicals**

| <b>Nature of Problem</b>          | <b>Scale of Problem<sub>1</sub></b> | <b>Level of Concern<sub>2</sub></b> | <b>Ability to Control Problem<sub>2</sub></b> | <b>Availability of Statistical Data<sub>3</sub></b> | <b>Specific Chemicals Creating Concerns</b>                                                                    | <b>Prior<br/>ity<br/>Rank<br/>ing</b> |
|-----------------------------------|-------------------------------------|-------------------------------------|-----------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Air Pollution (vehicles)          | National                            | High                                | medium                                        | sufficient                                          | PM10 , CO                                                                                                      | 1                                     |
| Air Pollution(ger district)       | National                            | High                                | Medium                                        | sufficient                                          | PM10, CO                                                                                                       | 1                                     |
| Air Pollution (industries)        | National                            | Medium                              | Medium/div>                                   | In sufficient                                       | TSP, PM10, SO <sub>2</sub> , Cl <sub>2</sub> , NO <sub>2</sub> , VOCs, dioxin, pesticides, fume of heavy metal | 2                                     |
| Air Pollution (power plant)       | National                            | High                                | High                                          | Sufficient                                          | SO <sub>2</sub> , TSP, NO <sub>x</sub>                                                                         | 1                                     |
| Air Pollution (Petroleum Station) | Local                               | Medium                              | Medium                                        | Insufficient                                        | VOCs                                                                                                           | 2                                     |
| Ground-water Pollution            | National                            | High                                | Medium                                        | sufficient                                          | Lead, chromium, cadmium, arsenic                                                                               | 3                                     |

|                                      |          |      |        |              |                                                                                                                                                                                                                                                                                                                                                                          |   |
|--------------------------------------|----------|------|--------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Soil Contamination                   | National | High | Low    | Insufficient | Insecticides<br>Herbicides:<br>Heavy metals:<br>lead, cadmium,<br>arsenic, mercury,<br>nickel and chromium<br>dioxins/furans                                                                                                                                                                                                                                             | 1 |
| Chemical Residues in Food            | National | High | medium | insufficient | Pesticides,<br>Chemicals: colouring<br>chemicals not<br>allowed in foods,<br>lead, cadmium,<br>nitride<br><br>Veterinary drugs:<br>clenbuteral,<br>salbutamol,<br>chloramphenicol, and<br>nitrofurans                                                                                                                                                                    | 1 |
| Drinking Water Contamination         | National | Low  | medium | sufficient   | Lead, alkali (pH),<br>cadmium and arsenic                                                                                                                                                                                                                                                                                                                                | 3 |
| Hazardous waste disposal / treatment | National | High | Low    | Insufficient | Pesticide:<br>Dioxins/furans<br>Chemicals:<br>chromium (Cr), alkali<br>(pH), mercury,<br>cyanide<br>infectious waste                                                                                                                                                                                                                                                     | 1 |
| Occupational Health: Agriculture     | Local    | Low  | low    | insufficient |                                                                                                                                                                                                                                                                                                                                                                          | 3 |
| Occupational Health: Industrial      | National | High | low    | insufficient | Organic solvents<br>Pesticides<br>Chemical fertilizers<br>Heavy metals:<br>lead, arsenic,<br>cadmium, mercury,<br>cyanide, and<br>chromium<br>Gas: ammonia<br>Smoke<br>TSP<br>PM10<br>Liquid nitrogen,<br>ethylene oxide and<br>oxygen<br>Organic solvents:<br>benzene, toluene,<br>trichloroethylene,<br>ethyl alcohol, methyl<br>alcohol, acetone,<br>chloroform, etc. | 1 |

|                                        |          |        |        |              |                                                                                                                                          |   |
|----------------------------------------|----------|--------|--------|--------------|------------------------------------------------------------------------------------------------------------------------------------------|---|
| Industrial Chemical Accidents:         | National | Medium | medium | sufficient   | Mercury Cyanide<br>Organic solvents: benzene, toluene, trichloroethylene, ethyl alcohol, methyl alcohol, acetone, chloroform, etc.       | 2 |
| Unknown chemical import                | National | High   | Low    | Insufficient | N.A                                                                                                                                      | 1 |
| Storage/Disposal of Obsolete Chemicals | National | High   | low    | insufficient | Aldrin<br>Chlordane<br>Dieldrin<br>Heptachlor<br>Hexachlorobenzene (HCB)<br>Polychlorinated Biphenyls<br>Chemicals for military purposes | 1 |
| Chemicals Poisoning / Suicides         | National | Low    | low    | Sufficient   | Medicines, Pesticides, Cleansing products                                                                                                | 3 |
| Chemical impacts to the biodiversity   | National | Medium | Low    | Insufficient | Rodenticide<br>Mercury cyanide                                                                                                           | 2 |
| Forest fire                            | National | High   | Medium | Sufficient   | PCB (dioxin/furans)<br>GHG                                                                                                               | 1 |
| Illegal import of chemicals            | National | High   | Medium | Insufficient | ammonite<br>Cs-137<br>Zinc, NaSO <sub>4</sub>                                                                                            | 1 |
| Chemicals in toy                       | National | Medium | low    | insufficient | Lead<br>Zn, Cu <sup>+</sup>                                                                                                              | 2 |

\* Note: Priority Ranking 1 = Very high 2 = High 3 = Moderate 4 = Low

### 3.2. Comments/Analysis

The chemical management is comparatively new understanding since 1990. The use of chemical substances on a large scale in Mongolia was maintained in five main sectors: agriculture, manufacturing industries, livestock management, disease control, education and scientific research. However some of the pesticides were banned, it has been still used in rural areas, and it may be available on the black market. A number of chemicals have appeared at the open-air markets without proper labels packed in small packages apparently from larger, bulkier consignments. This has resulted in misuse or inappropriate application of pesticides and other chemical formulations. Most of the existing industries in Mongolia are old and use outdated technology. Small and medium-size enterprises producing washing powder, soaps, phosphoric fertilizer and other chemical substances have appeared and more enterprises are likely to spring out. Particularly, the number of new industries where chromium is widely used has been growing in the countryside. However, the mineral deposits are potential sources of wealth, this sector are still has used sodium cyanide for extraction. Carbon monoxide effect is particularly strong around the working area of the mines and can have an effect over a large area. In copper molybdenum mining operations, large quantities of acid and other chemicals are used. Moreover illegal import of chemicals from China is increasing year by year. Police Office has concluded that frequencies of incidents due to inadequate use of chemicals reveal facts in illegal import of chemicals in Mongolia. Mostly, they pass chemicals through border in industrial sector such as mercury, cyanide and zinc phosphide in illegal way. Another challenge in chemical usage is, pesticide containers are used for domestic purposes particularly in storing dairy products.

Use of obsolete pesticides is one of the problems in the country. According to inventory made in 2007, in state level totally 944 chemicals were registered, and 8.3ton of chemicals was stored from business process. By the inventory, chemicals already banned and severely restricted such as aldrin, hexachlorobenzene and dieldrin have been stored in 18.5 kg. Generally, people don't aware about chemicals which they are using in their process and storing without any labelling, registration. They don't maintain minimum requirement of chemical usage. Most of the local administrations haven't got at least one person specialized in chemistry. Enforcement of related standard, norm and laws in using, transporting, storing and disposing of chemicals is very weak at the national level.

## **CHAPTER 4**

### **LEGAL INSTRUMENT AND NON-REGULATORY MECHANISM FOR MANAGING CHEMICALS**

#### **4.1. Overview of National Legal Instruments Which Address the Management of Chemicals**

The environmental legal tradition of Mongolia reflects its nomadic history and is based on religious principles. Modern nomads continue to be dependent on the grass and waters that nourish their herds and continue to respect the teachings of their religious history. Since the beginning of the 1920's, the Mongolian Government has emphasized the importance of natural resources in a legal framework and carried traditions of environmental protection forward into modern times. Mongolia, through its Constitution of 1992, has guaranteed the right of citizens to live in a healthy and safe environment and stated that the public own the land and natural resources. Since that time, the Government has been actively developing a body of law designed to conserve its natural heritage while at the same time responding to demands of a newly formed market economy. All in all, there are a total of 32 laws relating to environmental management in Mongolia and some 150 associated regulatory documents (in excess of 40 in the case of forests, 20 for water etc.). Dealing with the chemical management, there are about 30 programmes and plans have been formulated in Mongolia and some of them already finished and some of them are developed recently, such as National Implementation Plan on POPs. Moreover there are number of important sectoral policies and plans such as; National Development Concept, Road Master Plan, Power Sector Master Plan, Renewable Energy Master Plan, Food Security Programme, Health Master Plan, Environment Health Programme, Healthy-Mongolia Programme, Ecological Education Programme and most recently "3d Campaign of Cropping" Programme etc.

In addition some "father" policy documents already developed such as Government Action Program (2004-2008), the Millennium Development Goals (1990-2015), and the annual Socio-Economic Guidelines. Under the auspices of the President, "MDG-Based National Development Strategy (NDS) of Mongoli (NDS)" had been developed since 2006 and adopted in 2008 by Parliament.

In 1997, the Government policy on ecology was developed and deliberated by the Parliament. The document is aimed to establish legal and economic bases for achieving ecological balance, which is a core principle of Mongolia's sustainable development for the next twenty years. The Government Action Plan for the period of 2004-2008 includes 11 main objectives and 3 of them are for environmental priority issues:

"to provide sustainable development and ecological balance promote land reform mitigate air, water, soil and environmental pollutions in the major cities and towns" . The Nature and Environment Policy was reflected in the Government Action Plan, underlining "The Government shall aim to rationally utilize the natural resources with due consideration of deposits, to ensure an eco-oriented economic growth by the means of restoring nature, to define the civil rights and liabilities related to the utilization and

protection of local natural resources and to create a mechanism of self awareness among the citizens in protecting the nature and environment”.

By the Second Report of MDGs underlines that for the Goal 7, the number, type and names of chemical and toxic chemical substances traded in the country have increased drastically in the recent few years. In 2002, the stocktaking of toxic chemical substances carried out in the capital and 21 aimags revealed a total 1.7 thousand tons of chemical substances of 563 types. This sharp increase of chemical substances is mainly caused by the expansion of mining activities, particularly their unsafe and illegal storage and utilization.

The NDS, which is most recently developed in Mongolia, defines in a comprehensive manner its policy for the next fourteen years aimed at promoting human development in Mongolia, in a humane, civil, and democratic society, and developing intensively the country's economy, society, science, technology, culture and civilization in strict compliance with global and regional development trends. The objective of the Strategy is to protect and strengthen Mongolia's sovereignty, and develop it into a middle income country through achieving its Millennium Development Goals attaching high priority to promoting private sector-led dynamic economic growth, human development in Mongolia including education, healthcare, as well as sustainable development of science, technology and environment, strengthening intellectual development and human capacity; creating a knowledge-based economy sustained by high technology, which respects environmentally friendly production and services; fostering a democratic system of governance, which serves its citizens, protects human rights and freedoms, and is free from corruption and red tape. However NDS is developed under comprehensive involvement of experts, professionals at all sector, it overlooked about chemicals management issues.

The Ministry of Nature and Environment is the state central administration authority supervising and coordinating environmental protection activities. Main environmental policy and activities of the Ministry of Nature and Environment are following :

- Report the State of Environment, and develop policy to ensure ecological security
- Development of environmental laws
- Policy on protection and prevention of air, water, land and environmental pollution
- Environmental impact assessment , introduction of environmentally sound technology and clean development mechanism

In 2006, National Implementation Plan of POPs was approved and identified following priorities :

1. Stop usage of PCBs containing equipment, eliminate their stockpiles and wastes in environmentally sound manner and decontaminate polluted sites.
2. Improve management of hazardous wastes, especially medical wastes, used oils, plastics etc, and reduce hazards of POPs wastes by way of eliminating and recycling environmentally friendly methods.
3. Build capacity for research and monitoring of POPs chemicals.

4. Raise awareness on POPs chemicals among general public and “risk groups” and create a sound information exchange system.
5. Development of proposals for the improvement of the inventory system of PCDD/PCDF, HCB and PCB releases from industrial processes and from non industrial sources, including the updating and verification of emission factors.
6. Restoration of POPs contaminated sites.

The plan has 2 major milestones, for 2006-2010 and 2011-2020.

Actually, in the legal side chemicals management is new aspect in Mongolia. In the chemical management in Mongolia involves a number of governmental agencies; each of which has employed its legal instrument to regulate specified chemicals under its responsibility. But in the Article 20 of Law on the Government, responsible issues belonged to the Minister of Nature and Environment are ecological policy development and implementation of environmental protection, its rehabilitation and proper use, conservation of natural plant and wildlife resources and subsoil resources. Therefore the chemicals are under responsible issue of Minister of Nature and Environment.

It should be stressed that in Mongolia’s situation, object to be regulated by the law – chemicals- are categorised by its impacts to the human health and environment as toxic and hazardous. Therefore the main basic law of the chemical management is Law on Toxic and Hazardous chemicals adopted in 2006. Presently, there are 19 laws, 15 Ministerial or other government body’s regulation and decisions being used as legal tools. Table 4.A shows the existing legal instruments and their references, addressing the management of chemicals.

Table 4.B gives an overview of the Legal Instruments which impose on chemical categories and their use for import, production, storage, transportation, distribution/marketing, use/handling, and disposal.

Table 4.C and 4.D demonstrate the existing banned and severely restricted chemicals.

**Table 4.A.: References to Existing Legal Instruments Which Address the Management of Chemicals**

| Legal Instrument                                                   | Responsible Ministries or Bodies               | Chemical Use Categories Covered                                                   | Objective(s) of Legislation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Relevant Articles/ Provision |
|--------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Mongolian Law on Environmental Protection /1995, amended in 2007 / | Parliament                                     | Overall chemicals categories, have impacts toxic and hazardous to the environment | Define a national policy in protection of nature and environment, proper use and restoration of its natural resources;<br>Adopt through submission to the Government the National Program for Environmental Protection and Ecological Safety;<br>Approve and monitor the implementation of environmental legislation;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Article 13                   |
|                                                                    | Government                                     | Overall chemicals categories, have impacts toxic and hazardous to the environment | Upon consultation with and approval by the Central State Administrative Organization and Aimag or Capital City Governors, prohibit any economic and other activities of citizens, economic entities and/or organizations which has an adverse effect on human health and the environment irrespective of the form of their ownership;<br>Organize ecological education and training programs.<br>Coordinate and organize any efforts with respect to setting controls on customs, imports and exports of wildlife and plant species and other natural products                                                                                                                                                                                                                                                                                                                                                                                                                                                | Article 14                   |
|                                                                    | MNE                                            | Overall chemicals categories, have impacts toxic and hazardous to the environment | Organize the implementation of the national policy and legislation on protection of nature and environment, proper use and restoration of its natural resources, and assurance of ecological balance;<br>Carry out intersectorial and interregional coordination on conservation and restoration of nature and environment, develop and adopt through authorized organizations or in collaboration with other State Central Administrative Organizations the standards of environmental capacity and organize its implementation;                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Article 15                   |
|                                                                    | Citizen's Representative Khurals and Governors | Overall chemicals categories, have impacts toxic and hazardous to the environment | In cities, villages and other settlements, and resorts and rest houses, establish borders of special areas to protect from and control the pollution of rivers, lakes, ponds, springs and other bodies of water and meet sanitary requirements;<br>Control and monitor any activities of local economic entities and/or organizations with respect to protection of nature and environment, restoration and use of natural resources, take measures to alleviate and mitigate any adverse effects upon the environment. If necessary, the Governor shall also prohibit any activities of an economic entity and/or organization in the event of such adverse effects or inform authorized organizations for their consideration.<br>Issue permits to citizens, economic entities and/or organizations to use natural resources within the local area<br>Control and monitor the implementation of hygienic and sanitary requirements in local area, designate garbage and waste disposal points for the area. | Article 16, 17, 18           |

|                                                       |                               |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                          |
|-------------------------------------------------------|-------------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Mongolian Law on Toxic and Hazardous Chemicals /2006/ | MNE and MIC                   | Toxic and hazardous chemicals              | Approve regulation on production, exportation, importation, sell, transportation /through border/, and production of toxic and hazardous chemicals.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Article 6                |
|                                                       | MNE MoH NEMA                  | Toxic and hazardous chemicals              | Approve regulation on storage, transportation, usage and disposal of toxic and hazardous chemicals.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Article 6                |
|                                                       | MNE MoFA MoH                  | Agricultural, consumer need chemicals      | Approve list of pesticides, fertilizers, household and sanitary insecticides and renew its available volume to use in each year.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Article 6                |
|                                                       | MNE MoH SEA                   | Industrial, agricultural and consumer need | Approve regulation on conducting risk assessment on toxic and hazardous chemicals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Article 6                |
|                                                       | MNE                           | Toxic and hazardous                        | Renew list of banned and severely restricted chemicals and to inform to the International Organisations.<br>Integrated database covering export, import, transport, production, store, trade, use and disposal of chemicals.<br>Issue permission to import and sell of toxic and hazardous chemicals to cause adverse impacts to the environment.<br>Provide by professional guidelines in using toxic and hazardous chemicals, to develop recommendation if needed. Provide by information to the public on chemicals physical and chemical characteristics and its harm, safety measure when have incidents, guide to dispose and transport.<br>To organise implementation of MEAs on chemicals issue. | Article 6                |
|                                                       | MoD                           | Toxic and hazardous                        | Regulate toxic and hazardous chemicals in purpose of military and provide by information to the MNE.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Article 6                |
|                                                       | Government                    | Toxic and hazardous                        | Approve borders to export and import of toxic and hazardous chemicals.<br>Approve list of chemicals to be banned and severely restricted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Article 15               |
|                                                       | Governors                     | Toxic and hazardous chemicals              | Based on recommendation by Professional organisation to define place to store chemicals.<br>Conduct registration of utilization of toxic and hazardous chemicals of economic entities at respective area and send report to the MNE.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Article 10<br>Article 13 |
|                                                       | State Professional Inspection | Toxic and hazardous chemicals              | To monitor and control chemicals through borders.<br>To monitor and control implementation of the law.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Article 10               |

|                                            | Agency                                                       |                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |
|--------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
|                                            | Inspectors in charge of Environment, Health, and Emergency   | Toxic and hazardous chemicals                                                          | Control in disposal of toxic and hazardous chemicals.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Article 14                            |
|                                            | Health inspector                                             | Toxic and hazardous chemicals                                                          | Review occupational safety rule of economic entity, using toxic and hazardous chemicals.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Article 13                            |
| Law on Household and Industry Waste /2003/ | Parliament                                                   | Chemicals in the industrial and household waste                                        | Define state policy on the waste.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Article 6                             |
|                                            | Government                                                   | Chemicals in the industrial and household waste and hazardous chemicals into the waste | Approve guidelines in definition of fee and norm and normative of waste.<br>Approve regulation on involving into passport system of hazardous waste. Define safety requirement to collect, transport, landfill of hazardous waste.<br>Approve list of industries, which produce special categorized wastes in large volume.                                                                                                                                                                                                                                                                    | Article 7<br>Article 11<br>Article 16 |
|                                            | MNE                                                          | Chemicals in the industrial and household waste                                        | Organize implementation of state policy on waste. Approve state registration and reporting regulation of waste and conduct regular registration.<br>Approve regulation on building and type of disposal site and requirement on operational procedure of citizen and business entity, who will perform landfill of waste.                                                                                                                                                                                                                                                                      | Article 8                             |
|                                            | Citizen's Representative Khural of Aimag and City, Governors | Chemicals in the industrial and household waste                                        | Approve local waste norm and normative and local waste programme. Organize implementation of state policy on waste in the respective area. To define disposal site in the city. Duureg Governors are responsible to define temporary dumping site in the district. To choose business entities to perform landfill pursuant to the law and other regulations.<br>Organise waste treatment campaign and take measure in violation of the law from citizen and economic entity. All governors are responsible to conduct registration of the waste at the respective area and inform to the MNE. | Article 9                             |
|                                            | MNE MoH Ministry of Education,                               | Hazardous chemicals in the waste                                                       | Approve classification and ranking of hazardous waste, depending on adverse impacts to the human health and environment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Article 16                            |

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|                                                                 | Culture and Science |                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                         |
|                                                                 | SPIA                | Chemicals in the industrial and household waste                          | In case of technology and process to landfill have adverse impacts to the human health and environment, or the site and place are not consistent with city plan or related laws and regulations, SPIA shall prohibit the any activities.<br>Control law impementation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Article 22              |
| Law on transportation and import of hazardous substances /2000/ | MNE                 | Chemicals in hazardous waste                                             | Issue permission to export hazardous waste based on professional organisation having circumstances of without any technique and facility to recycle or legally accepted of import to that country.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Article 5               |
|                                                                 | Government          | Chemicals in hazardous waste                                             | Determine regulation of collecting, packaging, temporary handling, securing, storing of hazardous waste.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Article 6               |
| Law on Air /1995/                                               | MNE                 | Chemicals in the air<br>By-product chemicals<br>ODSs                     | To develop a program for air protection, submit it to the government for adoption, and organize its implementation;<br>To organize work on testing and research on the quality of the air;<br>To adopt regulations and statutes on air protection and draft standards for approval by the authorized agency.<br>To organize a network the purpose of which is the regular monitoring of air pollution, hazardous physical impacts, as well as changes in small-contents in the air like ozone and hydrogen.<br>To adopt permissible volume of air polluting substances discharged and the hazardous physical impacts caused by stationary sources of production and service owned and operated by citizens, economic entities and/or organizations<br>To approve a list of substances which have hazardous impacts on the ozone layer. | Article 3<br>Article 15 |
|                                                                 | MNE<br>MoH          | Chemicals in the air<br>By-product chemicals<br>ODSs                     | In the event of unavoidable discharge of air polluting substances and the causing of hazardous physical impacts, the admissible volume of which is not standardized, may jointly issue a temporary permit based on the characteristics and amount of the substance and its impact on human health and the environment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Article 10              |
|                                                                 | MoH                 | Toxic and hazardous chemicals in the air<br>By-product chemicals<br>ODSs | To draft standards on admissible content of polluting substances in the air and on the toxic or hazardous physical impacts and have them adopted by the authorized agency;<br><br>To control of air pollution and the physical hazardous impacts on the human health.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Article 3               |
|                                                                 | SPIA                | Chemicals in the                                                         | Professional control over the discharge of polluting substances into the air and of physically                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Article 10              |

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|  |                                         | air<br>By-product<br>chemicals<br>ODSs By product<br>chemicals                     | hazardous impacts caused by citizens, economic entities, and/or organizations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                       |
|  | Health and<br>Environment<br>inspectors | Chemicals in the<br>air<br>By-product<br>chemicals<br>ODSs By product<br>chemicals | In event of the discharge of air polluting substances by a stationary source of an economic entity or organization where the hazardous physical impacts prove to be greater than the established limits and the circumstances become dangerous to human health and the environment, state health and environment inspectors may limit or suspend the activities of the responsible economic entity or organization.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Article 10                            |
|  | Air Quility<br>Service under<br>MNE     | Chemicals in the<br>air<br>By-product<br>chemicals<br>ODSs By product<br>chemicals | To determine air quality, measure and test, as well as compile relevant data. To determine the permissible volume of air polluting substances discharged and the hazardous physical impacts caused by stationary sources of production and service owned and operated by citizens, economic entities and/or organizations .<br>To conduct national registration and listing of sources of greenhouse gases and solvents in accordance with procedures adopted by MNE<br>To take urgent actions to determine the reasons for the critical increase of air polluting substances and hazardous physical impacts and to eliminate the damage.                                                                                                                                                                                                                                                                                 | Article 4,<br>Article 7<br>Article 16 |
|  | Governor                                | Chemicals in the<br>air<br>By-product<br>chemicals<br>ODSs By product<br>chemicals | To issue permit economic entities and/or organizations which manufacture using stationary sources of production which discharge air polluting substances into the air and cause hazardous physical impacts based on assessment done by Professional Service Citizens.<br>To take urgent actions to determine the reasons for the critical increase of air polluting substances and hazardous physical impacts and to eliminate the damage.<br>To protect the air from pollution, may limit or prohibit the driving of vehicles of certain kinds on territories of resorts, sanitariums, tourist camps, city streets and residential areas.<br>If it is determined that discharge of greenhouse gases has increased during a certain year, a local governor and authorities of a local area and management of an economic entity or an organization are required to take measures to reduce discharge of greenhouse gases. | Article 8<br>Article 10               |
|  | City governor                           | Chemicals in the<br>air<br>By-product<br>chemicals<br>ODSs By product<br>chemicals | To approve construction of a building for industrial or service purposes which has a potential of extremely hazardous impacts on the air on the basis of the recommendation of the local Citizen Representative Khurals of a respective level and the assessment of a professional organization.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Article 11                            |
|  | Health and                              | Chemicals in the                                                                   | To limit or suspend the activities of the responsible economic entity or organization in event                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Article 10,                           |

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|                    | Environment inspectors,<br>Police officer | air<br>By-product chemicals<br>ODSs By product chemicals | of the discharge of air polluting substances by a stationary source of an economic entity or organization where the hazardous physical impacts prove to be greater than the established limits and the circumstances become dangerous to human health and the environment.<br>To submit to authorized agencies a recommendation to stop or to change the industrial operation of an economic entity or an organization which repeatedly neglected permissible limits of air polluting substances, hazardous physical impacts, terms, and requirements stated in the permit.                                            | Article 14 |
| Mineral Law /2006/ | Parliament                                | Industrial chemicals                                     | Establish State policy with respect to geology and mining;<br>Oversight of the implementation by the Cabinet Ministry of legislation with respect to exploration and mining;<br>Decide whether to permit mineral exploration and mining on State specially protected land.<br>Involve definite mineral in strategic significance category based on government submission.<br>Limit and ban to issue any mining and exploration licence in definite area. Based on government submission or self initiative. Define special rule and regulation in terms of mining, transportation and storing of radioactive minerals. | Article 8  |
|                    | Government                                | Industrial chemicals                                     | To enforce implementation of legislation with respect to exploration and mining of minerals;<br>To implement State policy with respect to the development of the geology and mining sectors;                                                                                                                                                                                                                                                                                                                                                                                                                           | Article 9  |
|                    | Ministry of Industry and Commerce         | Industrial chemicals                                     | To develop and implement State policy with respect to the development of the geology and mining sectors; Approve regulation on mineral exploration and mining and develop related standard.                                                                                                                                                                                                                                                                                                                                                                                                                            | Article 10 |
|                    | Mineral and Petroleum Authority           | Industrial chemicals                                     | To assess mineral resources and conduct geological research . To assess technology and equipment used in mining and exploration and develop policy recommendation. To give assessment and conclude about significance to the country's social and economic development from mining operation. To receive and issue licenses.                                                                                                                                                                                                                                                                                           | Article 11 |
|                    | Governors                                 | Industrial chemicals                                     | To organise enforcement laws and decisions from Government in terms of mining at local area. To control adequate use of licensed site and in event of violation of related laws and decision suspend exploration and mining.<br>Control on paying deposit to the local budget and process in environmental and health protection. Review and develop environmental protection plan in co-operation with license holder. In event of fulfill stated on environmental protection plan, to be compulsory executed by license holder from deposit.                                                                         | Article 12 |
|                    | MNE                                       | Industrial chemicals                                     | To issue EIA at any activities to exploration and mining activities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |
| Law on             | MNE                                       | Industrial                                               | To approve guidelines on development of Environmental Protection Plan and Environmental                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Article 6  |

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| Environmental Impact Assessment |                                        | chemicals                                                            | Monitoring Programme and regulation on rehabilitation<br>To issue whether or not to implement a project based on the expert's conclusion on the Detailed Environmental Impact Assessment Report.<br>To make a decision on authorizing an economic entity to conduct Detailed Environmental Impact Assessments for period of two years based on the conclusion of the Commission                                                                                                                                                                                                                                             | Article 7               |
| Law on Health /1998/            | Parliament                             | Chemicals, have adverse impacts to the human health<br>Bio-additives | Determine state policy on health                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Article 6               |
|                                 | Government                             | Chemicals, have adverse impacts to the human health<br>Bio-additives | Organise implementation of state policy on health<br>Approve Programme on Public Health, and issue financial support and control implementation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Article 7               |
|                                 | MoH                                    | Chemicals, have adverse impacts to the human health<br>Bio-additives | Enforce the law and approve regulation on health and standard, norm and normatives on health service and production, To provide by professional guidance to the state central and local administrations,<br>To provide by information about health issue to the public.<br>To make assessment and monitoring on State Health Programme and projects.<br>To issue special permission to the economic entities, who request to import, produce and supply household and sanitary insecticides.                                                                                                                                | Article 8<br>Article 44 |
|                                 | Local Citizen's Representative Khurals | Chemicals, have adverse impacts to the human health<br>Bio-additives | To develop and approve local health programme.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Article 9               |
|                                 | Governors                              | Chemicals, have adverse impacts to the human health<br>Bio-additives | Enforce the law at the local level and allocate human and financial resources for local health issue. Take immediate measure when occurring natural disaster and incidents and quarantine.                                                                                                                                                                                                                                                                                                                                                                                                                                  | Article 10              |
| Law on Drug /1998/              | National Council of drug               | Drugs and bio-preparation,                                           | To develop proposal and recommendations on issues of the National Drug Policy and submit them to the relevant State Central Administrative Body;<br>To develop proposals for amending the list of essential drugs;<br>To make conclusions and recommendations on production and import of the drugs;<br>To make professional recommendations on altering the list of and controlling the usage of narcotics and psychotropic drugs;<br>To make conclusions on national standards of the drugs and provisions of the pharmacopeias;<br>To approve making pharmacological, pharmaceutical and clinical analyses on new drugs, | Article 5               |

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|                    |            |                                          | discuss their results and to make final decisions on whether to put them into practice or not.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                |
|                    | MoH        | Drugs and bio-preparation medical device | To organize activities to issue permission on the import and reface of the drugs for human beings and livestock, and to assure quality of drugs<br>Permission for drug import and export shall be issued to the drug procurement organization in accordance with regulations, approved by the Minister of Health.<br>The license to manufacture the drugs for human shall be issued by the MoH.<br>To approve and enforce the list of drugs for sale with and without a prescription.<br>To approve and enforce the Regulation on Registering Drugs in the State Drug Registry.<br>The list of the narcotic and psychotropic drugs and the procedure to use them shall be approved by the Minister of Health.<br>Control on production, import, supply, transport, deliver, use and advertise of medicine. | Article 6<br>Article 8<br>Article 10<br>Article 13<br>Article 15<br>Article 16 |
|                    | MFA        | Drugs and bio-preparation medical device | Issue permission to produce livestock need medicine and medical equipment.<br>Approve list of medicine with recipe or without recipe by doctor.<br>Approve regulation on registration and fees for registry of drugs to the State Drug Registry                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Article 10                                                                     |
|                    | SPIA       | Drugs and bio-preparation medical device | Control on production, importing, supplying, transporting, distributing, using and advertise of drugs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Article 16                                                                     |
|                    | Government | Drugs and bio-preparation medical device | Determine customs border to import and export of medicine.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Article 16                                                                     |
|                    | Governors  | Drugs and bio-preparation medical device | To place pharmacies at suitable locations and to coordinate activities on drugs and medical equipment service.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Article 10                                                                     |
| Law on Food /1999/ | Parliament | Chemicals in food                        | Determine and exercise control over the implementation of the Government policy on food supply and food safety of the population.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Article 4                                                                      |
|                    | Government | Chemicals in food                        | To determine the food safety indicators and to establish control procedures on foodstuff crossing the State border.<br>To approve control procedures on food safety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Article 5                                                                      |

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|  | MFA                                                          | Chemicals in food | <p>To inform the public on quantity and types of livestock and strategic food to imported or exported that year considering food safety and supply.</p> <p>To establish requirements, procedures and quantities for technology of food production and service, as well as for hygiene and sanitation of raw materials of animal and plant origin.</p> <p>To implement policies on improving nutritiousness of food, increasing food production, introducing traditional and advanced technologies.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Article 6  |
|  | MoH                                                          | Chemicals in food | <p>To approve universal norms, instructions and requirements on hygiene, sanitation and safety of food production and production of its equipment.</p> <p>To establish norms of permissible sanitary levels for pesticides, medicines, fertilizers, radioactive substances, heavy metals, other chemical substances, micro organisms, food additives and other mixtures used in agriculture and food production, and to introduce such norms to the National standards.</p> <p>To establish appropriate norms for microelements required in food enrichment</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Article 6  |
|  | Citizen's Representative Khurals and Governors               | Chemicals in food | <p>To approve and monitor implementation of policies and programs on ensuring food safety of the population of their respective territories.</p> <p>To develop policies and programs on ensuring food safety of the population of their respective territories, and submit them to Citizens' Representatives Khurals of the particular instance.</p> <p>To inform each year the Citizens' Representatives Khurals of the particular instance on the implementation of policies and programs on ensuring food safety of the population of their respective territories, on real performance regarding the consumption of the population and relay related issues to appropriate authorities.</p> <p>To prohibit upon the State inspector's report production and services having pollution effects on the environment around food production and service entities.</p> <p>To organise work on providing the population with drinking water, exercise control over use and protection of drinking water sources, reservoirs, water distribution network and equipment, and other facilities.</p> | Article 7  |
|  | Veterinary and plant quarantine authority and its laboratory | Chemicals in food | <p>Examine animal- or plant- originated foodstuff, and certify its quality</p> <p>Micro organisms, chemical substances, medicine, fertilisers, radioactive substances, pesticides to be used in production and service of food must be examined and given a conclusion by the appropriate and competent sanitary, epidemiological, veterinary and animal- or plant quarantine authorities.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Article 9  |
|  | SPIA                                                         | Chemicals in food | <p>To establish the food security indicators, and to issue permissions for food crossing the State border.</p> <p>To provide aimag, capital city and border control agencies with professional and methodological guidance, organize training for food producers and service providers.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Article 12 |

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|                     |            |                                               | <p>To organise the work on preparing, training and retraining professional control personnel.</p> <p>To prohibit the export and import of food and means of food production not complying with the sanitary and quality requirements.</p> <p>To create a database regarding food safety.</p> <p>To establish and maintain control agencies with a laboratory capable of determining indicators of food safety in permanent border-crossing points and in other border-crossing points – control agencies with a laboratory capable of determining primary indicators of food safety.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |
|                     | Inspectors | Chemicals in food                             | <p>Inspector in charge of sanitation and epidemiology shall supervise the health of an individual engaged in food production and service; sites and environment; problem stages of production process; and hygienic safety and cleanliness of a ready-to-consume product.</p> <p>Inspector in charge of veterinary control shall supervise the sanitation and hygienic safety of a site, environment and problem stages of production process of an entity engaged in production and service of products that use livestock, animals, their raw meat, fat, intestines and by-products; fish; milk and other dairy products, raw eggs, raw materials and products of animal origin being sold on market, or being used in public catering or in processing production as input.</p> <p>State Inspector in charge of plant and vegetable quarantine shall supervise the sanitation and hygienic safety of vegetables, fruits and other raw materials of plant origin; vegetable warehouses, vegetable storage areas of public catering places and their sites and equipment.</p> <p>State Inspector in charge of food production and service control shall supervise the implementation of universal norms of technology to be observed in production and service of food and means of food production.</p> <p>State Inspector in charge of standards, control and ratification shall supervise the implementation of State standards during all stages of production and service, from designing and processing technical documentation of a food product and production blueprints until consumption of a finished product.</p> | Article 13 |
| Law on Water /2004/ | Parliament | Chemicals in water /surface and ground water/ | Determine State policy on Water                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Article 9  |
|                     | Government | Chemicals in water                            | <p>Organize enforcement of state policy and other regulation on water</p> <p>To approve Water Programme</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Article 10 |
|                     | MNE        | Chemicals in water                            | Organise implementation of the Programme to supply water with sanitary requirements to the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Article 11 |

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|                                                      |                                      |                    | population in cooperation with related governmental administration bodies.                                                                                                                                                                                                                                                                                                      |                                       |
|                                                      | Water Authority                      | Chemicals in water | Develop standard and technical requirements to treat waste water from industries and services which use chemicals.<br>Conduct monitoring and assessment on water resources and handle water resource registration and cadastre. To provide by information related on water and its issue to the public. To develop technical requirements to recycle waste water from industry. | Article 12                            |
| Law on Control on Explosives and Exploding equipment | Ministry of Trade and Industry       | Industrial         | To issue license on importation, exportation and production of explosives and exploding equipment<br>To handle database covering items, volume on explosives and exploding equipment, stored, imported, exported, produced, used, sold and disposed in Mongolia.<br>To develop safety standard on storage and transportation of explosives and exploding equipment              | Article 6<br>Article 17<br>Article 18 |
|                                                      | Government                           | Industrial         | Approve border to pass and transport and border to be banned to pass explosives and exploding equipment<br>Approve safety requirement of new type of explosives in Mongolia.                                                                                                                                                                                                    | Article 6                             |
|                                                      | NEMA                                 | Industrial         | To issue in giving in hand of confiscated explosives to the professional organisation to dispose.                                                                                                                                                                                                                                                                               | Article 9                             |
|                                                      | State Police Office                  | Industrial         | Control on transportation of explosives. Issue permission of vehicles to transport explosives.                                                                                                                                                                                                                                                                                  | Article 10                            |
|                                                      | Governor of the City and Aimag       | Industrial         | To define location to produce and store explosives.                                                                                                                                                                                                                                                                                                                             | Article 14                            |
|                                                      | State Professional Inspection Agency | Industrial         | To dispose explosives, loss of quality requirements and date of use, on the basis of conclusion by professional organisation. To monitor and control law enforcement.                                                                                                                                                                                                           | Article 14                            |
|                                                      | State Customs Agency                 | Industrial         | To inform explosives, passed border to the Police Office and send report to the MIC every month.                                                                                                                                                                                                                                                                                | Article 17                            |
|                                                      | MNE                                  |                    | Shall conduct EIA on project to produce explosives.                                                                                                                                                                                                                                                                                                                             |                                       |
| Law on Cropping                                      | Government                           | Agricultural       | Organize implementation of State Policy on Cropping and enforcement of the law. Approve Programme on Development of Cropping.                                                                                                                                                                                                                                                   | Article 4                             |
|                                                      | MFA                                  | Agricultural       | Develop State Policy on Development of Cropping. To be maintained rule of rehabilitation crop land and improving its fertility.                                                                                                                                                                                                                                                 | Article 5                             |

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| Law on Petroleum Products /2005/ | Citizen's Representative Khurals              | Agricultural                      | Approve Plan to develop cropping at the respective territory.                                                                                                                                                                                                                                                                                                                                                                              | Article 6               |
|                                  | Governors                                     | Agricultural                      | To support farmers in improving land fertility and building irrigation.                                                                                                                                                                                                                                                                                                                                                                    | Article 7               |
|                                  | Government                                    | Chemicals in petroleum production | Control implementation of the Policy in importation production, trade, transportation, store and investment of petroleum products<br>Approve volume of reserve and regulation to create reserve of petroleum products to the economic entities, which have permission to produce and wholesale.                                                                                                                                            | Article 5<br>Article 15 |
|                                  | Ministry of Trade and Industry                | Chemicals in petroleum production | Organize implementation of State Policy on Importation, Production, Trade, Transportation, Store, Investment of Petroleum Products.<br>Issue special license to produce and wholesale of petroleum products and to stay or abolish.<br>Approve rule and norm.<br>Approve regulation to registry containers to keep petroleum products in cooperation with SPIA.                                                                            | Article 5               |
|                                  | Mineral and Petroleum Authority               | Chemicals in petroleum production | Implement State Policy on petroleum products.<br>Develop draft norm, rule and standard in production, trade, transportation, store.<br>Make technique and technological conclusion on project to build factory, store, delivery station of petroleum products. Make professional recommendation in issuing special license.<br>Create database on petroleum products. Conduct training, support by professional methodological guidelines. | Article 6               |
| Law on subsoil /1998/            | Parliament                                    | Chemicals in subsoil              | Determine State Policy on Subsoil.<br>Determine direction to utilization of subsoil fund.                                                                                                                                                                                                                                                                                                                                                  | Article 6               |
|                                  | Government                                    | Chemicals in subsoil              | Execute state policy and determine technical policy to protect and use subsoil.<br>The subsoil use for landfill toxic substances to human health and livestock, animals shall be issued by Government.                                                                                                                                                                                                                                     | Article 6               |
|                                  | Ministry of Industry and Commerce             | Chemicals in subsoil              | Implement state policy on protection and use of subsoil and define policy to proper use of minerals and resources. Implement state monitoring on geological survey for using subsoil.<br>To issue mining claim for exploration pursuant to the law.                                                                                                                                                                                        | Article 6               |
|                                  | Ministry of Nature and Environment            | Chemicals in subsoil              | State control on proper use of subsoil and organise policy.                                                                                                                                                                                                                                                                                                                                                                                | Article 6               |
|                                  | Citizen's Representative Khurals of Aimag and | Chemicals in subsoil              | Implement the law and Governmental decision in terms of use and protection of subsoil.                                                                                                                                                                                                                                                                                                                                                     | Article 7               |

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|                    | City                                           |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |
|                    | Governors of Aimag and City                    | Chemicals in subsoil | Organise implementation of the law and decision made by Representative Khural and conduct inspection of utilization and protection.<br>To halt any illegal activities to use subsoil and construction.                                                                                                                                                                                                                                                                                                                                                                                                     | Article 7  |
|                    | Governors of Soum and Duureg                   | Chemicals in subsoil | To issue land claim to use natural resources in the subsoil. To issue subsoil for purpose of landfill toxic chemicals and storing gas and oil, and building for waste water treatment.                                                                                                                                                                                                                                                                                                                                                                                                                     | Article 8  |
| Law on Land /2002/ | Parliament                                     |                      | To determine the state general policy on land; To take land for the purposes land under state special protection; border strip lands; land allocated for ensuring national defense and security, land allocated to foreign resident diplomatic representatives, consuls, and resident representatives of international organizations; fee-zone land.                                                                                                                                                                                                                                                       | Article 17 |
|                    | Government                                     |                      | To implement the State general policy on land and organize and ensure the implementation of legislation on land;<br>To establish procedures for writing records and reports on State Unified Land Territory and on certifying State land characteristics and quality.                                                                                                                                                                                                                                                                                                                                      | Article 18 |
|                    | Ministry of Construction and Urban Development |                      | To organize the implementation land legislation and Government decision on land relation; To permit and suspend business activities in land management, land cadastre and to define procedure and instruction in the business activity.<br>To put state control on land characteristics and quality, to give conclusion on Land management plan of Aimag and city, and control its implementation. To guide development of state policy on land cadastre. To submit to the Government in definition of land into classification of State Unified Land Territory, and removal land from the classification. | Article 19 |
|                    | MNE                                            |                      | To submit to the Government in taking into Special Need land classification of State protected area and its removal from the classification and in determining of strip of this land.<br>To define level and rank of land degradation and type of desertification and develop procedure and guidelines in protection and rehabilitation.                                                                                                                                                                                                                                                                   |            |
|                    | Citizen's Representative Khural and Governors  |                      | To conduct control over the implementation of legislation on land as well as their own decisions and, where necessary, discuss the Governor's report on the issues.<br>Upon submission by the Governor, discuss and approve the annual program on land possession, use, and protection in the territory.<br>To organize and ensure the implementation of legislation on land in their territory. To conduct control over whether land possessors and users are using and protecting land and its resources efficiently, rationally and in accordance with laws and contract in their territory. To submit  | Article 20 |

|                        |                                                            |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |
|------------------------|------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|                        |                                                            |                              | <p>proposal to Citizen's Representative Khural in taking land into Special Need Land.</p> <p>In case of degradation of land characteristics, based on conclusion by professional organisation, to take back the land.</p> <p>To submit proposal to Ministry of Construction and Urban Development in making conclusion by professional organisation based on compliance from citizen and economic entity dealing with negative impacts to the environment.</p>                                                         |            |
|                        | Municipality Governor                                      |                              | <p>Upon approved plan, size, needs and location of the land to be possessed.</p> <p>Upon approved plan, to issue land possession along centralized engineer system and in the location planned to be connected to the system. In this case shall take related District Governor's opinion.</p>                                                                                                                                                                                                                         | Article 21 |
|                        | Governor of Aimag                                          |                              | Upon approved plan and based on opinion by Soum's Governor, to issue land possession along centralized engineer system of Aimag.                                                                                                                                                                                                                                                                                                                                                                                       | Article 21 |
|                        | Governor of Soum                                           |                              | Upon approved plan to issue land possession to the citizen and economic entity.                                                                                                                                                                                                                                                                                                                                                                                                                                        | Article 21 |
|                        | Governor of District                                       |                              | To issue land possession to the citizen and economic entity.                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Article 21 |
|                        | Governor of Bag and khoroo                                 |                              | Responsible of land usage, protection, sanitary and hygienic issues in the respective area.                                                                                                                                                                                                                                                                                                                                                                                                                            |            |
|                        | Administration of Land Affairs and Geodesy and Cartography |                              | To develop General Plan of State Land Management. To report about land in every year. To conduct land management activities in the state level. To control protection, rehabilitation of land and land management activity. To approve regulation in issuing certificate to possess of land. To make conclusion on negative impacts from land usage in cooperation with professional organisation. To handle monitoring network in evaluation of land characteristics and quality, monitoring of land quality changes. | Article 23 |
|                        | Land Department of Aimag and City                          |                              | Upon Governor's decision, to establish contract with citizen and economic entity in possession of land and issue certification.                                                                                                                                                                                                                                                                                                                                                                                        | Article 23 |
| Law on Sanitary /1998/ | MNE and MoH                                                | Chemicals in the environment | Approve list of waste which have toxic impacts to the human, livestock and animal.                                                                                                                                                                                                                                                                                                                                                                                                                                     | Article 7  |
|                        | Citizen's                                                  | Chemicals in the             | Enforce the law and review Governor's report. Approve financial allocation for sanitary                                                                                                                                                                                                                                                                                                                                                                                                                                | Article 7  |

|                                                        |                                                                            |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                          |
|--------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|                                                        | Representative Khurals of Aimag, City and Soum, Duureg                     | environment                      | improvement and to control on expenditure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                          |
|                                                        | Governors                                                                  | Chemicals in the environment     | Organize implementation on the law in the respective territorial area, to issue and enforce regulation related on sanitary requirements. To control use of cemetery, sewage and public service place, and on drinking water resources, rivers, ponds, water supply system and dumping site. If necessary, to define protectional zone and its rule.                                                                                                                                                                                                                                                                                         | Article 15<br>Article 16 |
| Law on Rays protection and its safety                  | Nuclear Energy Commission under Ministry of Education, Culture and Science | Radioactive chemicals            | Develop state policy on using nuclear energy, rays protection and its safety and submit to the related State administrative body. Implement in collecting, storing, transportation and landfill of radioactive waste and conduct radio active assessment and inspection in cooperation with professional agency on the consumer used products and drinking water and make conclusion whether or not have negative impacts. Issue special license to the citizen and economic entity to prospect, explore and mining, process and extract, and to import, export, transport and perform landfill and rehabilitation of radioactive minerals. | Article 6                |
|                                                        | Governor of Aimag and City                                                 | Radioactive chemicals            | Enforce the law and related standard and norm as well as any decision issued by Commission. To organize training in rays protection and its safety in the respective territorial area.                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Article 10               |
| Law on Control on Narcotic and Psychotropic substances | Government                                                                 | Narcotic, psychotropic chemicals | Approve borders to pass narcotic, psychotropic chemicals. Approve regulation on store and disposing of narcotic, psychotropic chemicals and equipment to produce.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Article 6                |
|                                                        | MoH                                                                        | Narcotic, psychotropic chemicals | To issue special license to produce and trade of narcotic, psychotropic chemicals. To control registration, allocation, production, expenditure, store, trade, and use of narcotic, psychotropic chemicals.                                                                                                                                                                                                                                                                                                                                                                                                                                 | Article 8<br>Article 14  |
|                                                        | MNE                                                                        | Narcotic, psychotropic chemicals | To control on gathering raw materials of narcotic, psychotropic chemicals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Article 14               |
|                                                        | Customs Agency                                                             | Narcotic, psychotropic chemicals | To border control on to pass of narcotic, psychotropic chemicals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Article 14               |
|                                                        | Police Office                                                              | Narcotic,                        | To halt illegal network of narcotic, psychotropic chemicals and inspect violation and crime,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Article 14               |

psychotropic  
chemicals

take preventive measure

**Table 4.A.1: Other Legislative Acts Which Address the Management of Chemicals**

|            | <i>Legal Instrument</i>                                                                               | <i>Issued authority</i>                                                                                                                 | <i>Chemical Use Categories Covered</i> | <i>Objective(s) of Legislation</i>                                                                            | <i>Enforcement ranking</i> | <i>Comments</i>                                   |
|------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------|
| <b>LA1</b> | The ordination on permission in producing, importing, trading and using of hazardous chemicals 1998/. | ordination 86/A120<br><br>Minister of Nature and Environment and Minister of Agriculture and Food,                                      | Toxic and hazardous chemicals          | Procedure in permission to produce,, import, sell and use of toxic and hazardous chemicals                    | 1                          |                                                   |
| <b>LA2</b> | Regulation on storing, transporting and disposing of toxic and hazardous chemicals /2007/             | Ministerial Order #151/126/52<br><br>Minister of Nature and Environment<br>Minister of Health<br>Minister in charge of emergency issues | Toxic and hazardous waste              | To implement basic requirement in store, transportation , usage and disposal of toxic and hazardous chemicals | 1                          | It requires a lot of public awareness activities. |
| <b>LA3</b> | Regulation on making risk assessment of toxic and hazardous chemicals                                 | Ministerial Order<br><br>Minister of Nature and Environment                                                                             | Toxic and Hazardous Chemicals          | To regulate who,when, how to make assessment oftoxic and hazardous chemicals                                  | 3                          | Related standards are needed                      |

|            |                                                                                                                                |                                                                                                                                   |                                       |                                                                                                                                                                                                                                                       |   |          |
|------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------|
| <b>LA4</b> | Regulation on registering and testing pesticides in Mongolia / 1999/.                                                          | Ministerial Order #86A164<br>Minister of Nature and Environment,<br>Minister of Industry and Agriculture,<br>Minister of Health   | Pesticides                            |                                                                                                                                                                                                                                                       | 3 | outdated |
| <b>LA5</b> | Borders to pass toxic and hazardous chemicals /2006/                                                                           | Government Resolution #296                                                                                                        | Toxic and hazardous chemicals         | To approve borders to pass toxic and hazardous chemicals<br>7 borders were approved                                                                                                                                                                   | 1 |          |
| <b>LA6</b> | List of banned and severely restricted chemicals to use in Mongolia /2007/                                                     | Government Resolution #95                                                                                                         | Toxic and hazardous chemicals         | To approve list of banned and severely restricted chemicals to use in Mongolia<br>83 kind of chemicals banned and 28 kind of severely restricted                                                                                                      | 1 |          |
| <b>LA7</b> | List of permissible pesticides for agricultural and plant protection need in 2008 /2008/                                       | Ministerial Order #70/38/60<br><br>Minister of Nature and Environment and Minister of Health and Minister of Food and Agriculture | Industrial Consumer need agricultural | To approve list of pesticides for plant protection and annual admissible volume.<br>To approve list of pesticides for veterinary and annual admissible volume.<br>To approve list of substances for household sanitary purpose and admissible volume. | 1 |          |
| <b>LA8</b> | To ban mercury usage in mining activities /2008/                                                                               | Ministerial Order                                                                                                                 | Mercury                               | To ban mercury usage in mining and quarrying                                                                                                                                                                                                          | 1 |          |
| <b>LA9</b> | Resolution on classification, collecting, packaging, handling, transportation, securing and disposal of hazardous waste /2002/ | Minister of Nature and Environment<br>Government Resolution #135                                                                  | Hazardous chemicals in waste          | To define classification of hazardous waste depending on its feature - as chemical, infectious, radioactive. To regulate procedure of hazardous waste to collect, transport, package, handle and secure.                                              | 1 |          |

|             |                                                                                                                                                                                                                                             |                                                                                          |                                                                            |                                                                                                                                                                                                                                             |   |                                                                                                                 |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------|
| <b>LA10</b> | Regulation on involving to passport system of hazardous waste /2006/                                                                                                                                                                        | Government Resolution #268                                                               | Toxic and hazardous substances in the waste                                | The hazardous waste passport is going to reveal information and data on dangers and risk from source and prevent from toxic waste harm. Economic entity which generates and deals with hazardous waste shall have hazardous waste passport. | 1 |                                                                                                                 |
| <b>LA11</b> | Instruction on collecting, store, transportation and disposal of waste from health organisation /2002/                                                                                                                                      | Ministerial Order<br>Minister of Nature and environment and Minister of Health           | Toxic and hazardous chemicals in waste generated from health organisations | To give definition what is the waste generated from health organisation and classification of the waste.<br>To define instruction on collecting, store, transportation and disposal ways of the waste.                                      | 1 |                                                                                                                 |
| <b>LA12</b> | Technological instruction in collecting, keeping transportation and disposal of chemical waste in environment friendly way. Regulation on importation, transportation and usage of products containing toxic and hazardous chemicals /2003/ | Ministerial order # 126/171<br>Minister of Nature and Environment and Minister of Health | Waste containing toxic and hazardous chemicals                             | To regulate creation of disposal site and land.<br>To define disposal ways depending on waste feature.<br>To approve list of products containing toxic and hazardous chemicals                                                              | 2 | Cause of financial capacity special building for disposal has not yet established.                              |
| <b>LA13</b> | Instruction on keeping record and reporting of store and disposing of the hazardous waste                                                                                                                                                   | Ministerial order #127, 2007<br>Minister of Nature and Environment                       | Hazardous chemicals discharged by waste                                    | To make record on hazardous waste dumped by citizen and economic entities.<br><br>To approve an instruction form to make record.                                                                                                            | 3 | Who will control and how, is unclear. Lack of enforcement measure and lack of compliance with the related laws. |
| <b>LA14</b> | Procedure on making custom registration /2004/                                                                                                                                                                                              | Order by Director of Customs Agency #59                                                  | Chemicals                                                                  | All kind of chemical substances to import, shall be made custom registration upon conclusion of Customs Central Laboratory.                                                                                                                 | 1 |                                                                                                                 |

|      |                                                                                                                   |                                                          |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |                                                                                                     |
|------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------|
| LA15 | Procedure on controlling of production, utilization and importation of chemicals /2003/                           | Minister in charge of State Professional Inspection #337 | Industrial chemicals | Environmental inspector shall put control on production, utilization, and importation of chemicals. Health inspector shall define impacts to the air, soil, water and human environment due to utilization of chemicals from business entities and put control on precautionary measure. Labor inspector shall control on whether or not conforming of the labor condition and technical safety requirement of business entities which are using and producing and storing of chemicals to the related standard | 1 | Main procedure in state inspection.                                                                 |
| LA16 | To ban usage of Plastic sacks and Bags in UB city                                                                 | Decree<br><br>General Manager of Municipality            | pesticide            | To halt usage of plastic bags and sacks in service sector                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 3 | Lack of non-regulatory mechanism, not so good enforced                                              |
| LA17 | Approval of classification on toxic chemicals, amendments into classification of extremely toxic chemicals /2002/ | # 63/89                                                  | Toxic chemicals      | List of chemicals in category of toxic characteristics shall be approved by Annex 1, list of chemicals in category of impacts to the human and animal body shall be approved by Annex 2. Chemicals under control of Rotterdam and Stockholm Conventions shall be at Annex 3, 4 and that chemicals shall be belonged into category of extremely toxic category in Annex                                                                                                                                          | 2 | Classification is different stated in the Law on Toxic and Hazardous chemicals. Need to be renewed. |

## 4.2. Summary Description of Key Legal Instruments Relating to the Chemicals

Along with above mentioned laws, several important laws such as Law on State Audit and Inspection, and Law on Special License and Law on Local administrative units and its administration of Mongolia, which address chemicals management. All these laws are very important and play as main regulation at the enforcement level.

### *Law on Special License*

Objective of this Law is to regulate a relation with respect to giving, delaying and invalidating a license to some business activities that might negatively affect public interest, human well-being, environment and national security and that might require specific conditions and expertise. All types of food industry and food services will be conducted on the base of inspection and permission by appropriate institution on industrial conditions, technology procedures and product samples. According to this law, business activities, such as manufacturing, importing and selling narcotics, organizing, advertising and encouraging any types of depravity; dealing with casino business; profit-seeking business through multistage marketing or pyramid approach are prohibited.

In framework of environment issue, following activities are belonged to take license.

- importing, selling and utilizing ozone depleting substances and products involving such substances in their contents;
- importing and utilizing of toxic and hazardous chemicals.
- producing of toxic and hazardous chemicals, except explosive substances
- discharging emissions which are not defined admissible level by the standard
- conducting EIA

In infrastructure:

- establishing and working with atomic energy generator; building railway stations;
- establishing power sources and distribution network; dealing with energy generation, transmission, dispatch regulation, distribution, provision and selling;
- building and maintaining auto roads and road construction; technical inspection to auto transportation vehicles; developing geodesy and dealing with construction building;

In industry and trade field:

- selling narcotic and strong poisonous substances except drugs;
- exporting, trading of toxic and hazardous chemicals and producing explosive substances and exploding facilities and blasting operation .
- minerals exploration;
- utilization of minerals;
- importation of alcohol and tobacco products
- wholesaling and producing of petroleum products

Food and agriculture field:

- planting tobacco plants and manufacturing tobacco;
- producing alcoholic products except milk vodka;
- producing seed of crops;
- manufacturing and importing livestock medicine and veterinary facilities;
- selection of livestock sickness microbes;
- selling and importing chemical substances utilized to protect plants;
- adapting new and imported veterinary medicine and new sorts of animal selects into industry and services, importing and exporting of new sort of animals;

- privately deal with veterinary and selection service, and manufacturing new medicine for veterinary and livestock selection;

In health issue:

- preparation of medicine using drug plants;
- producing, importing and selling drugs and medical facilities, tools and equipment and;
- all types of services to deliver health care;
- producing, importing and selling drugs, mutually effected medicament and substances;
- domestically and internationally invested medical institutions dealing with professional health care services;
- producing, selecting, reserving, storing, transporting, selling harmful microbes and their causes;
- service in household sanitary to control pests and insects
- importing, producing and supplying of biological active preparation
- services as nursery and treatment of patients;

According to law not only Central Government Organisations, but also Local Governors responsible of issuing licenses in some business activities. For example, Governors of Aimag and City have to right in issuing special license such as:

- local public transportation and post service;
- professional activities of health care institutions;
- importing, producing, disposing of poisonous chemical substances;
- establishing secondary schools;
- selling and serving with alcoholic beverages;

Governors of Soum and District shall issue license of:

- dealing with business that discharge polluting chemicals to the atmosphere and that effects poisonous physical impact and using local sources for such kind of business;
- selling of tobacco

### ***Law on State Audit and Inspection***

Objective of this law is to regulate relationship in implementation of state inspection and to define system of state audit and inspection and its legal basis. The state audit and inspection system is comprises from Great Ikh Khural, State Audit Organization, State Inspection by State Administrative Organization, Constitutional Court, and Prosecutor and Court's Power and Local Self -Governing Organization.

This law shall regulate relationship in inspection executed by Government, Line Ministries, Governors of Aimag and City, Soum and District and other legally authorized body which is State Professional Inspection and Local Self-Governing Organisation.

The inspectional organisation shall give conclusion in inspected issue and activities and define cause of breach and take measure or submit to the authorized body pursuant to the related laws. Government shall have power to regulate inspectional organisation in direction of integrated goal and take measure in effective system of administrative inspection. According to this law Governors shall have several powers in the inspection of laws and legislative acts issued by President, Government, Line Ministries and Citizen's Representative Khurals:

- To inspect at any activities of business entities and organisations, not concerning of ownership and location
- To organize activities in informing and publicizing about laws and other legislative acts and report to the Government.

State Professional Inspection shall executed by legally authorized organisation. Therefore in Mongolia, State Professional Inspection Agency executes this power and shall have responsibilities of enforcement of the laws and other legislative acts and providing by methodological guidance to the local division of State Professional Agency. Inspectors at State Professional Agency, shall implement powers given by law. It should be mentioned an example of inspector's power, is that, to suspend any activities have adverse impacts to the human health and environment, or probable to cause dangers. In addition he/she shall take preventive measure from any accident. In framework of this measure, he/she shall make decision in decontamination, refinement, to stop using of such building, vehicles, equipment and facilities, to halt sell and dispose of such products which have probably to cause any negative impacts. Therefore he/she has to power to use non-compliance measure such as fine, penalty and tax pursuant to the law.

#### ***Other procedure related to chemical management***

The one of the important element in the chemical management is standardization. In Mongolia the role of standardization is regulated by Law on Standardization and Conformity Evaluation. According to this law, National Standard shall respond to the advanced standard of International, Regional and Foreign Countries. Any standard, which is approved by Technical Commission, comprises delegates from government, business entities, scientific research organisations and other institutions, shall accepted as National Standard. Conformity Evaluation is process to define whether the product/organisation is conforming standard, technical adjustment and requirements stated in related norm. Goal of making Conformity Evaluation is to improve customer's confidence and to help in making right choice and protect from forgery and improve product competence. Conformity Evaluation is comprises from accreditation, testimony, confirmation and technical verification. In Mongolia. A lot of National Standards developed in the environment field such as Water standard /MNS 4586-1998/, Waste water standard /MNS 4943-2000/, Air quality standard /MNS 4585-2007/. Totally, 140 standards in environmental field have been effective in Mongolia and 2/3 of standards have been developed before 1989. Most of them defined general requirements and method of measure. In environment monitoring and waste issues overall 8 standards are now working on. Ground water standard defines 18 indicators and drinking water defines 25 indicators respectively and all these standards very similar to the standards in China and other countries. In 2000 new 6 standards have been approved in mining sector in field of rehabilitation and restoration.

### 4.3. Existing Legislation by Use Category Addressing Various Stages of Chemicals from Production/Import through Disposal

LTHC- Law on Toxic and Hazardous Chemicals  
 LHIW - Law on Hazardous and Industrial Waste  
 LTIHS – Law on Transportation and Import Hazardous Sustances  
 LC- Law on Customs  
 LL- Law on Licensing  
 LSAI- Law on State Audit and Inspection  
 LPP- Law on Petroleum Production  
 LH- Law on Health  
 LF- Law on Food

**Table 4.B: Overview of Legal Instruments to Manage Chemicals by Use Category**

| Category of Chemical                                                     | Import | production | storage | transport | Distribution/<br>marketing | Use/handling | disposal |
|--------------------------------------------------------------------------|--------|------------|---------|-----------|----------------------------|--------------|----------|
| <b>Pesticides</b>                                                        | LTHC   | LTHC       | LTHC    | LTHC      | LTHC                       | LTHC         | LTHC     |
| <b>Agricultural</b>                                                      | LTIHS  |            |         |           |                            |              |          |
| <b>Household</b>                                                         | LC     | LSAI       | LSAI    | LTIHS     | LSAI                       | LTIHS        | LHIW     |
| <b>Public health</b>                                                     | LL     | LL         |         |           | LL                         | LSAI         | LSAI     |
| <b>Fertilizers</b>                                                       | LTHC   | LTHC       | LTHC    | LTHC      | LTHC                       | LTHC         | LTHC     |
|                                                                          | LC     |            |         |           |                            |              |          |
|                                                                          | LL     | LSAI       | LSAI    |           | LSAI                       | LSAI         | LHIW     |
|                                                                          |        |            |         |           |                            |              | LSAI     |
| <b>Industrial chemicals (used in manufacturing, processing facility)</b> | LTHC   | LTHC       | LTHC    | LTHC      | LTHC                       | LTHC         | LHIW     |
|                                                                          | LC     | LSAI       | LSAI    |           | LL                         | LSAI         | LSAI     |
|                                                                          | LL     |            |         |           | LSAI                       | LL           |          |
| <b>Petroleum products</b>                                                | LTIHS  | LTHC       | LTHC    | LTHC      | LTHC                       | LTHC         | LTHC     |
|                                                                          | LC     | LSAI       | LSAI    | LPP       | LPP                        | LPP          |          |
|                                                                          | LL     | LL         | LPP     |           | LSAI                       | LSAI         | LHIW     |
|                                                                          | LPP    | LPP        |         |           |                            |              |          |
| <b>Consumer chemicals</b>                                                | LTHC   | LTHC       | LTHC    | LTHC      | LTHC                       | LTHC         | LTHC     |
|                                                                          | LSAI   | LSAI       | LSAI    | LSAI      | LSAI                       | LSAI         | LHIW     |
|                                                                          | LF     | LF         | LF      | LF        | LF                         | LF           | LSAI     |
|                                                                          | LH     | LH         | LH      | LH        | LH                         | LH           |          |
|                                                                          | LL     | LL         | LL      |           |                            |              |          |
| <b>Chemical wastes</b>                                                   | LTHC   | LTHC       | LTHC    | LTHC      | LTHC                       | LTHC         | LTHC     |
|                                                                          | LHIW   | LHIW       | LHIW    | LHIW      | LHIW                       | LHIW         | LHIW     |
|                                                                          | LSAI   | LSAI       | LSAI    | LSAI      | LSAI                       | LSAI         | LSAI     |

#### 4.4. Summary description of Key Approaches and Procedures for Control of Chemicals

In Mongolia chemical substances (toxic and hazardous) are responsible issue under Ministry of Nature and Environment. According to “Law on Toxic and Hazardous Chemicals” Government shall approve chemicals to be banned and severely restricted in Mongolia. Government Resolution #95 in 2007, totally 83 chemicals are banned and 28 are severely restricted in Mongolia. In addition, “List of permissible pesticides for agricultural and plant protection need in 2008” is approved by Minister of Nature and Environment and Minister of Health and Minister of Agriculture.

**Table 4.C. Banned Chemicals in Mongolia**

| Name of Chemical                                                                                                                                                                                                                            | CAS No.                             | conditions                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------|
| Aldrin,<br>1,2,3,4,10,10-hexachloro -<br>1,4,4a,5,8,8a-hexahydro-<br>1,4-endo,exo-5,8- dimethnonaphthalene<br>(C <sub>12</sub> H <sub>8</sub> Cl <sub>6</sub> )                                                                             | 309-00-2                            | Pesticide                                    |
| Dustable powder formulations containing a combination<br>of:<br>-Benomyl • 7%<br>-Carbofuran • 10%<br>-Thiram • 15%                                                                                                                         | 17804-35-2<br>1563-66-2<br>137-26-8 | Very toxic pesticide                         |
| Binapacryl;<br>2-(1-Methylpropyl)-4,6-dinitrophenyl 3-methyl-2-<br>butenoate;<br>2-(1-Methylpropyl)-4,6-dinitrophenyl 3,3-<br>dimethylacrylate;<br>Dinoseb methacrylate<br>(C <sub>15</sub> H <sub>18</sub> N <sub>2</sub> O <sub>6</sub> ) | 485-31-4                            | Pesticide                                    |
| Methyl Bromide<br>(CH <sub>3</sub> Br)                                                                                                                                                                                                      | 2903-30-10                          | To speed-up vegetable maturity               |
| Endosulfan;<br>1,4,5,6,7,8,8- heptachloro-4,4,7,7-tetrahydro-4,7-<br>methanoindene<br>(C <sub>10</sub> H <sub>5</sub> Cl <sub>7</sub> )                                                                                                     | 76-44-8                             | Pesticide                                    |
| Hexachlorobenzene;<br>HCB<br>(C <sub>6</sub> Cl <sub>6</sub> )                                                                                                                                                                              | 118-74-1                            | Fungicide, substances for rubber, explosives |
| Hexachlorocyclohexane (Mixed isomers);<br>1,2,3,4,5,6-hexachlorocyclohexane,<br>(C <sub>6</sub> H <sub>6</sub> Cl <sub>6</sub> )                                                                                                            | 608-73-1                            | Pesticide                                    |
| Dichlorohexafluoro-propane;<br>CFC-216<br>(C <sub>3</sub> F <sub>6</sub> Cl <sub>2</sub> )                                                                                                                                                  | 2903-45-29                          | Refrigerator                                 |
| Chloroheptafluoro-propane;<br>CFC-217<br>(C <sub>3</sub> F <sub>7</sub> Cl)                                                                                                                                                                 | 2903-45-29                          | Refrigerator                                 |
| Dalapon;<br>2,2-Dichloropropanoic acid;<br>alpha,alpha-dichloro-propionic acid (CH <sub>3</sub> CCl <sub>2</sub> COOH)                                                                                                                      | 75-99-0                             | Pesticide                                    |
| Tris (2,3-dibromopropyl) phosphate;                                                                                                                                                                                                         | 126-72-7                            | For producing rubber, paint, paper and water |

|                                                                                                                                                                                                                                                                                             |                                                 |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------|
| 2,3-Dibromo-1-propanol phosphate;<br>TDBPP;<br>(C <sub>9</sub> H <sub>15</sub> Br <sub>6</sub> O <sub>4</sub> P)                                                                                                                                                                            |                                                 | pipe                          |
| Dieldrin,<br>1,2,3,4,10,10- hexachloro -6,7-epoxy-<br>dimetanonaphthalene<br>(C <sub>12</sub> H <sub>8</sub> Cl <sub>6</sub> O)                                                                                                                                                             | 60-57-1                                         | Pesticide                     |
| DDT,<br>1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane;<br>(C <sub>14</sub> H <sub>9</sub> Cl <sub>5</sub> )                                                                                                                                                                                 | 50-29-3                                         | Pesticide                     |
| Ethylene dibromide;<br>EDB or<br>1,2 -dibromoethane<br>(BrCH <sub>2</sub> CH <sub>2</sub> Br)                                                                                                                                                                                               | 106-93-4                                        | Pesticide                     |
| Dinitro-ortho-cresol<br>(DNOC) and its salts<br>4,6-Dinitro-ortho-cresol<br>2-Methyl-4,6-dinitrophenol<br>DNOC<br>2,4-Dinitro-ortho-cresol<br>C <sub>7</sub> H <sub>6</sub> N <sub>2</sub> O <sub>5</sub> / CH <sub>3</sub> C <sub>6</sub> H <sub>2</sub> OH(NO <sub>2</sub> ) <sub>2</sub> | 534-52-1<br>2980-64-5<br>5787-96-2<br>2312-76-7 | Pesticide                     |
| Dinoseb;<br>2-(sec-butyl)-4,6-dinitrophenol or<br>2-(1-methylpropyl)-4,6-dinitrophenol;<br>C <sub>10</sub> H <sub>12</sub> N <sub>2</sub> O <sub>5</sub>                                                                                                                                    | 88-85-7                                         | Pesticide                     |
| Bromochlorodifluoro<br>Methane;<br>Halon-1211;<br>(CF <sub>2</sub> BrCl)                                                                                                                                                                                                                    | 2903-46-10                                      | Refrigerator                  |
| Hexachlorodifluoro-propane;<br>CFC-212;<br>(C <sub>3</sub> F <sub>2</sub> Cl <sub>6</sub> )                                                                                                                                                                                                 | 2903-45-29                                      | Refrigerator                  |
| Dichlorodifluoromethane; CFC-12*;<br>(CF <sub>2</sub> Cl <sub>2</sub> )                                                                                                                                                                                                                     | 2903-42-00                                      | Refrigerator                  |
| Tetrachlorodifluoroethane, CFC-112;<br>(C <sub>2</sub> F <sub>2</sub> Cl <sub>4</sub> )                                                                                                                                                                                                     | 2903-45-21                                      | Refrigerator                  |
| Nàðtafol(cis isomer);<br>Di folitan;<br>N-(1,1,2,2-Tetrachloroethyl-thio)cyclohex-4-ene-1,2-<br>dicarboximide;<br>3a,4,7,7a-Tetrahydro-N-(1,1,2,2-tetrachloroetha-<br>nesulphenyl)phthalimide;<br>(C <sub>10</sub> H <sub>9</sub> Cl <sub>4</sub> NO <sub>2</sub> S)                        | 2425-06-1                                       | Fungicide                     |
| Lindane;<br>Cyclohexane;<br>1,2,3,4,5,6-hexachloro-gamma-isomer;<br>(C <sub>6</sub> -H <sub>6</sub> -Cl <sub>6</sub> )                                                                                                                                                                      | 58-89-9                                         | Pesticide                     |
| Maleic hydrazide<br>1,2-dihydro-3,6-pyridazinedione;<br>(C <sub>4</sub> H <sub>4</sub> N <sub>2</sub> O <sub>2</sub> )                                                                                                                                                                      | 123-33-1                                        | To improve vegetable maturity |
| Methamidophos (Soluble liquid formulations of the<br>substance that exceed 600 g active ingredient/l)<br>(C <sub>2</sub> H <sub>8</sub> NO <sub>2</sub> PS)                                                                                                                                 | 10265-92-6                                      | Very toxic pesticide          |

|                                                                                                                                                                                                                                                                                                               |            |                                                                                                    |
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| 1,1,1-trichloroethane;<br>methyl chloroform;<br>TCA/ MCF/ MC<br>(C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub> )                                                                                                                                                                                              | 2903-19-10 | For dry cleaning and clean technical facility                                                      |
| Methyl-parathion (emulsifiable concentrates (EC) at above 19.5%, active ingredient and dusts at above 1.5% active ingredient)<br>(CH <sub>3</sub> O) <sub>2</sub> P(S)OC <sub>6</sub> H <sub>4</sub> NO <sub>2</sub>                                                                                          | 298-00-0   | Very toxic pesticide                                                                               |
| Mirex;<br>1,1a,2,2,3,3a,4,5,5,5a,5b,6-Do decachloro-octahydro-1,3,4-metheno-1H-cyclobuta[cd]<br>pentalene;<br>(C <sub>10</sub> Cl <sub>12</sub> )                                                                                                                                                             | 2385-85-5  | Pesticide, to producing plastic, rubber, paint, paper and fire resistance of electrical equipment. |
| Monocrotophos;<br>Dimethyl (E)-1-methyl-2-(methylcarbamoyl) vinyl phosphate;<br>Phosphoric acid, dimethyl 1-methyl-3-(methylamino)-3-oxo-1-propenyl ester (E)-;<br>(C <sub>7</sub> H <sub>14</sub> NO <sub>5</sub> P) /<br>((CH <sub>3</sub> O) <sub>2</sub> PO-OC(CH <sub>3</sub> )=CHCO-NHCH <sub>3</sub> ) | 6923-22-4  | Very toxic pesticide                                                                               |
| Nitrofen;<br>2,4-Dichloro-4'-nitrodiphenyl ether; 2,4-Dichlorophenyl-4'-nitrophenyl ether; 2,4-Dichloro-1-(4-nitrophenoxy)benzene<br>(C <sub>12</sub> H <sub>7</sub> Cl <sub>2</sub> NO <sub>3</sub> or C <sub>6</sub> H <sub>3</sub> Cl <sub>2</sub> OC <sub>6</sub> H <sub>4</sub> NO <sub>2</sub> )        | 1836-75-5  | Herbicide                                                                                          |
| Ethyl parathion<br>0, 0-Diethyl 0-(p-nitrophenyl) phosphorothioate or<br>0,0-Diethyl 0-(p-nitrophenyl) thiophosphate<br>(C <sub>2</sub> H <sub>5</sub> O) <sub>2</sub> P(S)OC <sub>6</sub> H <sub>4</sub> NO <sub>2</sub>                                                                                     | 56-38-2    | Very toxic pesticide                                                                               |
| Trichloropentafluoropropane<br>1,1,1-trichloro-2,2,3,3,3-pentafluoro-propane<br>C <sub>3</sub> Cl <sub>3</sub> F <sub>5</sub> or CFC 215                                                                                                                                                                      | 28109-69-5 | Refrigerator                                                                                       |
| Monochloropentafluoro-ethane;<br>CFC-115*;<br>CClF <sub>2</sub> CF <sub>3</sub>                                                                                                                                                                                                                               | 76-15-3    | Refrigerator                                                                                       |
| Pentachlorophenol and its salts and esters                                                                                                                                                                                                                                                                    | 87-68-5*   | Pesticide                                                                                          |
| Polychlorinated terphenyls (PCT)                                                                                                                                                                                                                                                                              | 61788-33-8 | To producing pesticide                                                                             |
| Pentachlorophenol<br>(C <sub>6</sub> HCl <sub>5</sub> O)                                                                                                                                                                                                                                                      | 87-86-5    | Pesticide                                                                                          |
| Tetramethyl lead<br>((CH <sub>3</sub> ) <sub>4</sub> Pb)                                                                                                                                                                                                                                                      | 75-74-1    | To produce petroleum with lead                                                                     |
| Dibromotetrafluoroethane; Halon-2402;<br>(C <sub>2</sub> F <sub>4</sub> Br <sub>2</sub> )                                                                                                                                                                                                                     | 2903-46-30 | Refrigerator                                                                                       |
| 1,1,2,2-Dichlorotetrafluoroethane;<br>CFC-114;<br>(C <sub>2</sub> F <sub>4</sub> Cl <sub>2</sub> )                                                                                                                                                                                                            | 2903-44-10 | Refrigerator                                                                                       |
| Tetrachlorotetrafluoropropane;<br>CFC-214;<br>(C <sub>3</sub> F <sub>3</sub> Cl <sub>4</sub> )                                                                                                                                                                                                                | 2903-45-29 | Refrigerator                                                                                       |

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| Tetraethyl lead;<br>(C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> Pb)                                                             | 78-00-2                                                                                                 | to make petroleum with lead and fungicide with organic mercury |
| Ö ðáðháñá or Chlorinated camphene<br>Polychlorinated bornans and camphenes;<br>(C <sub>10</sub> H <sub>10</sub> Cl <sub>8</sub> ) | 8001-35-2                                                                                               | Insecticide                                                    |
| Bromotrifluoromethane; Halon-1301;<br>(CF <sub>3</sub> Br)                                                                        | 2903-46-20                                                                                              | Refrigerator                                                   |
| Pentachlorotrifluoro<br>propane;<br>CFC-213;<br>(C <sub>3</sub> F <sub>3</sub> Cl <sub>5</sub> )                                  | 2903-45-29                                                                                              | Refrigerator                                                   |
| Chlorotrifluoromethane;<br>CFC-13<br>(CF <sub>3</sub> Cl)                                                                         | 2903-45-11                                                                                              | Refrigerator                                                   |
| 1,1,2-Trichlorotrifluoro<br>ethane;<br>CFC-113;<br>(C <sub>2</sub> F <sub>3</sub> Cl <sub>3</sub> )                               | 2903-43-00                                                                                              | To clean electrical equipment and metal.                       |
| Ugilec 121;<br>1,1'-methylenebis-dichloro<br>monomethyl derive benzene;<br>Monomethyldichlorodiphenylmethane                      | 81161-70-8                                                                                              | Not biodegradable chemicals. Not found data about use.         |
| 2- fluoroacetamide<br>(C <sub>2</sub> H <sub>4</sub> FNO)                                                                         | 640-19-7                                                                                                | Pesticide                                                      |
| Phosphamidon (Soluble liquid formulations of the<br>substance that exceed 1000 g active ingredient/l)                             | 13171-21-6<br>((E) & (Z)<br>mixed<br>isomers);<br>23783-98-4<br>(Z)-isomer;<br>297-99-4<br>(¿)- isomer. | Very toxic pesticide                                           |
| Pentachlorofluoroethane;<br>CFC-111;<br>(C <sub>2</sub> FCl <sub>5</sub> )                                                        | 2903-45-20                                                                                              | Refrigerator                                                   |
| Heptachlorofluoro-propane; CFC-211;<br>(C <sub>3</sub> FCl <sub>7</sub> )                                                         | 2903-45-29                                                                                              | Refrigerator                                                   |
| Trichlorofluorometh<br>ane , CFC-11*<br>(CFCl <sub>3</sub> )                                                                      | 2903-41-00                                                                                              | To load refrigerator                                           |
| Chlorobenzilate<br>(C <sub>16</sub> H <sub>14</sub> Cl <sub>2</sub> O <sub>3</sub> )                                              | 510-15-6                                                                                                | Pesticide                                                      |
| Nhlordane or Chlordane, alpha & gamma isomers<br>(C <sub>10</sub> H <sub>6</sub> Cl <sub>8</sub> )                                | 57-74-9                                                                                                 | Pesticide                                                      |
| Chlordimeform;<br>N-(4-Chloro-o-tolil)-N,N-dimetilformamidina)<br>(C <sub>10</sub> H <sub>13</sub> ClN <sub>2</sub> )             | 6164-98-3                                                                                               | Pesticide                                                      |
| Cyhexatin;<br>Tricyclohexyltin<br>hydroxide;<br>Cyhexatin                                                                         | 13121-70-5                                                                                              | Pesticide                                                      |

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| (Tricyclohexyltin Hydroxide);<br>Plictran<br>(C <sub>18</sub> H <sub>34</sub> OSn)                                                                                                                                                                                                                                                                              |                                                                                                            |                                                           |
| Endrin;<br>2,7:3, 6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3, 6,6a,7,7a-octahydro-(C <sub>12</sub> H <sub>8</sub> Cl <sub>6</sub> O)                                                                                                                                                                                                     | 72-20-8                                                                                                    | Pesticide                                                 |
| 1,2-Epoxyethane;<br>Oxirane;<br>Dimethylene oxide;<br>(C <sub>2</sub> H <sub>4</sub> O)                                                                                                                                                                                                                                                                         | 75-21-8                                                                                                    | In chemical industry, in preserving agricultural products |
| O-Alkyl (≤C <sub>10</sub> , inc. cycloalkyl) alkyl (Me, Et, n-Pr or i-Pr)-phosphonofluoridates<br>Sarin: O-Isopropyl methylphosphonofluoridate<br>Soman: O-Pinacolyl methylphosphonofluoridate                                                                                                                                                                  | 107-44-8<br>96-64-0                                                                                        | In making chemical weapon                                 |
| O-Alkyl (≤C <sub>10</sub> , inc. cycloalkyl) N,N-dialkyl (Me, Et, n-Pr or i-Pr)-phosphoramidocyanidates<br>Tabun: O-Ethyl N,N-dimethyl phosphoramido-cyanidate                                                                                                                                                                                                  | 77-81-6                                                                                                    | In making chemical weapon                                 |
| O-Alkyl (H or ≤C <sub>10</sub> , incl. cycloalkyl) S-2-dialkyl (Me, Et, n-Pr or i-Pr)-aminoethyl alkyl (Me, Et, n-Pr or i-Pr) phosphonothiolates and corresponding alkylated or protonated salts<br>X: O-Ethyl S-2-diisopropylaminoethyl methyl phosphonothiolate                                                                                               | 50782-69-9                                                                                                 | In making chemical weapon                                 |
| Sulfur mustards: 2-Chloroethylchloro-methyl-sulfide<br>Mustard gas: Bis (2-Chloroethyl) sulfide;<br>Bis(2-Chloroethylthio) methane;<br>Sesquimustard: 1,2-bis(2-Chloroethylthio) ethane;<br>1,3-Bis (2-Chloro-ethylthio)-n-propane;<br>1,4-Bis (2-Chloro-ethylthio)-n-butane;<br>1,5-Bis (2-Chloro-ethylthio)-n-pentane;<br>Bis(2-Chloroethylthio-methyl)ether; | 2625-76-5<br>505-60-2<br>63869-13-6<br>3563-36-8<br>63905-10-2<br>142868-93-7<br>142868-94-8<br>63918-90-1 | In making chemical weapon                                 |

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| O-Mustard: Bis (2-Chloro-ethylthiomethyl) ether                                                                                                                                                                                                     | 63918-89-8 |                           |
| Lewisite1: 2-Chlorovinyl-dichloroarsine;                                                                                                                                                                                                            | 541-25-3   | In making chemical weapon |
| Lewisite2: Bis (2-Chlorovinyl) chloroarsine ;                                                                                                                                                                                                       | 40334-69-8 |                           |
| Lewisite3: Tris (2-Chlorovinyl) arsine                                                                                                                                                                                                              | 40334-70-1 |                           |
| Nitrogen mustards:                                                                                                                                                                                                                                  |            | In making chemical weapon |
| HN1: Bis (2-Chloroethyl) ethylamine;                                                                                                                                                                                                                | 538-07-8   |                           |
| HN2: Bis (2-Chloroethyl)methylamine;                                                                                                                                                                                                                | 51-75-2    |                           |
| HN3: Tris (2-Chloroethyl)amine                                                                                                                                                                                                                      | 555-77-1   |                           |
| Saxitoxin                                                                                                                                                                                                                                           | 35523-89-8 | In making chemical weapon |
| Ricin                                                                                                                                                                                                                                               | 9009-86-3  | In making chemical weapon |
| Alkyl (Me, Et, n-Pr or i-Pr) phosphonyldifluorides;<br>DF: Methylphosphonyl-difluorides                                                                                                                                                             | 676-99-3   | In making chemical weapon |
| O-Alkyl (H or ≤C10 , incl, cycloalkyl) O-2-dialkyl<br>(Me, Et, n-Pr or i-Pr)-aminoethyl alkyl<br>(Me, Et, n-Pr or i-Pr)phosphonites and corresponding<br>alkylated or protonated salts<br>QL: O-Ethyl O-2 diisopropylaminoethyl<br>methylphosphonie | 57856-11-8 | In making chemical weapon |
| Chorosarin: O-Isopropyl methylphosphonochlori-date                                                                                                                                                                                                  | 1445-76-7  | In making chemical weapon |
| Chlorosoman: O-Pinacolyl methylphosphonochlori-<br>Date                                                                                                                                                                                             | 7040-57-5  | In making chemical weapon |
| Amiton: O,O-Diethyl S/2-<br>(diethylamino)ethylphosphonothiolate and<br>corresponding alkylated or protonated salts                                                                                                                                 | 78-53-5    | In making chemical weapon |
| PEIB: 1,1,3,3,3-Penta-fluoro-2-(trifluoromethyl)-1 -<br>propene                                                                                                                                                                                     | 382-21-8   | In making chemical weapon |
| BZ: 3-Quinuclidinyl benzilate (*)                                                                                                                                                                                                                   | 6581-06-2  | In making chemical weapon |
| Methylphosphonyl dichloride;                                                                                                                                                                                                                        | 676-97-1   | In making chemical weapon |
| Dimethyl methyl-phosphonate;                                                                                                                                                                                                                        | 756-79-6   |                           |
| Exemption: Fonofs: O-Ethyl S-phenyl ethyl-<br>phosphonothiolothionate                                                                                                                                                                               | 944-22-9   |                           |
| N,N-Dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidic<br>dihalides                                                                                                                                                                                      |            | In making chemical weapon |
| Dialkyl (Me, Et, n-Pr or i-Pr)N,N-dialkyl (Me, Et, n-Pr or<br>i-Pr) phosphoramidates                                                                                                                                                                |            | In making chemical weapon |
| Arsenic trichloride                                                                                                                                                                                                                                 | 7784-34-1  | In making chemical weapon |
| 2,2-Diphenyl -2-hydroxyacetic acid                                                                                                                                                                                                                  | 76-93-7    | In making chemical weapon |
| Quinuclidin-3-ol                                                                                                                                                                                                                                    | 1619-34-7  | In making chemical weapon |
| N,N-Dialkyl (Me, Et, n-Pr or i-Pr)aminoethyl-2 -chlorides<br>and corresponding protonated salts                                                                                                                                                     |            | In making chemical weapon |
| N,N-Dialkyl (Me, Et, n-Pr or i-Pr)aminoethyl-2 -ols and<br>corresponding protonated salts<br>Exemption: N,N-Dimethylaminoethanol and<br>corresponding protonated salts<br>N,N-Diethylaminoethanol and corresponding protonated                      | 108-01-0   | In making chemical weapon |

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| salts                                                                                     | 100-37-8 |                           |
| N,N-Dialkyl (Me, Et, n-Pr or i-Pr)aminoethane-2-thiols and corresponding protonated salts |          | In making chemical weapon |
| Thiodiglycol:<br>Bis: (2-hydroxyethyl)sulfide                                             | 111-48-8 | In making chemical weapon |
| Pinacolyl alcohol: 3,3-Dimethylbutan-2-ol                                                 | 464-07-3 | In chemical weapon        |

**Table 4.C. Severely Restricted Chemicals in Mongolia**

| •  | Name of the substance                                                                                                                                                                                   | CAS No                                                        | Condition                                                             |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------|
| 1  | Benzidine;<br>(1,1'-Biphenyl)-4,4'-diamine (9ci) ;<br>(NH <sub>2</sub> C <sub>6</sub> H <sub>4</sub> C <sub>6</sub> H <sub>4</sub> NH <sub>2</sub> )                                                    | 92-87-5                                                       | To make paint and plastic                                             |
| 2  | 4-Aminodiphenyl;<br>(1,1'-Biphenyl)-4-amine;<br>p-Biphenylamine;<br>p-Xenylamine;<br>(C <sub>12</sub> H <sub>11</sub> N / C <sub>6</sub> H <sub>5</sub> C <sub>6</sub> H <sub>4</sub> NH <sub>2</sub> ) | 92-67-1                                                       |                                                                       |
| 3  | 1,2-dichloro-ethane                                                                                                                                                                                     | 107-06-2                                                      | To making plastic (PVC) and petroleum products with lead.             |
| 4  | Carbon tetrachloride,<br>(CCl <sub>4</sub> )                                                                                                                                                            | 2903-14-00                                                    | To making drug and oil and in making research                         |
| 5  | Chromium(VI) salts,<br><br>Cr <sup>6+</sup>                                                                                                                                                             |                                                               | In animal skin tanning and manufacture of wood and paint and plastic. |
| 6  | Mercury, elemental (lg)                                                                                                                                                                                 | 7439-97-6                                                     | In mining and measuring equipment                                     |
| 7  | Mercury, elemental and inorganic forms                                                                                                                                                                  |                                                               | For sanitary purposes and veterinary and photo                        |
| 8  | Polybrominated biphenyls (PBB)                                                                                                                                                                          | 36355-01-8 (hexa);<br>27858-07-7 (octa);<br>13654-09-6 (deca) | Pesticide, to produce plastic and synthetic                           |
| 9  | Polychlorinated Biphenyls;<br>(PCBs)<br>Aroclor;<br>Clorhen;<br>Phenochlor;<br>(C <sub>12</sub> H <sub>(10-n)</sub> Cl <sub>n</sub> , n=1-10)                                                           | (52469-21-9,<br>11097-69-1<br>etc)                            | Transformers, capacitors, thermostat ,<br>paint and plastic           |
| 10 | Zinc phosphide<br>(Zn <sub>3</sub> P <sub>2</sub> )                                                                                                                                                     | 1314-84-7                                                     | Pesticide                                                             |
| 11 | Nyanide<br>(CN <sup>-</sup> )                                                                                                                                                                           | 57-12-5                                                       | In electric chemical industry, clean metal,<br>mining operation.      |
| 12 | Phosgene: Carbonyl dichloride                                                                                                                                                                           | 75-44-5                                                       | In making chemical weapon                                             |
| 13 | Cyanoden chloride                                                                                                                                                                                       | 506-77-4                                                      | In making chemical weapon                                             |
| 14 | Hydrogen cyanide                                                                                                                                                                                        | 74-90-8                                                       | In making chemical weapon                                             |
| 15 | Chloropicrin: Trichloronitromethane                                                                                                                                                                     | 76-06-2                                                       | In making chemical weapon                                             |
| 16 | Phosphorus oxychloride                                                                                                                                                                                  | 10025-87-3                                                    | In making chemical weapon                                             |
| 17 | Phosphorus trichloride                                                                                                                                                                                  | 7719-12-2                                                     | In making chemical weapon                                             |
| 18 | Phosphorus pentachloride                                                                                                                                                                                | 10026-13-8                                                    | In making chemical weapon                                             |
| 19 | Trimethyl phosphite                                                                                                                                                                                     | 121-45-9                                                      | In making chemical weapon                                             |
| 20 | Triethyl phosphite                                                                                                                                                                                      | 122-52-1                                                      | In making chemical weapon                                             |
| 21 | Dimethyl phosphite                                                                                                                                                                                      | 868-85-9                                                      | In making chemical weapon                                             |
| 22 | Diethyl phosphite                                                                                                                                                                                       | 762-04-9                                                      | In making chemical weapon                                             |
| 23 | Sulfur monochloride                                                                                                                                                                                     | 10025-67-9                                                    | In making chemical weapon                                             |
| 24 | Sulfur dichloride                                                                                                                                                                                       | 10545-99-0                                                    | In making chemical weapon                                             |
| 25 | Thiohyl choride                                                                                                                                                                                         | 7719-09-7                                                     | In making chemical weapon                                             |
| 26 | Ethylthioethanolamine                                                                                                                                                                                   | 139-87-7                                                      | In making chemical weapon                                             |

|    |                      |          |                           |
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| 27 | Methyldiethanolamine | 105-59-9 | In making chemical weapon |
| 28 | Triethanolamine      | 102-71-6 | In making chemical weapon |

#### 4.5. Non-regulatory mechanism for managing chemicals

Most pioneering procedure to promote non-regulatory mechanism is “Order on Taking Environmental Violation Information and its Promotion“, issued by Minister of Nature and Environment. Since then a number of amendments to encourage non-regulatory mechanism were made into environmental laws. According to amendments into Law on Environmental Protection, protective method of the environment are to ban any activities to use natural resources, registration into list of rare and very rare species, to define standard and norm of the impacts to the environment, to organize ecological educational activities, and to promote ecologically-friendly technology, and to define sanitary zone, and to give definite right and power to local community in protection of the environment. In framework of this law, a number of regulation were approved by Ministry of Nature and Environment, including “Regulation on the Voluntary Ranger” and “Regulation on Local Community activities to protect, use and possess natural resources”. In order to implement control in environmental protection, rehabilitation, and proper use of natural resources in local level, volunteer ranger shall be appointed by respective Governors. He/she has several power by the law along with enforce the laws and rules in waste disposal and protection of water points and resources. 15% of fine income from informed violation shall be given to the rangers in incentive. In 2007 Minister of Nature and Environment has issued Order on Incentive procedure for information about illegal usage and storage of chemicals.

At local level, in framework of waste management Governors of District has issued a number of procedures to collect plastic bags. For example, in every district there is incentive measure to pay for plastic bag waste. All that non-regulatory mechanism give great contribution in chemical management rather than banned or restricted regulation.

#### 4.6. Comments/analysis

Since 1994 in area of environmental management, a lot of laws have been adopted. In Mongolia most of violation in field of chemical management address to the i) illegal import of chemicals from China, ii) illegal use of chemicals, particularly in mining sector, iii) illegal trade of chemicals in open-market. However chemical management is new understanding in Mongolia, currently overall 19 laws in the chemicals management in effective. Therefore it should address law enforcement at first.

In Mongolia exceeds of responsibility have been given to the State Professional Inspection Agency according to current law. This system more capacity and resources requires from SPIA. Currently over 700 inspectors in SPIA are executing monitoring of chemical management. However we can increase number of inspectors, it will not give alone any contribution to the law enforcement. Therefore community involvement at all stage is very important. Moreover the amounts of fines and penalties have not increased in parallel with inflation rates and don't act as a deterrent. Particularly in mining sector

fine and penalties at any violation are in range of 250000-500000 tug are not reasonable, comparing to the profit from business activities. According to Law on Toxic and Hazardous Chemicals, average fines described to the citizen about 30000-60000 tug /25-52USD/and to business entity 150000-250000 tug /150-215USD/. It is says that non-compliance measure in Mongolia is not sufficient to prevent from violation in chemical issue. At the local level due to lack of financial capacity, local inspectors and authorities can't catch-up the violation.

In Mongolia non-regulatory mechanism is very weak and sometimes ineffective. Ministerial Order to promote by incentive for information about illegal chemical usage and storage issued by Minister of Nature and Environment gave considerable contribution to reveal illegal import and usage of chemicals. Most recently, from Municipality has issued Decree to ban usage of plastic sacks and bags in Ulaanbaatar city. But lack of incentive mechanism, this regulation is not so good enforced.

It is mentioned before that in field of environmental pollution there are only 8 standards have been developed. Sometimes it is very difficult to define volume of the damage due to illegal activities. What is the great amount of damage? What is the harm? Therefore there is need to develop precise assessment or standards of the damage due to chemicals.

Moreover, there are some overlaps and gaps in the laws regulating chemical management in Mongolia. For example: according to Law on Licence, Governors of Aimag and City shall responsible of issuing license in importing and producing of toxic and less toxic chemicals. This regulation is overlapped with Law on Toxic and Hazardous Chemicals adopted in 2006.

## CHAPTER 5 MINISTRIES, AGENCIES, AND OTHER INSTITUTIONS MANAGING CHEMICALS

### 5.1. Responsibilities of Different Government Ministries, Agencies, and Other Institutions

Table 5.A. Responsibilities of Government Ministries, Agencies and Institutions

| <b>Stages of life-cycle</b><br><b>Ministry concerned</b> | <b>importation</b> | <b>production</b> | <b>storage</b> | <b>transport</b> | <b>distribution /marketing</b> | <b>use /handling</b> | <b>disposal</b> |
|----------------------------------------------------------|--------------------|-------------------|----------------|------------------|--------------------------------|----------------------|-----------------|
| Environment                                              | X                  | X                 | X              | X                | X                              | X                    | X               |
| Health                                                   | X                  | X                 | X              | X                | X                              | X                    | X               |
| Agriculture                                              | X                  | X                 | X              | X                | X                              | X                    | X               |
| Labour                                                   | -                  | X                 | -              | -                | -                              | X                    | -               |
| Industry<br>Trade/Commerce                               | X                  | -                 | -              | -                | X                              | -                    | -               |
| Finance/Customs                                          | X                  | -                 | -              | -                | -                              | -                    | -               |
| Transport                                                | -                  | -                 | -              | X                | -                              | -                    | -               |
| Interior/Civil<br>Defence                                | X                  | X                 | X              | X                | X                              | X                    | X               |
| Justice/Border<br>Control                                | X                  | -                 | -              | -                | -                              | -                    | -               |
| Foreign Affairs                                          | -                  | -                 | -              | -                | -                              | -                    | -               |
| State Inspection                                         | X                  | X                 | X              | X                | X                              | X                    | X               |
| Police Office                                            | -                  | X                 | X              | X                | X                              | X                    | -               |

### 5.2. Description of Ministerial Authorities and Mandates

In general following institutions are played as leading role in chemical management.

#### 1. Ministry of Nature and Environment/The Council

- Develop national policy and action plan on the implementation of the MEAs in chemical management and coordinate the collaboration of the co-implementing agencies;

- Draft amendments to the existing laws and regulation in importation, exportation, production, usage and disposal of chemicals and by-products;
- Conduct chemicals inventory and establish information database;
- Provide information to the individuals, industries and other organizations;
- Exchange information with international organizations;
- Public awareness, training and methodological guidelines
- Evaluate the performance of tasks of the co-implementing agencies and report to the government

## **2. Ministry of Health**

- Develop and implement the national policy on protection of human health from chemical's risk;
- Carry out studies and make assessments of chemical impact to the human health, especially risk to women and children and the genetic reproduction of the population;
- Coordinate the use and import of chemicals for public health including household and sanitary insecticides;
- Undertake preventive measures from chemicals originated diseases for the public; and
- Establish and coordinate poison research centers

## **3. Ministry of Food and Agriculture**

- Develop and implement the national policy on using and importing of pesticides, insecticides for agriculture and protection of food products from contamination;
- Take measures to use non-POPs pesticides for plant protection and adopt new technologies;
- Strengthen the national capacity to identify chemicals concentration in food products;
- Expand public awareness activities on risk of the chemical contained products, food stuff and possible sources; and
- Establish evaluation mechanism for law enforcement at the industries and economic entities within the sector

## **4. Ministry of Industry and Trade**

- Develop and implement the national policy to encourage technological renovation of the industries to reduce the toxic and hazardous emission; and
- Establish inventory and information database of industrial sources of chemicals

## **5. Ministry of Social welfare and Labor**

- Conduct assessment on negative impacts of chemicals to the reproduction of the population and implement the necessary actions;
- Develop special provision regarding chemicals by amending to the safety criteria of working condition; and
- Public awareness on chemicals impact to human body

## **6. Ministry of Finance and Economy**

- Incorporate the necessary funding for the activities to prevent from socio-economic implications of chemicals in the state long or mid-term socio-economic development plans and budgets;
- Provide financial support to strengthen the technical capacity of the central and local chemical laboratories and to establish chemical poisoning research centers;
- Provide economic incentives and encouragement for the clean production and use of modern technologies; and
- Support to find financial assistance from donor organizations to implement projects/programs on chemical management

## **7. Ministry of Infrastructure**

- Develop and implement action plans to reduce the chemical emission from combustion and use for the infrastructure machineries; and
- Conduct inventory on chemical emission sources in the sector and to strengthen the capacity to identify the emission and accumulation amount of chemicals

## **8. Ministry of Foreign Affairs**

- Coordinate the international cooperation in framework of the implementation of the MEAs in chemical management, including the linkage between the international organizations and the national implementing agencies;
- Develop and implement the external policy of the country on ensuring chemical safety
- Provide support on cooperating with the international organizations and foreign countries on chemical management issues and sharing experience and information

## **9. National Disaster Prevention Authority**

- Identify the total amount of toxic and hazardous chemical resources and the location of the major contaminated sites, conduct hazard assessments and take the necessary measures;
- Dispose the toxic and hazardous chemical wastes by an environmentally-sound technology;

- Conduct hazard assessment of toxic and hazardous chemicals from disasters like forest fires, develop and implement the action plans; and
- Carry out assessment on the national capacity of the chemical laboratories to analyze chemicals, identifying the needs to strengthen for submission to the relevant authorities for funding

#### **10. Research institutions, industries and NGOs**

- Scientific support on identification and recognition of toxic and hazardous chemicals and their sources;
- Carry out research and studies on impact of chemicals to the human, animals, and environment and chemical caused diseases, reporting the result to the relevant authorities;
- Public awareness on chemical threats and preventing measures;
- Provide information on alternatives and new technologies in using chemicals;
- Establish internal control mechanisms to manage chemicals;
- Provide scientific based data;
- Attract community control on importation and usage of chemicals;
- Support for international and national law enforcement; and
- Initiate various measures to reduce harm from chemicals
- 

#### **11. State Professional Inspection Agency**

- Ensure the enforcement of international and national laws on chemicals;
- Provide an integrated professional control on chemical issues in environment, health, food, agriculture, industry, work safety, quality, standards, household and plant protection; and
- Take the necessary actions

#### **12. General Customs Authority**

- Customs control on import chemicals and their by-products in accordance with the law;
- Prepare report about importation of chemicals and their by-products for the relevant authorities;
- Control on the illegal importing and exporting of the toxic and hazardous chemicals
- Take measures to improve the knowledge and qualification of the customs officers on chemicals

### **13. Standards and Metrology Center**

- Develop national standards on permissible residues of chemicals in production and products;
- Define the maximum acceptable concentration of toxic and hazardous chemical substances, in food products and develop standards of criteria (by chemical substances)
- Develop methodological standardization of equipment for chemical analysis and control

### **14. Monitoring laboratories**

- Carry out emission and accumulation analyzes of chemical sources;
- Analysis of chemical concentration in products;
- Analysis of chemicals concentration in food, human body and animals by each elements; and
- Responsible for acting as verifying inspector for conflict between producer and user or seller and control organization

## **5.2 Comments and Analysis**

Mostly, chemical substances in Mongolia begin their life cycle as imported entities. Hence the Customs Department is the first gate for the control of chemicals entering to the country and it is the most important point in the chemical life cycle where a mechanism to regularize inflow of chemicals to the country can effectively be applied. But in this stage State Inspection at the Border has also great contribution. Production, storage, marketing, and usage activities are manipulated by many agencies. Besides, there are more than one department in each Ministry undertaking the control of one chemical substance and its different impact whether on health or the environment. Therefore, there appear to be some overlaps or gaps in the mandates of ministries as far as the chemical management is concerned. Since some chemical substances, such as pesticides are multi purpose---they can be used both in farms and household settings. Ministry of Food and Agriculture is primarily responsible for the consumption of a given amount of pesticides in the country in order to be able to produce an agreed amount of agricultural products in a year, while Ministry of Health keeps an eye on household pesticides. However, this gap is fulfilled when both of ministries work together and exchange relevant information. In other hand, existing system is requiring leadership role from Ministry of Nature and Environment and close cooperation between Ministry of Health and Ministry of Food and Agriculture.

Effective chemical management depends on financial allocation to implement strategy and plan. Following is state budget allocation at line ministries, who are main body in organizing implementation of government policy.

**Table 5.A Budget allocation for 2007**

|    | <b>Government Institutions</b>              | <b>Allocation from the State Budget, million Tugrugs**</b> |
|----|---------------------------------------------|------------------------------------------------------------|
| 1  | Minister of Foreign Affairs                 | 17,016,135.7                                               |
| 2  | Minister of Finance                         | 450,905,468.5                                              |
| 3  | Minister of Justice and Internal Affairs    | 123,649,476.6                                              |
| 4  | Minister of Nature and Environment          | 11,819,632.6                                               |
| 5  | Minister of Defense                         | 41,435,614.1                                               |
| 6  | Minister of Construction and Urban Planning | 284,428,227.8                                              |
| 7  | Minister of Education, Culture and Science  | 401,246,903.5                                              |
| 8  | Minister of Road, Transport and Tourism     | 9,979,603.0                                                |
| 9  | Minister of Social Welfare and Labour       | 29,893,581.2                                               |
| 10 | Minister of Fuel and Energy                 | 155,366,140.9                                              |
| 11 | Minister of Industry and Trade              | 32,530,510.5                                               |
| 12 | Minister of Food and Agriculture            | 111,497,093.8                                              |
| 13 | Minister of Health                          | 20,361,035.4                                               |

\*\* The Parliament approves the allocation from Government State Budget for the Ministries and respective agencies on an annual basis.

Since the Government policy is focused more on looking on day to day social well-beings of citizens and lacks long term visioned approach it allocates more budget to short term actions and very little to future oriented actions, such as environmental issues. At the Cabinet level, the Environmental Minister has the second from bottom budget, 11,819,632.6 Tugrugs per annum, which is equivalent to 10.1 million USD. A major assessment of environmental issues of MNE capacity conducted in 2005 and funded by the World Bank found that while pressures on natural resources grow MNE leadership is inadequate, a result of poor coordination, wasteful use of very limited funds and lack of motivation. The expenditure for environmental inspection activities is now part of the budget of State Professional Inspection Agency. The total of that budget in 2006 was 1586841.0 Tugrugs (equivalent to 1.3 million USD), in 2007 it has same level with previous year. It is insufficient is allocation for environmental protection is at 11.0 billion however amount of income from natural resource use fee to the state treasury at 133.3 billion tug. It is shown that we have to increase community involvement into environmental protection, particularly chemical management monitoring and raise awareness.

## CHAPTER 6

### RELEVANT ACTIVITIES OF INDUSTRY, PUBLIC INTEREST GROUP AND THE RESEARCH SECTOR

This chapter describes relevant activities carried out by various organizations that support the infrastructure for managing chemicals in Mongolia. These organizations are grouped as industry, public interest groups/community groups, and the research groups. All of these organizations play important roles in chemicals management in recent years. An overview of their activities is presented based on the information contributed by the organizations themselves through questionnaires and brainstorming sessions.

#### 6.1 Description of Organizations/Programmes

There are universities and research institutions offering courses in various disciplines related to chemistry ranging from fundamental chemistry, analytical chemistry, food chemistry, environmental chemistry, eco-toxicology, and so on. A number of research institutions conduct researches on chemical safety and environmental protection. The followings are organizations actively involved in education and research in chemical safety as well as environmental and health protection related to chemicals.

**Table 6.1.1. Organizations actively involved in education and research in chemical safety and related environmental and health protection**

| Name of the organization                                  | Address                                            | Activities                                                                                                                                                                                         |
|-----------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Chemistry Faculty of Mongolian National University</b> | Ulaanbaatar,<br>Sukhbaatar district<br>Tel: 316755 | Preparation of experts and carrying out of scientific researches in areas of the chemical analysis and synthesis, technology, biotechnology, ecology                                               |
| <b>University of Agriculture</b>                          | Ulaanbaatar,<br>Khan-Uul district<br>Tel:248976    | Development and research of new kinds of mineral fertilizers and biologically active substances<br>Development, test and introduction of new chemical and biological means of protection of plants |
| <b>University of Health Science</b>                       | Ulaanbaatar,<br>Sukhbaatar District<br>Tel:314093  | Preparation of experts and carrying out of scientific researches in the field of hygiene and toxicology, a labour safety, preservation of the environment                                          |
| <b>University of Science and Technology</b>               | Ulaanbaatar,<br>Sukhbaatar District<br>Tel:346513  | Preparation of experts and carrying out of scientific researches in areas of chemical technology, food technology, radioecology, sounding of an environment, etc. to directions                    |

|                                                                              |                                                       |                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Center for National Health Development</b>                                | Ulaanbatar,<br>Sukhbaatar<br>District<br>Tel:456784   | Carry out research on health development in Mongolia.. Make assessment of composition of diseases among the population.                                                                                                                                                       |
| <b>Public Health Institute</b>                                               | Ulaanbatar,<br>Bayanzurkh<br>district<br>Tel:451069   | Carry out reasearch and training on public health sector. Prepare doctors and expert in health science                                                                                                                                                                        |
| <b>Poisons Center</b>                                                        | Ulaanbaatar,<br>Bayanzurkh<br>District<br>Tel: 467107 | Scientific researches in the field of sanitary and hygiene and toxicology, a background of criteria of a security and decontamination of chemical substances, a toxicological assessment chemical and pesticides, the laboratorial analytical control of chemical substances. |
| <b>Cancer Research Center</b>                                                | Ulaanbaatar,<br>Bayanzurkh<br>District<br>Tel:456363  | Carry out research on cancer situation in Mongolia. To define causes and impacts. From chemicals to the cancer.                                                                                                                                                               |
| <b>Chemistry, Chemical technology Institute of Mongolian Science Academy</b> | Ulaanbaatar,<br>Bayanzurkh<br>District<br>Tel:325454  | Scientific and technical information and introduction of development in manufacture in the field of chemical technology. Scientific researches in the field of inorganic synthesis and synthesis of fibrous materials, biochemistry.                                          |
| <b>Tanning Industry Association</b>                                          | Ulaanbaatar,<br>Chingeltei District<br>Tel:9987605    | To protect interest of tanning factories                                                                                                                                                                                                                                      |
| <b>Chemistry and environment NGO</b>                                         | Ulaanbaatar,<br>Bayangol District<br>Tel: 9925876     | To protect environment from chemical impacts                                                                                                                                                                                                                                  |
| <b>Mongolian Chamber of Commerce</b>                                         | Ulaanbaatar,<br>Sukhbaatar<br>District<br>Tel:312374  | To protect interest of owners of business entities                                                                                                                                                                                                                            |
| <b>Consumer Interest Protection Association</b>                              | Ulaanbaatar,<br>Sukhbaatar<br>District<br>Tel:        | To protect consumer from food insafety                                                                                                                                                                                                                                        |
| <b>Master Plan Development Programme of Health Sector</b>                    | Ulanbaatar<br>Sukhbaatar<br>Tel:315634                | To develop Master Plan on Health Sector                                                                                                                                                                                                                                       |
| <b>Project “Green gold”</b>                                                  | -                                                     | To protect environment from chemical contamination and improve public awareess in chemical usage                                                                                                                                                                              |
| <b>WWF project</b>                                                           | -                                                     | To strenghten public awareness through                                                                                                                                                                                                                                        |

**Table 6.A. Summary of expertise available outside of Government**

| <b>Field of Expertise</b> | <b>Research Institutes</b> | <b>Universities</b> | <b>Industry</b> | <b>Environmental/ Consumer Groups</b> | <b>Labour Unions</b> | <b>Professional Orgs</b> |
|---------------------------|----------------------------|---------------------|-----------------|---------------------------------------|----------------------|--------------------------|
| Data Collection           | X                          | X                   | X               | -                                     | X                    | X                        |
| Testing of Chemicals      | -                          | X                   | -               | -                                     | -                    | X                        |
| Risk Assessment           | -                          | -                   | -               | -                                     | -                    | X                        |
| Policy analysis           | X                          | -                   | -               | -                                     | -                    | -                        |
| Training and Education    | X                          | X                   | -               | -                                     | -                    | -                        |
| Research on Alternatives  | X                          | X                   |                 |                                       |                      |                          |
| Monitoring                | -                          | -                   | -               | -                                     | -                    | -                        |
| Enforcement               | -                          | -                   | -               | -                                     | -                    | -                        |
| Information to Workers    | -                          | -                   | X               | -                                     | -                    | -                        |
| Information to Public     | -                          | -                   | -               | -                                     | -                    | X                        |

#### 6.4 Comment/Analysis

Recent 2 years the numbers of citizen's movement, coalition and association have been increased and amongst it citizen's environmental participation raised year by year. After election in 2004, over 40 citizens's movements and coalitions have been born and intensified of their activities. But experts and focus survey are shown that above mentioned intensification of public movements are reactions in lack of their involvement procedure into governmental policy development. Most of the policy documents and acts, developed after 1996, always stressed about public involvement into policy development process. But lack of enforcement mechanism and gaps in knowledge about activities and resources, that acts have remained as just promulgation. In 2007 totally 6197 NGO have been registered in Ministry of Justice and Internal Affairs. 6.5% of them in ecology and environment field, 4.1% of in the health sector and 13.4 % is in economic, agriculture and business field. Currently over 400 NGOs are working in the environmental field. But

involvement into environmental laws, strategy and policy document development of them very insufficient.

This chapter provides an insight into an array of organizations involved with chemicals management apart from the designated government agencies. These organizations often supply the government with valuable data for addressing specific concern and special issues, even they do not have full access to government decision-making process.

## CHAPTER 7 INTER-MINISTERIAL COMMISSIONS AND CO-ORDINATING MECHANISMS

Achieving the national goal of chemical safety requires substantial cooperation among governmental agencies, private sector and other stakeholders. As stated that chemical management is comparatively new understanding in Mongolia, therefore, coordinating mechanism is recently established. Interministerial body in chemical management, so called officially as National Council in Charge of Policy Regulation of Toxic and Hazardous Chemicals, appointed by the Cabinet in 2006, with major responsibility in formulating the national policies and plans corresponding to specific concerns. (normally it is called also as “Committee” or “Chemical Council” )

Table 7.A. Inter-ministerial Commissions and Coordinating Mechanisms

| Name of Mechanism                                                                | Responsibilities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Secretariat                                                    | Members                                                                                                                                                                                                        | Legislative Mandate                  | Effectiveness |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------|
| National Council in charge of Policy Regulation of Toxic and Hazardous Chemicals | Develop recommendation to the related laws in terms of elaboration of chemicals management and develop policy on chemical safety<br><br>Submit recommendation on implementation of MEAs in field of chemical management, which are ratified in Mongolia<br><br>Provide by professional guidance in event of incident, and emergency deal with toxic and hazardous chemicals and support by recommendation and conclusion.<br><br>Provide by management and guidelines to the sub-committees at local level in regulation of protection and use of toxic and hazardous chemicals<br><br>Review work of sub-committees and experts.                                                                                                                 | Secretary is appointed by Government and will work at the MNE. | The committee chaired by Minister of Nature and Environment, and composed of high-level representatives from 19 concerned governmental agencies and ministries , 3 science and research institutions, 1 NGO.   | Law on Toxic and Hazardous Chemicals |               |
| National Committee on Drug                                                       | It may have sub-committees in charge of human and animal health issue. Develop recommendation on state drug policy and submit to the relevant government agencies.<br>Develop proposal to the list of essential drug and medical equipment<br>To make conclusions and recommendations on production and import of the drugs<br>To make professional recommendations on altering the list of and controlling the usage of narcotics and psychotropic drugs;<br>To make conclusions on national standards of the drugs and provisions of the pharmacopeias;<br>To approve making pharmacological, pharmaceutical and clinical analyses on new drugs, discuss their results and to make final decisions on whether to put them into practice or not. | n/a                                                            | Committee chaired by Minister of Health<br>The Committee consists from high-level representatives from concerned governmental agencies and ministries , science and research institutions, hospitals, and NGO. | Law on Drug and medical equipment    | 1             |
| National Committee on Public Health                                              | Develop recommendation on public health issue submit to the relevant government agencies.<br>Organize in conducting research on public health disease composition.<br>To make conclusions and recommendations medical service<br>To organize in public awareness programme on health<br>To control implementation public health strategy and programmes                                                                                                                                                                                                                                                                                                                                                                                           | n/a                                                            | Representatives from ministries and State Professional Inspection Agency and hospitals, research institutions.<br>Committee Chaired by Vice Minister of Health                                                 | Law on Health                        | 2             |

|                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |                                                                                                                                                                                                                                                                                        |                                              |   |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---|
| National Committee on food security                                    | <p>To provide by management in “National Programme on food supply and security and harmonize interdisciplinary issues.</p> <p>To regulate and organize internal control on food security of production and trade and harmonize inter -sectional agencies.</p> <p>To control on implementation of decision, programme and strategy on food security.</p> <p>To provide by administration and guidelines to the sub-committee at the local level and review reports.</p> <p>To observe in the public opinion on food security and take measure being issued by related government body.</p> <p>To provide by involvement from public interested groups and NGOs in improving food security</p> <p>To cooperate with enforcement agencies in field of food security</p> <p>To organize public awareness campaign in raising awareness state policy and strategy and modern trend of food consumption</p> | n/a | Representatives from line ministries in health, education, finance and transport and agencies, NGOs,                                                                                                                                                                                   | Law on Food                                  | 2 |
| National Committee on 3d Campaign of Cropping                          | To regulate programme implementation in state level, provide by professional guidelines and administration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | n/a | Committee chaired by Prime Minister and executive chairman is Minister of Food and Agriculture. Members are Minister of Finance, Minister of Nature and Environment, and representatives from government agencies and Governors of some Aimags, scientific and research organisations. | Government Programme on Campaign of Cropping | 1 |
| National Committee for the implementation of the Stockholm Convention: | <p>To consider and give approval for ratification of Stockholm Convention on persistent organic pollutants (POPs)</p> <p>To consider and supervise on the development of the national profile for POPs management</p> <p>To consider and supervise on the development of the National Implementation Plan (NIP) for Stockholm Convention on POPs</p> <p>To coordinate among governmental agencies and the private sector concerning all activities in accordance with the obligation of Stockholm Convention, and the collaboration with Secretariat of Stockholm Convention</p> <p>To appoint ad-hoc working groups as appropriate</p> <p>To perform other functions as assigned by the National Environment Board.</p>                                                                                                                                                                              | n/a | Committee chaired by Minister of Nature and Environment<br>Representatives of line ministries, scientific and research institutions.                                                                                                                                                   | National Implementation Plan                 | 1 |
| National Ozone Committee                                               | <p>To develop the national strategy for reducing the use of Ozone-Depleting Substances (ODSs) according to the Montreal Protocol</p> <p>To establish state policies and strategy to control production, importation, use and disposal of ODSs</p> <p>To study problems and obstacles against the national actions to comply with the obligation of the Montreal Protocol</p> <p>To provide comments regarding the Montreal Protocol to all related committees and governmental agencies.</p>                                                                                                                                                                                                                                                                                                                                                                                                          | n/a | The Committee chaired by Prime Minister and composed of representatives from 14 concerned agencies and ministries, ODSs experts.                                                                                                                                                       |                                              | 1 |
| Committee on Impementation of Basel Convention                         | <p>To determine and formulate the appropriate legal and technical measures for the implementation of the Basel Convention</p> <p>To consider and arrange the ratification of the protocol and the amendments to the Basel Convention</p> <p>To coordinate among governmental agencies and the private sector concerning all activities in accordance with the obligation of the Basel Convention</p> <p>To perform other functions as assigned by the Pollution Control Committee</p>                                                                                                                                                                                                                                                                                                                                                                                                                 | n/a | Inter-ministerial body composed of representatives from:<br>Min.Health<br>Min. of Industry<br>Min. of Finance<br>Min. of Transports<br>Min. of Foreign Affairs<br>Min. of Commerce etc.<br>Committee chaired by                                                                        |                                              | 2 |

## **Comments and Analysis**

In Mongolia 13 ministries have authority under laws and regulations addressing diverse chemicals groups as well as different stages in their life cycle. In addition there are 8 inter-ministerial commissions that undertake work related to chemical issues. It is necessary to note an overall performance of the commissions and councils. Each inter-ministerial commissions established for development of respective strategic plan and Programme for short or long term and organize its implementation. Therefore they comprised from different level of representatives. Currently we have number of strategy and programmes developed or participated by the commissions such as “Master Plan in Health Sector”, “Programme on 3d Campaign of Cropping”, “Energy Master Plan”, “Programme on Construction of 40000 Apartments”, even some of these programmes still have public opposition.

“National Council in charge of Policy Regulation of Toxic and Hazardous Chemicals” has been established in 2006. Since then it has organised state chemicals inventory in 2007. But the Council is needed to be evolved in terms of their structure and scope of participation as seen from members.

In Mongolia’s situation strategic priorities for the future national chemical management need to be identified by integrated and multi-sectoral approach in harmonizing above mentioned policy documents. Besides, a shared sense of responsibility and accountability for chemical safety should be taken root not only in public sector—political, managerial, technical levels, but also in business sector. There is needed to be put more consideration in public involvement into development of chemical strategy.

## CHAPTER 8. DATA ACCESS AND USE

### 8.1. Availability of Data for National Chemicals Management

**Table 8.A. Quality and Quantity of Available Information**

| Data needed for/to                                   | Pesticides<br>(agricultural,<br>public health<br>and consumer<br>use) | Industrial<br>Chemicals | Consumer<br>chemicals | Chemical<br>wastes |
|------------------------------------------------------|-----------------------------------------------------------------------|-------------------------|-----------------------|--------------------|
| Priority setting                                     | X                                                                     | -                       | -                     | -                  |
| Access Chemicals<br>Impact under Local<br>Conditions | X                                                                     |                         |                       |                    |
| Risk Assessment<br>(environment/health)              | -                                                                     | -                       | -                     | -                  |
| Classification/Labelling                             | X                                                                     | -                       | -                     | -                  |
| Registration                                         | X                                                                     | X                       | X                     | X                  |
| Licensing                                            | X                                                                     | X                       | X                     | -                  |
| Permitting                                           | X                                                                     | X                       | X                     | X                  |
| Risk reduction<br>Decisions                          | -                                                                     | -                       | -                     | -                  |
| Accident<br>Preparedness/Response                    | X                                                                     | X                       | X                     | X                  |
| Poisoning Control                                    | X                                                                     | X                       | X                     | X                  |
| Emissions Inventories                                | X                                                                     | -                       | -                     | -                  |
| Inspections & Audits<br>(environment/health)         | X                                                                     | X                       | X                     | X                  |
| Information to workers                               | -                                                                     | -                       | -                     | -                  |
| Information to the<br>public                         | -                                                                     | -                       | -                     | -                  |

## 8.2. Location of National Data

**Table 8.B Location of National Data**

| Type of Data                            | Location (s)                      | Data Source                | Who has Access          | How to gain Access         | Format                  |
|-----------------------------------------|-----------------------------------|----------------------------|-------------------------|----------------------------|-------------------------|
| Production Statistics                   | Ministry of Industry and Commerce | Report                     | Legal and physical body | By request and Self access | Printed and Electronics |
|                                         | Statistical Office                | Statistical Report         |                         | Self access                | Printed and electronics |
| Import /Export Statistics               | Customs Agency                    | Report                     | Legal and physical body | By request and Self access | Printed and Electronics |
|                                         | Statistical Office                | Statistical Report         |                         | Self access                | Printed and electronics |
|                                         | MNE                               | Permission                 |                         | By request and Self access | Printed and Electronics |
|                                         | MoH                               | Permission                 |                         | By request and Self access | Printed and Electronics |
|                                         | MAF                               | Permission                 |                         | By request and Self access | Printed and Electronics |
|                                         | MTC                               | Permission                 |                         | By request and Self access | Printed and Electronics |
|                                         | Ministry of Defence               | permission                 |                         | By request and Self access | Printed and Electronics |
| Chemical Use statistics                 | MNE                               | Report and data permission | Legal and physical body | By request and Self access | Printed and Electronics |
|                                         | MoH                               | Report and data permission |                         | By request and Self access | Printed and Electronics |
|                                         | MFA                               | Report and data permission |                         | By request and Self access | Printed and Electronics |
|                                         | MTC                               | Report abd data permission |                         | By request and Self access | Printed and Electronics |
|                                         | SPIA                              | Report and data monitoring |                         | By request and Self access | Printed and Electronics |
|                                         | Ministry of Defence               | Permission report          |                         | By request and Self access | Printed and Electronics |
| Industrial Accident Report              | NEMA                              | Report and data            | Legal and physical body | By request and Self access | Printed and Electronics |
| Transport Accident Report               | NEMA                              | Report and data            | Legal and physical body | By request and Self access | Printed and Electronics |
|                                         | Police Office                     | Report and data            |                         | By request and Self access | Printed and Electronics |
| Occupational Health Data (agricultural) | MoH                               | Report and data            | Legal and physical body | By request and Self access | Printed and Electronics |
|                                         | Poison's Center                   | Report and data Research   |                         | By request and Self access | Printed and Electronics |
|                                         | Health Intitutions                | Report and data research   |                         | By request and Self access | Printed and Electronics |
| Occupational Health Data (industrial)   | MoH                               | Report and data            |                         | By request and Self access | Printed and Electronics |

|                                                       |                                   |                          |                         |                            |                         |
|-------------------------------------------------------|-----------------------------------|--------------------------|-------------------------|----------------------------|-------------------------|
|                                                       | Poison's Center                   | Report and data Research | Legal and physical body | By request and Self access | Printed and Electronics |
|                                                       | Health Intitutions                | Report and data research |                         | By request and Self access | Printed and Electronics |
| Poisoning Statistics                                  | MoH                               | Report and data          | Legal and physical body | By request and Self access | Printed and Electronics |
|                                                       | Poison's Center                   | Report and data Research |                         | By request and Self access | Printed and Electronics |
| Pollutant Release and Transfer Register               | MNE                               | Report and research      | Legal and physical body | By request and Self access | Printed and Electronics |
|                                                       | Environmental Laboratory research | Analysis                 |                         | By request and Self access | Printed and Electronics |
|                                                       | SPIA monitoring                   | Analysis                 |                         | By request and Self access | Printed and Electronics |
|                                                       | Air quality Service               | Analysis                 |                         | By request and Self access | Printed and Electronics |
| Hazardous Waste Data                                  | Local Government Administrations  | Report                   | Legal and physical body | By request and Self access | Printed and Electronics |
|                                                       | MNE                               | Report and analysis      |                         | By request and Self access | Printed and Electronics |
|                                                       | MoH                               | report                   |                         | By request and Self access | Printed and Electronics |
|                                                       | SPIA                              | Report                   |                         | By request and Self access | Printed and Electronics |
| Register of Pesticides<br>Register of Toxic chemicals | MNE                               | Report                   | Legal and physical body | By request and Self access | Printed and Electronics |
|                                                       | MoH                               | Report                   |                         | By request and Self access | Printed and Electronics |
|                                                       | MFA                               | Report                   |                         | By request and Self access | Printed and Electronics |
|                                                       | Ministry of Defence               | report                   |                         | By request and Self access | Printed and Electronics |
| Inventory of Existing Chemicals                       | MNE                               | report                   | Legal and physical body | By request and Self access | Printed and Electronics |
| Register of Imports                                   | Customs Agency                    | data                     | Legal and physical body | By request and Self access | Printed and Electronics |
| Register of Producers                                 | MNE                               | Data                     | Legal and physical body | By request and Self access | Printed and Electronics |
| <b>PIC Decisions</b>                                  | MNE                               | Data                     | Legal and physical body | By request and Self access | Printed and Electronics |

## 8.4. Availability of International Literature

**Table 8.C. Availability of International Literature**

| Literature                                                    | Location (s)                     | Who has access | How to gain access |
|---------------------------------------------------------------|----------------------------------|----------------|--------------------|
| Environmental Health Criteria Documents (WHO)                 | MoH<br>WHO representative Office | -              | -                  |
| Health and Safety Guides (WHO)                                | -                                | -              | -                  |
| International Chemical Safety Data Cards (IPC/SEC)            | -                                | -              | -                  |
| FAO/WHO Pesticides Safety Data Sheets                         | MFA                              | -              | -                  |
| Document from the FAO/WHO Joint Meeting on Pesticide Residues | MFA<br>MoH                       | -              | -                  |
| Material Safety Data Sheets (Industry)                        | -                                | -              | -                  |
| OECD Guidelines for the Testing of Chemicals                  | MNE                              | -              | -                  |
| Good Laboratory Practice Principles                           | -                                | -              | -                  |
| Good Manufacturing Practice Principles                        | -                                | -              | -                  |
| WHO/UNEP Global Env.Library Network                           | MHO<br>MNE                       | -              | -                  |

All above literatures randomly received or collected by agency or person who wants to use in work and there are not special procedure to ensure stable operation of literature collecting and dissemination information to the people. Therefore person, who wants to assess information from literature in the ministries, almost don't have opportunity.

## 8.5. Availability of International Databases

**Table 8.D. Availability of International Databases**

| Database                           | Location(s) | Who has Access | How to gain access |
|------------------------------------|-------------|----------------|--------------------|
| IRPTC                              | -           | -              | -                  |
| ILO CIS                            | -           | -              | -                  |
| IPCS INTOX                         | -           | -              | -                  |
| Chemical Abstract Service Database | -           | -              | -                  |
| Global Information Network on      | -           | -              |                    |

|                                        |   |   |   |
|----------------------------------------|---|---|---|
| Chemicals (GINC)                       |   |   |   |
| STN Database                           | - | - | - |
| Relevant Database from other countries | - | - | - |

### Comments/Analysis

Table 8.B shown about location and access of the data related to chemical management. According to the Constitution, everyone has the right to access government information in Mongolia. But in terms of accessing information at government agencies is very difficult. This relation is regulated by “Mongolian Law on Procedure to Receive and Solve of Compliance and Request from Citizen” . According to this law average time to have reply from government bodies is 5 days. Sometimes the bureaucracy of government administration became one of the challenges to access any information. Therefore, particularly, citizens like to have information at respective website of government agencies. But web site usage of government agencies is insufficient and almost impossible to have updated data and report. According to Table 8.B, Mongolia has lack of integrated database on the chemical management and necessary reports and data have been dispersed among ministries and agencies. Moreover, there is no any data location of scientific and research institutions.

Not only chemicals data but also environmental and health databases are probably not widely used. Data is produced by various authorities and at different levels of detail and in some cases it is difficult to access data and information internal side in the government. A national standard for the compilation of chemical management data is not yet in existence. Moreover every agency that works in relation to chemical management has their own literature or databases, and do not share the information with others. In same time political instability, data and information not so good managed and often faces difficulties due to instability of person who was keeping data.

International literature and databases on chemicals safety management are not available to the ordinary person and government body, due to lack of integrated library acquisition in the government. Therefore in Mongolia integrated database and information in chemical management is big challenge.

## **CHAPTER 9.**

### **TECHNICAL INFRASTRUCTURE**

#### **9.1. Overview of Laboratory Infrastructure**

Along with rapid development of industrial and foreign trade sector, requirements to have accurate knowledge about minerals and ability to control on importation and production are priorities in Mongolia. There are a lot of harm to the environment and human health and genetic fund due to toxic and hazardous chemicals such as mercury, cyanide, lead, cadmium, ODS, dioxins/furans etc. Therefore chemicals laboratories with advanced technology and equipment and experts, well developed standards, methodologies are needed to analyze and control situation. Currently there are 73 accredited laboratories in analyzing and controlling on all kind of importing goods such as food products, drinking water, minerals, petroleum products, building materials and animal originated products, as well as water and air are working in Mongolia. 56 of these are state owned, 17 are private and 32 of total laboratories are working at rural area under respective local administration and directions.

In state level there are 12 laboratories are working such as Central Laboratory of Geology, Central Laboratory of Veterinary and Sanitary, Central Laboratory of Customs, National Center of Natural Infectious Disease. These laboratories have comparatively well equipment and substances for its capacity, but laboratories at rural area have insufficient capacity. From project team conducted questionnaire to reveal technical and human capacity and define needs assessment among 12 laboratories considered have best tools and equipment at national level. .

**Table 9.A. Overview of Laboratory Infrastructure for Regulatory Chemical Analysis**

| <sup>1</sup> | Name/<br>Description of<br>Laboratory | Location | Certified<br>GLP<br>(yes/no) | Equipment/Analytical<br>Capabilities Available                          | Objects to analyse                                                               | Demonstration                                                                                                                                                                                                                                                                                                                        | Working<br>(yes/no) | comments                |
|--------------|---------------------------------------|----------|------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------------|
| 1            | Central Laboratory<br>of Geology      | UB       | yes                          | Atom Absorption<br>Spectrometer (AAS)<br>Shimadzu AA-6501F<br>/1997/    | ore, fossil, minerals<br><br>underground,<br>ground, drinking<br>and waste water | MgO, Na <sub>2</sub> O, K <sub>2</sub> O,<br>MnO, Cu, Zn, Pb,<br>Cd, Bi, Co, Ni, As, Hg<br>Sb, Au, Ag<br>Hg, As                                                                                                                                                                                                                      | yes                 |                         |
|              |                                       |          |                              | Inductively coupled<br>plasma (ICP-OES)<br>Shimadzu ICPS-7500<br>/1997/ | underground,<br>ground, drinking<br>and waste water                              | Al, Fe, Cu, Zn, Pb, Ni<br>Co, Mn, Cr, V, Mo, Ag<br>Sb, Cd, Ba, Sr                                                                                                                                                                                                                                                                    | yes                 |                         |
|              |                                       |          |                              | Atomic absorption<br>spectrometer /1997/                                | ore, fossil, minerals                                                            | Au                                                                                                                                                                                                                                                                                                                                   | no                  | Can't identified        |
|              |                                       |          |                              | Spectrometer<br>ANA 700<br>Japan/1996/                                  | ore, fossil ,<br>minerals                                                        | Fe <sub>2</sub> O <sub>3</sub> , Mo, Cr, V, W<br>F                                                                                                                                                                                                                                                                                   | yes                 |                         |
|              |                                       |          |                              | Spectrometer<br>VIS 722N<br>China /2004/                                | ore, fossil ,<br>minerals                                                        | SiO <sub>2</sub> , Al <sub>2</sub> O <sub>3</sub> , P <sub>2</sub> O <sub>5</sub> ,<br>TiO <sub>2</sub> , Fe <sub>2</sub> O <sub>3</sub>                                                                                                                                                                                             | yes                 |                         |
|              |                                       |          |                              | Spectrometer<br>VIS 7220<br>China /2006/                                | ore, fossil ,<br>minerals                                                        | SiO <sub>2</sub> , Al <sub>2</sub> O <sub>3</sub>                                                                                                                                                                                                                                                                                    | yes                 |                         |
|              |                                       |          |                              | Equipment to define<br>cyanide<br>Tuco thermal<br>Controls GmbH /2005/  | Underground,<br>ground and waste<br>water                                        | Cyanide /total/<br>Cyanide /free/                                                                                                                                                                                                                                                                                                    | yes                 |                         |
|              |                                       |          |                              | Gamma Spectrometer<br>Silena /1989/                                     | minerals                                                                         | Natural radioactive<br>U, Th, Ê-isotope                                                                                                                                                                                                                                                                                              | no                  | Software is<br>outdated |
|              |                                       |          |                              | Wave disperse roentgen<br>PA Nalytical Axios<br>/2006/                  | fossil                                                                           | SiO <sub>2</sub> ,TiO <sub>2</sub> , Al <sub>2</sub> O <sub>3</sub><br>Fe <sub>2</sub> O <sub>3</sub> , MnO, MgO,<br>CaO, Na <sub>2</sub> O, K <sub>2</sub> O<br>P <sub>2</sub> O <sub>5</sub> , F, As, Ba, Bi<br>Ce, Co, Cr, Cs, Cu<br>Ga, Ge, Hf, La, Mo<br>Nb, Nd, Ni, Pb, Pr<br>Rb, Sb, Sc, Sm, Sn, Sr<br>Ta, Th, U, V, W, Y, Zn | yes                 |                         |

|   |                                               |    |    |                                                                               |                                                                |                                                                                 |     |          |
|---|-----------------------------------------------|----|----|-------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------|-----|----------|
|   |                                               |    |    |                                                                               |                                                                | Zr                                                                              |     |          |
|   |                                               |    |    | Energy disperse spectrometer<br>Tracor Spectrace-5000<br>/1991/               | Fossil, polimetal, ore, uranium ore                            | 18 elements, U, Th                                                              | No  | Broken   |
|   |                                               |    |    | Coal apparatus<br>Russia /1974/                                               | Coal                                                           | Coke quality in coal<br>Ö, Y                                                    | yes | Outdated |
|   |                                               |    |    | Carbon analyse<br>Thermoanalyzer<br>Russia /1993/                             | Coal, hard material to burn                                    | N                                                                               | yes | Outdated |
|   |                                               |    |    | Calorimeter<br>Russia /1984/                                                  | Coal, hard material to burn                                    | Calorie                                                                         | yes | Outdated |
|   |                                               |    |    | Roentgen apparatus<br>Rigaku Dmax 2200<br>RINT /1997/                         | Fossil, minerals, organic and non-organic materials            | mineral                                                                         |     |          |
| 2 | Central Laboratory of Veterinary and Sanitary | UB | No | High pressure liquid chromatography<br>HPLC<br>Agilent 1100<br>Germany /2005/ | Meat, meat products, seafood, plant,                           | Chloramphenicol, tetracycline, sulphonamide, benzimidazon, avermectin, methanol | yes |          |
|   |                                               |    |    | HPLC<br>China Young Lin Instrument Co.Ltd<br>Autochro-2000<br>/2005/          | Meat, meat products, seafood, plant,                           | Chloramphenicol, tetracycline, sulphonamide, benzimidazon, avermectin, methanol | yes |          |
|   |                                               |    |    | Spectrophotometer<br>China Han Son technology Co.Ltd.<br>OPRON-3000 /2005/    | Meat, urine, blood cells                                       | Ca, Ph                                                                          | yes |          |
|   |                                               |    |    | 4. ELISA reader<br>IMMUNOSCAN<br>England, /2001/                              | Meat, meat products, dairy products, milk, seafood, egg, plant | Chloramphenicol, tetracycline, sulphonamide,                                    | yes |          |
|   |                                               |    |    | Gamm aspectrometer.<br>“Canberra Industries” Genie 2000<br>/2006/             | Soil, water, plant, animal origin products                     | 40 isotope releas gamma spectrum                                                | yes |          |

|   |                                                          |    |    |                                                                                  |                                                                       |                                                  |     |  |
|---|----------------------------------------------------------|----|----|----------------------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------|-----|--|
|   |                                                          |    |    | Inspector 1000<br>“Canberra Industries”<br>/2006/                                | Air, liquid, hard<br>material                                         | 40 isotope releas<br>gamma spectrum              | yes |  |
| 3 | Laboratory of State<br>Professional<br>Inspection Agency | UB | No | Atomic absorption<br>spectrometer (AAS)<br>Buck Scientific<br>(210/211 VGP)/2006 | Food products                                                         | Cd, Pb,As,Hg ,Na<br>Mg ,Ca,Fe ,Cu,Ba<br>Al       | yes |  |
|   |                                                          |    |    | Colony counter<br>BZG-30 /0001446/<br>German/2002/                               | All kind of samples                                                   | Bacterium count                                  | yes |  |
|   |                                                          |    |    | Spectrometer<br>/China 2006/                                                     | Food products<br>Vodka, water                                         | Fe+, Ammonia,<br>NH <sub>3</sub> , acid benzoin, | yes |  |
|   |                                                          |    |    | High pressure liquid<br>chromatography<br>USA                                    | Food products                                                         | Antibiotic, steroid<br>hormone                   | yes |  |
|   |                                                          |    |    | Spectrometer<br>Buck Scientific M500<br>/USA 1996/                               | All kind of samples                                                   |                                                  | yes |  |
|   |                                                          |    |    | Gamma Spectrometer<br>NaI detector USA<br>/1989/                                 | Food products,<br>drinking water,<br>tabacco, biological<br>additives | Gamma ray,<br>isotope.                           | yes |  |
|   |                                                          |    |    | Gamma spectrometer<br>system<br>USA 1990                                         | Food products,<br>drinking water,<br>tabacco, biological<br>additives | Gamma ray,<br>isotope.                           | yes |  |
|   |                                                          |    |    | Erweka DT-6<br>/Germany1996/                                                     | Disintegration of<br>capsule drug                                     |                                                  | yes |  |
|   |                                                          |    |    | (dissolution) Erweka<br>ZT3-4 /Germany 1996/                                     | Disolution of<br>capsule drug                                         | + -1í ì<br>+ -0.5%                               |     |  |
|   |                                                          |    |    | water analyser<br>Behrotest /Germany/                                            | Full analyse of<br>water                                              |                                                  | No  |  |
|   |                                                          |    |    | Soil analyse<br>Behrotest /Germany/                                              | Full analyse of soil                                                  |                                                  | No  |  |
|   |                                                          |    |    | Food analyser<br>Behrotest /Germany/                                             | Full analyse in<br>Food                                               |                                                  | no  |  |
|   |                                                          |    |    | Mercury analyser<br>JapanNippon                                                  | Hard and liquid<br>sample                                             | Mercury                                          | yes |  |

|   |                                                |    |     |                                                         |                                                             |                                                                                             |     |          |
|---|------------------------------------------------|----|-----|---------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----|----------|
| 4 | Public Health Institute                        | UB | no  | Instruments Corporation Auto MA-2 /2007/                |                                                             |                                                                                             |     |          |
|   |                                                |    |     | Human analyser/2000/                                    | Blood cells, urine                                          | 40 demonstration of biochemistry                                                            | Yes |          |
|   |                                                |    |     | Atomic absorption spectrometer AAS. AA-10 /1986/        | Water, soil, food products                                  | Fe, Cu, Mn, Pb, Ni, Cd, Zn, Co, Cr, Al                                                      | Yes |          |
|   |                                                |    |     | UV Spectronic 1201 /1995/                               | Water, soil, food products                                  | P, Ca, Mg, I, Fe                                                                            | yes |          |
|   |                                                |    |     | Sugar analyser Roche & Accutrend GCT /2000/             | Blood                                                       | Glucose sucrose                                                                             | yes |          |
|   |                                                |    |     | BUCHI B-324 /1997/                                      | Food products and human waste                               | protein                                                                                     | yes |          |
| 5 | Institute of chemistry and chemical technology | UB | no  | PCR analyser Perkin elmer DNA Thermal cycler-480 /1990/ | Blood                                                       | DNA                                                                                         | yes |          |
|   |                                                |    |     | Ultra-violet spectrometer                               | Organic substances compound                                 |                                                                                             | no  | Outdated |
|   |                                                |    |     | Ultra-violet spectrometer                               | Substances with assimilation of ultra violet in liquid form |                                                                                             | no  | Outdated |
|   |                                                |    |     | Derivatator                                             | Minerals                                                    | Phase analyse of minerals                                                                   | No  | Outdated |
|   |                                                |    |     | Xray roentgen                                           | Fossil, minerals                                            | Mineral analyse                                                                             | no  | Outdated |
| 6 | Central Laboratory of Customs                  | UB | Yes | Atomic absorption spectrometer                          | Minerals, animal and plant origin products                  | MgO, Na <sub>2</sub> O, K <sub>2</sub> O, MnO, Cu, Zn Pb, Cd, Bi, Co, Ni, As Hg, Sb, Au, Ag | no  | Outdated |
|   |                                                |    |     | High pressure chromatography (HPLC)                     | Organic compound                                            | Animal drug, antibiotics,                                                                   | yes |          |
|   |                                                |    |     | Gas chromatography (GC/MS)                              | Organic compound                                            | -narcotic, vodka, alcohol                                                                   | yes |          |
|   |                                                |    |     | Ultra-violet (FTIR)                                     | Substances have ultra violet                                | 16 thous of substances                                                                      | yes |          |

|   |                                                    |    |    |                                                   |                       |                                                                                  |     |                        |
|---|----------------------------------------------------|----|----|---------------------------------------------------|-----------------------|----------------------------------------------------------------------------------|-----|------------------------|
|   |                                                    |    |    |                                                   | assimilation          |                                                                                  |     |                        |
|   |                                                    |    |    | Petroleum product disintegration                  | Diesel fuel           |                                                                                  | Yes |                        |
|   |                                                    |    |    | Petroleum product (AD 5)                          | Auto diesel fuel      |                                                                                  | Yes |                        |
|   |                                                    |    |    | Octane analyser                                   | Auto diesel fuel      | Octane number                                                                    | Yes |                        |
|   |                                                    |    |    | Cigarette machine                                 | Cigarettes            |                                                                                  | Yes |                        |
|   |                                                    |    |    | Drug and explosive detector IONSCAN 400B          |                       | 13 kind of drugs and 15 kind of explosives                                       | yes |                        |
|   |                                                    |    |    | Atomic absorption spectrometer (AAS)              | Ore, fossil, minerals | -Zn,-Au,-Ag,-Pb,-Fe                                                              | Yes |                        |
|   |                                                    |    |    |                                                   | Lead in food products | -Pb,-Zn,-Cu,-Cd                                                                  | Yes |                        |
|   |                                                    |    |    |                                                   | Liquid                | Ca, Na, K, Pb, Cd, Cu, Cl, Br, J, CN, F, NO <sub>3</sub> <sup>-</sup> , acidity  | Yes |                        |
|   |                                                    |    |    | Measurements of wool and cashmere fibre           |                       | diameter                                                                         | Yes |                        |
|   |                                                    |    |    | Length of the wool and cashmere fibre             |                       | length                                                                           | yes |                        |
| 7 | Chemistry Faculty of Mongolian National University | UB | No | Atomic absorption spectrometer AAS AA600          | liquid                | Cd, As, Mo, V, Se, Cu, Hg, Pb, Co, Fe, Cr                                        | no  | Electron schema broken |
|   |                                                    |    |    | Mettler Toledo Sevenmulti /2006/                  | Liquid                | Ca, Na, K, Pb, Cd, Cu, Cl, Br, J, CN, F, NO <sub>3</sub> <sup>-</sup>            | yes |                        |
|   |                                                    |    |    | Ionmeter . Shrex PXSI216 /2006/                   | Liquid                | Cu, NO <sub>3</sub> <sup>-</sup> , Pb, Na, Br, Cl, F, Ca, I, Ag, NH <sub>3</sub> | yes |                        |
|   |                                                    |    |    | Spectrophotometer Jinghua instrument JH721 /2006/ | Liquid                |                                                                                  | yes |                        |
|   |                                                    |    |    | Gas chromatography Shimadzu GC-14A /1989/         | Organic compound      |                                                                                  | No  | Lack of detector       |
|   |                                                    |    |    | Liquid chromatography Knauer /2003/               | Organic compound      |                                                                                  | No  | Lack of some parts     |

|   |                                                    |    |    |                                                                                                                                                                                                     |                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                              |                                      |                                  |
|---|----------------------------------------------------|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------|
|   |                                                    |    |    | Spectrophotometer<br>Shimadzu, UV-265FW<br>/1988/<br>Light dispersing<br>photometer<br>JASCO /1986/<br>Atom microscope<br>Seiko SII /1993/                                                          | Sample in<br>transparent liquid<br>form                                                                                                                                                                                             | Light assimilation<br><br>Disperse angle                                                                                                                                                                                                                                                                                     | yes<br><br>yes                       |                                  |
|   |                                                    |    |    | Atom microscope<br>Seiko SII /1993/                                                                                                                                                                 | Form of the<br>substances at the<br>hard material                                                                                                                                                                                   | Physical power                                                                                                                                                                                                                                                                                                               | yes                                  |                                  |
| 8 | Laboratory of<br>Municipality<br>Inspection Agency | UB | No | High pressure<br>chromatography<br>HPGC 4890D<br><br>AAN 220 FS VARIAN<br><br>.Lactoscan<br><br>ELISA<br><br>Spectrometer<br><br>Ionmeter<br>Sugarmeter                                             | Vodka and spirit<br><br>All kind of food<br>products, water,<br>soil, waste water,<br>packages<br><br>Milk<br><br>All kind of food<br>products<br><br>Meat, meat<br>products<br>Water<br><br>Water, sanitary<br>products, cosmetics | <br><br>Mn,Na,Ca,Cu,Zn,Pb<br>Cd,Co,Ni,Gr,Hg,Fe<br>Au,Ag,K<br><br>Protein, fat, lactose,<br>water additives, pH<br>Mineraltemperature,<br>Freezing point,<br><br>Residue of<br>antibiotics, toxins<br><br>Nitride, sulfat, NH <sub>3</sub> ,<br>Fe, color, acid<br><br>Dry compound,                                          | yes<br><br>yes<br><br>yes<br><br>yes | Outdated<br><br><br><br><br><br> |
| 9 | Environmental<br>Central Laboratory                |    |    | Atomic absorption<br>spectrometer<br>Shimadzu AA -680G<br>/1993/<br>Atom assimilation<br>spectrometer<br>(AAS),Varian Spectr<br>AA-110 / 2007/<br>3. Ion chromatography<br>DX-120, DIONEX<br>/1998/ | Liquid sample<br><br>Liquid sample<br><br>Liquid sample                                                                                                                                                                             | (As , Cu, Pb, Mn,<br>Zn, Ni, Mo<br>Cd, Se Al, Fe<br>Cu, Zn, Co)<br><br>Co/Cr/Cu/Fe/Mn/Ni<br>Ca/Mg/Al;<br>Ag/Cd/Pb/Zn<br><br>(Cl <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> )<br>(Na <sup>+</sup> , K <sup>+</sup> , NH <sub>4</sub> <sup>+</sup> ,<br>Mg <sup>2+</sup> , Ca <sup>2+</sup> ) | yes<br><br>yes<br><br>yes            | <br><br><br>                     |

|    |                                                        |    |    |                                                                         |               |                                                                                           |                 |  |
|----|--------------------------------------------------------|----|----|-------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------------|-----------------|--|
|    |                                                        |    |    | Spectrophotometer UV-2102C, UNICO (Shanghai) instruments Co.,Ltd /2008/ | Liquid sample |                                                                                           | Just have using |  |
|    |                                                        |    |    | UV-VIS Spectrometer UV-1201, SHIMADZU                                   | Liquid sample |                                                                                           |                 |  |
|    |                                                        |    |    | Liquid and ion chromatography                                           | Liquid sample |                                                                                           | no              |  |
|    |                                                        |    |    | Mini pump MP-30 /2004/, Sibata Scientific Technology Ltd, Japan         | Air           | NO <sub>2</sub>                                                                           | yes             |  |
|    |                                                        |    |    | Mini pump MP-300 /2004/, Sibata Scientific Technology Ltd, Japan        | Air           | SO <sub>2</sub>                                                                           | yes             |  |
|    |                                                        |    |    | High volume sampler /1995/,Kimoto electric Co.Ltd Japan                 | Air           | PM 10<br>PM2.5                                                                            | no              |  |
|    |                                                        |    |    | Sample taker /PM-10/, Sibata Scientific Technology Ltd, Japan           | Air, dust     | PM 10<br>PM2.5                                                                            | yes             |  |
|    |                                                        |    |    | Laser dust monitor model LD, Sibata Scientific Technology Ltd, Japan    | Air           | PM 10<br>PM2.5                                                                            |                 |  |
|    |                                                        |    |    | 11.TESTO-350 /2003/, Germany                                            | Smoke         | CO, O <sub>3</sub> , CO <sub>2</sub> , NO <sub>x</sub> , SO <sub>2</sub> , H <sub>2</sub> | yes             |  |
|    |                                                        |    |    | 12. DUST UNIDON KF-8808, Ishibashi science industries Co. Ltd /1995/    | Air           | PM 10<br>PM2.5                                                                            | yes             |  |
|    |                                                        |    |    | 13. ALTAS-300D, Yanako analytical systems Inc., Japan                   | Vehicle fume  | CO, CO <sub>2</sub> , CH                                                                  | yes             |  |
|    |                                                        |    |    | Spectrophotometer NO-46, Russia                                         | Liquid sample |                                                                                           | yes             |  |
| 10 | Food-biotechnology Institute of Science and Technology | UB | No | AAC (Agilent 1100)                                                      | Food products | Organic acid, protein                                                                     | Yes             |  |
|    |                                                        |    |    | (HP-4890)                                                               | Food products |                                                                                           | Yes             |  |

|    |                                                                    |    |    |                                            |                            |                                                                                                                                  |     |          |
|----|--------------------------------------------------------------------|----|----|--------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------|-----|----------|
|    | University                                                         |    |    | spectrophotometer (UV-1240)                | Concentration              |                                                                                                                                  | Yes |          |
| 11 | Material technology Institute of Science and Technology University | UB | No | AAC-6800F Japan /1999/                     | Water, soil, food products | Na, K, Ca, Mg, Cu, Pb, Hg, Mn, Zn, Fe, Ni, Cr, Cd,                                                                               | Yes |          |
|    |                                                                    |    |    | X-ray MESA-500W Japan /1999/               | Soil, food products        | 81 elements from Na <sub>11</sub> -to U <sub>92</sub>                                                                            | Yes |          |
|    |                                                                    |    |    | Ultra-violet FTIR-8300 Japan /1999/        | All kind of dry samples    |                                                                                                                                  | Yes |          |
|    |                                                                    |    |    | HPLC, LC-10Atvp Japan /2000/               |                            |                                                                                                                                  | Yes |          |
|    |                                                                    |    |    | Ion chromatography. PIA-1000, Japan /2000/ | Water, liquid              | Cl, SO <sub>4</sub> , F, NO <sub>2</sub> , NO <sub>3</sub> , Br, PO <sub>4</sub> )<br>and ions (Na, K, NH <sub>4</sub> , Ca, Mg) | Yes |          |
|    |                                                                    |    |    | Spectrometer GENESYS-20 USA /2001/         | Water, soil, minerals      |                                                                                                                                  | yes |          |
| 12 | Natural Infectious Disease Laboratory                              |    |    | Microscope Japan (2001)                    | Microbe                    | Form of microbe, colony, dimension of morphology                                                                                 | Yes |          |
|    |                                                                    |    |    | Digital microscope (USA, 2006)             | Microbe                    | Form of microbe, colony, dimension of morphology                                                                                 | Yes |          |
|    |                                                                    |    |    | Spectrophotometer GENESYS-20               | Liquid                     | All kind of demonstration in spectrometer                                                                                        | Yes |          |
|    |                                                                    |    |    | 4.ELISA reader DNM-9602 (China, 2006)      | Suspicious samples         | microbe                                                                                                                          | Yes |          |
|    |                                                                    |    |    | thermostabilizator (USA, CHINA)            |                            | 28°-45° N                                                                                                                        | yes |          |
|    |                                                                    |    |    | Perkin elmer DNA Thermal cycler-480 /1996/ | Suspicious samples         |                                                                                                                                  | no  | Outdated |

## **9.2. Overview of Government Information Systems/Computer Capabilities**

Among above mentioned laboratories following popular challenges are existing by questionnaire;

- all of the laboratories are using outdated equipment and tools which are produced in Russia during 1970-1980 and most of it hand working.
- Lack of chemical analysing substances due to financial capacity.
- Lack of standard solution to compare result of analyse
- Lack of professionals, able to work or use advanced equipments and tools
- Lack of engineer and programmer to make repair and adjustment on the software of the equipment
- Loss of independent status due to lack of financial investment

The organisation which has authority to give certification is National Center of Standardization and Measurements. But its activities contradicted with international laboratory certification policy and sometimes certification which is given is not acknowledged, and procedure of duration, rule and manner to give permission are curbing business process.

All mentioned laboratories are certified by National Center of Standardization and Measurements. Central Laboratory of Geology is only one laboratory providing international standard ISO 9000, 9001 and get international accreditation by Germany Accreditation Organisation in 2005, ability to be accepted to 43 countries of its analyses. Laboratory of State Professional Inspection Agency also was given certificate valid at international level due to accepted by FAPAS for analysing salmonella.

Moreover a number of laboratories such as Laboratory of SPIA and Laboratory of Biotechnology Institute of Science and Technology University of Mongolia have been attended to the capability challenge programme from APLAS TO21 and valued in alcohol and seafood analyses.

## **9.3. Overview of Technical Training and Education Programme**

It is shown that all laboratories have sufficient human capacity with over 500 experts, researcher, doctors, and scientific professionals. But human capacity challenge more addressed to the technicians, electronic engineer and programmer to adjust and make repairs in maintenance of tools and equipment. Therefore regular training among technicians and engineers is needed foremost.

It is also shown that experts and scientists at scientific institutions have frequent of practices at international laboratories, but experts at inspection organisation have insufficient demonstration on it. It says about need to improve exchange programme of scientists with laboratories in developed countries and need to focus to the human capacity strengthening at inspectional organisations

#### 9.4. Comments/analysis

We also identified needs assessment at chosen laboratories. Following Table is general direction of the laboratories.

Table 9.B. General direction of laboratories

1. Central Laboratory of Geology -
2. Laboratory of Chemistry and Chemical Technology of Science and Academy
3. Chemical Faculty of Mongolia National University
4. Laboratory of State Professional Inspection Agency
5. Laboratory of Municipality Inspection Agency
6. Environmental Central Laboratory
7. Central Laboratory of Veterinary and Sanitary
8. Central Laboratory of Customs
9. National Center of Natural Infectious Disease
10. Material Technology Institute of Science and Technological University
11. Laboratory of Food-biochemical Institute of Science and Technological University
12. Laboratory of Public Health Institute

| <sup>1</sup> | Direction to analyses                                                                     | Name of the laboratory |
|--------------|-------------------------------------------------------------------------------------------|------------------------|
| 1            | Ore, fossil, mineral, soil                                                                | 1,2,12,3,5,6,10        |
| 2.           | Water                                                                                     | 1,2,12,3,5,6,10        |
| 3            | Air                                                                                       | 1,6                    |
| 4            | Organic compound                                                                          | 2,3                    |
| 5            | Human and animal parts, urine, blood                                                      | 7,12                   |
| 6            | Meat, meat products, seafood, plant, milk, dairy products, residue of drug and pesticides | 7,5,4                  |
| 7            | Lead and chemicals in food products                                                       | 4,5,12,10,11           |
| 8            | Coal                                                                                      | 1,2                    |
| 9            | Radioactive                                                                               | 1,7,4                  |
| 10           | Microbe, virus, infectious material                                                       | 4,7,9                  |
| 11           | Drug and cosmetics                                                                        | 4                      |
| 12           | Chemicals                                                                                 | 8                      |
| 13           | Petroleum products                                                                        | 8                      |
| 14           | Tobacco                                                                                   | 8                      |
| 15           | Narcotic                                                                                  | 8                      |

By needs assessment, approximately 2.628.194 USD for purchasing 39 type of equipment and tools, as well as 300.000 USD for chemical substances are needed for above mentioned laboratories. After all of these investments shall be made in the capacity, shall have potential to make comprehensive and right analyses on minerals, environmental pollution and human and animal health, further be able to full control importing goods and shall improve food safety at national level .

## **CHAPTER 10**

### **CHEMICAL EMERGENCY PREPAREDNESS, RESPONSE, AND FOLLOW-UP**

During this same period, Mongolia has itself been experiencing a number of rapid and important changes that have enhanced development opportunities, at the same time that they have placed in higher relief the importance of disaster conditions and needs. Since its adoption of a democratic governance system and the development of a competitive market economy, Mongolian authorities have been extremely receptive to reconsidering previous approaches to disaster management. The increasing economic opportunities in Mongolia and likelihood for more diverse forms of public, professional and private relationships have similarly encouraged the adoption of more comprehensive approaches to disaster management and sustainable national developmental interests.

In Mongolia context, when coupled with the already harsh, and increasingly more varied climatic conditions on which rural people must rely, the resilience of populations and livestock to climate change becomes more tenuous. Such disparities are reflected in many dimensions including diminished access to water, land and pastures in outlying locations, or poor and unequal access to basic services in underserved sub-urban and rural areas. Limited access to information, adequate urban housing or the assurance of safe and well-maintained infrastructure or a protected natural environment are issues that apply to many Mongolians throughout the country.

Despite economic expansion in recent years, poverty remains widespread with about a third of the population living below the poverty line. There is a rising demand for quality health coverage and while there have been notable accomplishments in recent years, a major challenge remains to provide improved access to education and job opportunities throughout the country, especially for women and young people. As both mining activity and industrial plants increase there are potentially significant impacts on environmental conditions or greater risk of disastrous accidents that could threaten the livelihood security and health of many more Mongolians.

The Mongolia is susceptible to the following type of the hazards and natural disasters, such as:

- Related with the climate features- changes on climate and climate conditions producing risk and setting up conditions for natural disasters – rainfall, increasing in water level, flood from the mountains to the plains, snow and dust storms, drought, desertification and extreme winter and dry summer.
- The hazard from geological structure- earthquake and land slides
- The inappropriate human activities and hazards from technical accidents- forest and steppefires, pollution from radioactive radiation and chemical elements, the high concentration of the poisonous chemicals, industrial accidents and earthquakes in urban and settlement areas.
- The biological hazard- infections of people and livestock diseases, rodents and spread of insects.

The recent case of a large spill of a solution containing sodium-cyanide and mercury in Khongor soum of Darkhan Uul aimag has revealed lack of national capacity to respond to

such emergencies which are very new to Mongolia. It is commonly accepted that under the rapid expansion of the mining sector, the transport and use of large quantity of chemicals will continue to expand in Mongolia. This will inevitably also increase the probability of chemical accidents with significant consequences to the population and the environment.

Growing ecological vulnerabilities and their socio-economic impact require a concerted and continuing attention. Previous disaster protection and locally applied risk reduction mechanisms such as livestock shelters, fodder stockpiles, sufficient access to economical veterinarian services or sustained water sources need to be restructured or reconfigured to enhance people's resilience. New risk reducing mechanisms are required in order to sustain the semi-nomadic way of life and the rural economy.

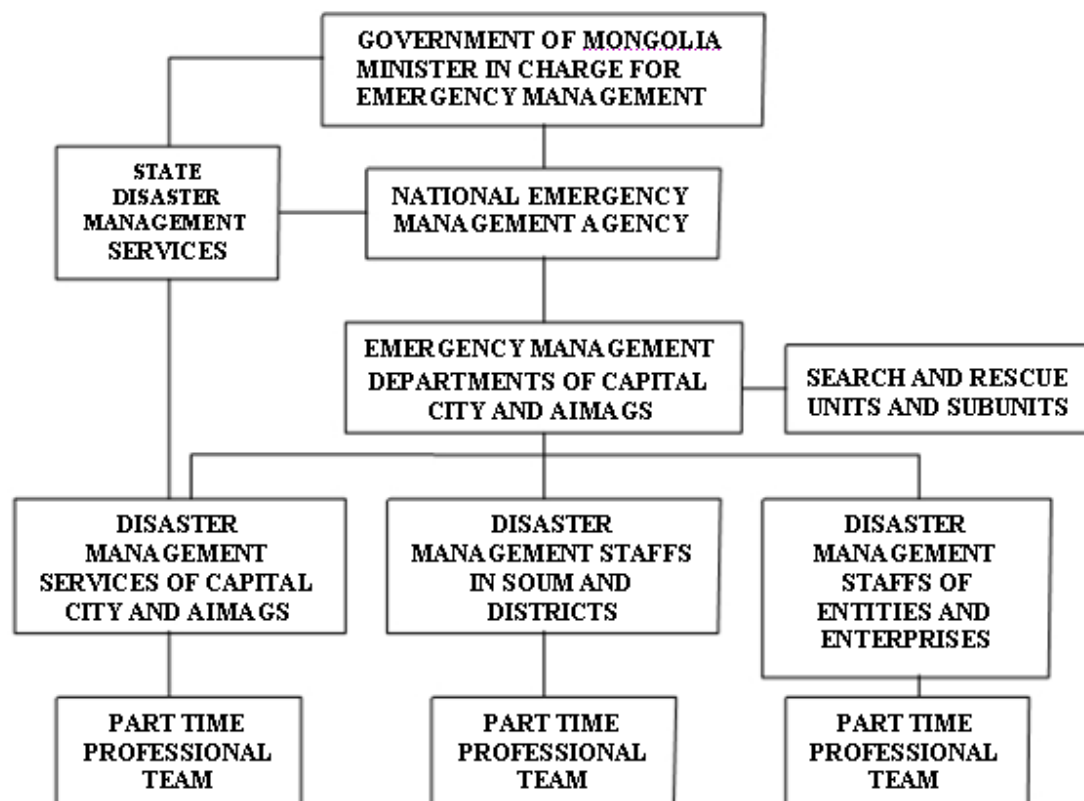
In the presence of already detected cases of H5N1 virus, Mongolia is in an extremely vulnerable position of rapid spread of the disease due to its pastoral livestock husbandry (with over 40 million heads of livestock 5 ) where all, wild and domestic animals, and even domestic birds share common grazing areas, water sources, and intensively interact with humans. Beside this, there is a potential danger of human infection from imported poultry products in urban areas, and contagion from infected localities, water sources for rural population which is very much mobile for search of better pastures facilitating even faster spread of the disease.

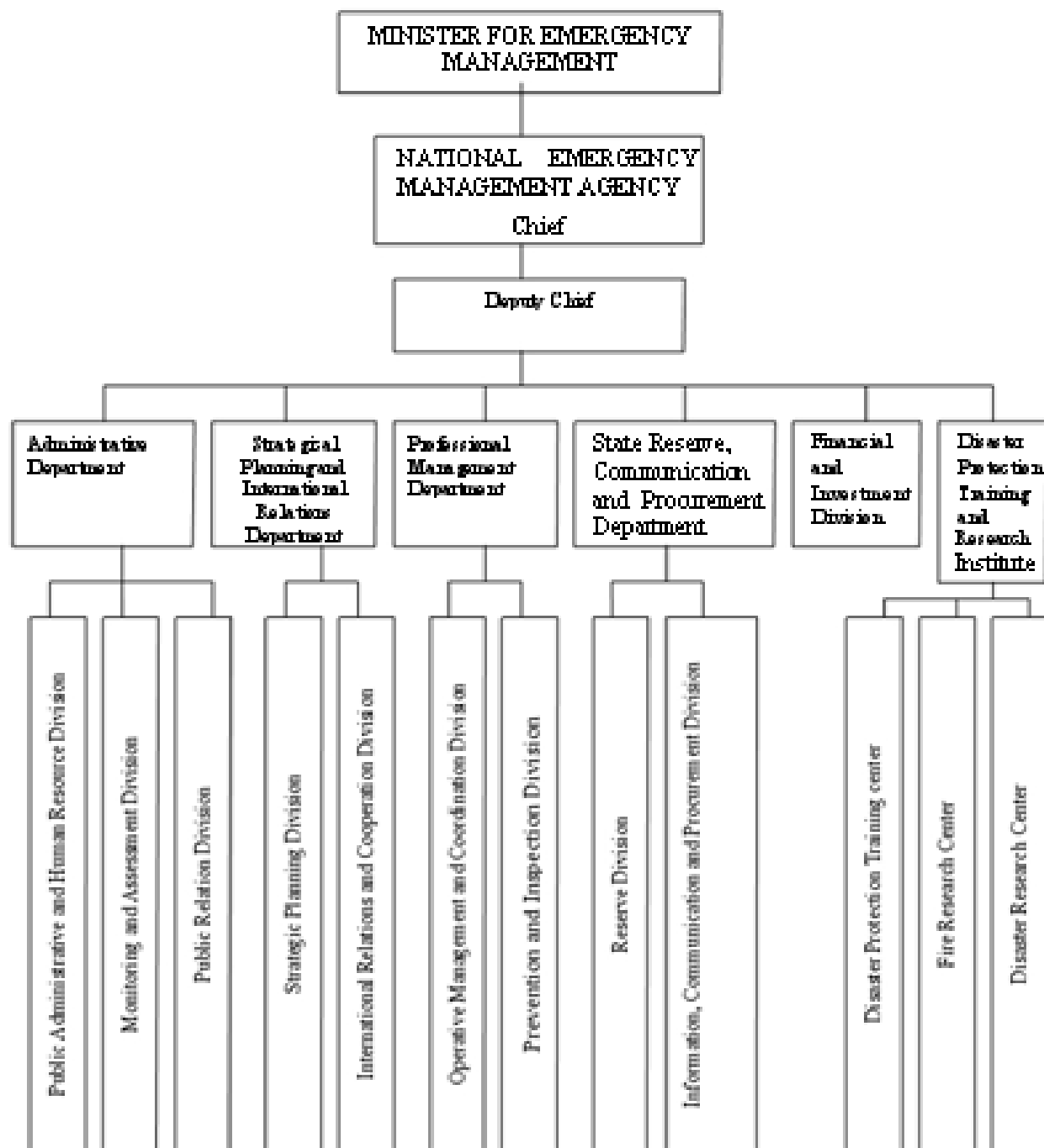
Chemical emergency preparedness, response and follow-up in Mongolia is regulated by some specific laws and legal acts such as "Law on Protection from Disaster", "Law on Toxic and Hazardous Chemicals", "Law on Environmental Protection", "Law on Household and Industry Waste", Regulation on storing, transporting and disposing of toxic and hazardous chemicals, Guidelines and Instructions from Chemical Council Experts.

Emergency means by "Mongolian Law on Protection from Disaster"- is the situation in conducting emergent activities such as coordination, monitoring and evaluation of measures from government bodies, business entities and authorities deal with in protection from disaster. Disaster means the tragedy and technical accident, terror, damages and loss to the human health, life and animals from explosion and exceed damages than national and local resources to the environment and property. Technical accident means that incidents such as breaking of communication network, construction and facility due to failure of technological and production maintenance and crash of vehicles or aircrafts, release of radioactive or chemical substances.

### **Emergency management structure and stakeholders**

The emergency management structure is defined by Law on Disaster Protection. Objective of this Law is to regulate relationship in the system of national emergency agency and disaster protection service, its administration and management structure and responsibilities to the government and local administration, business entity and citizen in protection from disasters. National Emergency Management Agency is central governmental body to implement government policy on emergency and measures to protect from disaster at national level. It included into Cabinet Ministry structure and under authority of Deputy Premier of Mongolia.





The structure of disaster management organizations is composed on the territorial industrial principle regardless of the ownership in the state, aimag, capital city, soum, district, bag, khoroo, entities and enterprises (aimag, soum, bag, khoroo administrative and territorial units in Mongolia). The Minister in charge for emergency management directs the disaster management activities at the state level. The Governors of the territorial units organize and manage the disaster management activities in their respective aimag, capital city,

soum, district and khoroo. Heads of the entities and enterprises organize and manage the disaster management activities in their respective units and organizations.

The state administrative organization in charge for emergency management (NEMA) is the organization responsible for the implementation of the state disaster management policy and the legislation on disaster management and the organization of nation-wide disaster management activities and provides professional management.

Disaster management services of state, aimag, capital city, soum, and district are established with their goal to implement disaster management duties. In order to coordinate the activities of disaster prevention, rescue, response and recovery the following disaster management state services based on related state administrative organization are created:

- Natural and chemical danger assessment and information service;
- Health protection service;
- Food and agriculture service;
- Fuel and energy service;
- Order service;
- Public awareness service;
- Information and communication service;
- Radiation protection service;
- Roads and transportation service;
- Construction and urban development service;
- Professional inspection service.

National Emergency Management Agency works to:

- Develop and implement disaster protection including strategical planning, disaster protection legislation, policy guidelines, policies, and plans;
- Develop training programmes and plans for all kind of disaster protection training;
- Provide disaster protection activities with a professional operative management
- Set up an information database and internal network for disaster protection and provide communication services;
- Prevent fire and organize fire inspections;
- Study disasters, to do laboratory analysis of radioactive and chemical poisons, and to repair and adjust needed equipments;
- Study fire cases and evaluate them;
- Provide a policy for and coordination of the state reserve;
- Organize the measures related to warehouse economics, quality and technology;
- Provide leadership of the public administration and human resource management;
- Monitor and evaluate the implementation of the disaster protection policy, planning, programme, project, agreements and contracts of cooperation, and to organize internal audit;
- Provide professional advice, support and service directed to developing disaster protection cooperation with foreign countries and international organizations
- Inform the public about the disaster protection policy, and to communicate and provide the public with immediate information related to disasters and forecasts;
- Manage the budget and financial policy of National Emergency Management Agency.

Emergency management activities are carried out by emergency management departments, divisions, rescue specialized unit and state reserve branches in 21 aimags and in the capital city. These units are responsible for disaster prevention at state and local level; mobilizing rapidly; searching and rescuing at disaster sites;

In addition enterprises and citizens have specific responsibilities under the law. For example:

- Implement disaster prevention plan and establish non-staff professional team depending on business process and its feature.
- Provide by necessary equipments and tools to the rescue team
- Be done disaster vulnerability and risk assessment by professional oragnisation
- Make up necessary financial resources for disaster prevention.
- Inform about disaster situation to the public, related authorities and institutions
- Implement related laws and dicision in framework of disaster prevention
- Regular maintenance of technological and production security and ecological safety requirements.
- Ability to use necessary equipments and tools and have knowledge about first aid in event of disaster occurance.
- Participate rescue and recovery campaign and inform about disaster to the related organisation.

### **10.1. Chemical Emergency Planning**

Actually in Mongolia hasn't yet developed chemicals emergency plan even there are many attempts of development policy and planning documents in terms of disaster manegement.

#### ***Government policy on disaster protection***

The major goals of the state policy on disaster protection are to assist in re-organizing a national disaster protection system capable to launch all types of needed activities and actions for the constant reduction of negative consequences of disasters that affect the socio-economic development of Mongolia and environments. The major objectives of the state policy on disaster protection are to favour legal and functional environments and bring up the capacity of the system through stead decentralization of multilevel hierarchy and promote citizens and economic entities to take more active participation and contribution in order to re-shape the national system of disaster protection in terms of structure and organization, and stabilize the system's activities. It has section about disaster preparation and prepadness and identified some activities as follows:

1. To put into successful operation disaster protection preparation and preparedness measures, a shift from activity identification practices to strategic planning is needed so that a proper management and normal practices are in place;
2. To establish a proper compiling of different professional groups and personnel/staff duly to specific geographical and climatic patterns and disaster characteristics of localities and ensure high level of continuing preparation and preparedness to potential disasters;
3. To nominate a permanent working group responsible for disaster assessment with the involvement of professional representing different government ministries and agencies and general public and provide budget and other means to ensure its proper functionality;

The state policy on disaster protection has two major phases of its implementation that period up to 2005 and period in the 10 years beyond 2005.

### ***Draft National Framework for Action 2006 - 2015***

The vulnerability to disaster issues were first addressed by UNDP in a prior project of Strengthening the Disaster Mitigation and Management System in Mongolia, Phase I (MON/02/305) from July 2002 - July 2004. The successful completion of this first phase was marked by significant Mongolian efforts to formulate the national law on Disaster Management (2003) and to commit itself to a more comprehensive civilian approach to addressing disaster issues by creating a new agency responsible for disaster management. This led to the further assistance from UNDP with the generous support of Government of Luxembourg in the project, Strengthening the Disaster Mitigation and Management System in Mongolia, Phase II (MON/05/305) from May 2005 to December 2007. The project phase II made a significant contribution to capacity building of newly established NEMA in terms of its human force and technical competence, its coordinated process of developing a draft National Framework for Action on Strengthening the Disaster Reduction Capacity in 2006-2015 in line with Hyogo Framework concepts, and support to establishment of partnerships for DRR. Objective of the NFA is to create a long-term strategy for disaster management to minimize vulnerability, improve preparedness; enhance institutional and technical capacity for disaster management and emergency response, and local disaster mitigation capacity. But the NFA is still hasn't approved by the government and need to be updated related to latest incidents in chemical management. It drafted following strategic goals as

- The development and strengthening of disaster management capacities and disaster risk reduction programs with special emphasis on building resistance and coping capacity at the community level;
- The promotion of public participation in disaster mitigation and preparedness at the community level and promotion of a disaster protection culture, using modern knowledge and practices in order to build a safety and resilience within the society
- The analysis and evaluation of hazards, vulnerabilities and elements at risk and the effective adoption of appropriate approaches to potential disaster risk in disaster prone areas;
- Create Disaster Risk Management Network and Communication system at local, regional, national and international levels
- The development of policies, donor coordination and strong partnerships to implement a coordinated action plan

It has also defined about research on the disaster study that to develop improved methods for predictive multi-risk assessments and socioeconomic cost-benefit analysis of risk reduction actions at all levels and to strengthen the technical and scientific capacity to develop and apply methodologies, studies and models to assess vulnerabilities to and the impact of geological, weather, water and climate-related hazards, including improvement of regional monitoring capacities and assessments.

### ***Draft National Action Plan on Disaster Management***

The Mongolian National Action Plan (NAP) was developed in line with the vision, goals and objectives of the National Framework for Action (NFA). As a comprehensive 10- year planning exercise, the NAP has taken into consideration all activities necessary to strengthen the Mongolian Disaster Management and Risk Reduction system. The priority actions (three years initially) concentrates on foundations, building a coherent system including clarifying and strengthening existing institutional arrangements for disaster risk reduction and disaster

management. A built in monitoring and evaluation framework is integral to assessing the plans progress towards its stated objectives and outcomes.

The action plan outlines key strategies for implementing the National Framework for Action (NFA). The approach is multi-sectoral ‘whole of government’ and ‘all hazards’ to reduce disaster risk. Programs are to be developed and implemented based on a broad consultative approach and through multi-sectoral, multi-disciplinary partnerships. Priorities actions include activities for mainstreaming disaster risk reduction into national plans frameworks and reducing disaster risk at the community level in order to build resilience and coping mechanisms targeting the most vulnerable people found in the society. The Mongolian National Action Plan on Disaster Risk Reduction is equivalent of a Corporate Plan on disaster risk management and is a cross sector plan. The NAP objectives are:

1. Implementation of the National Framework for Action
2. Improved understanding of how disaster risk reduction and management is an integral part of sustainable development
3. Improved understanding of why the National Disaster Risk Reduction and Disaster Management Action Plan and Implementation Strategies are imperative socio-economic development
4. Improved knowledge on disaster risk reduction and management for strategy implementation
5. Increased capacity for mainstreaming and implementing disaster risk reduction and management in the development process
6. Increased capacity at the community level to improve community resilience to disasters.

Reducing risk in the rural communities is central to the overall NAP strategy. The priority actions are to support strategic government planning and projects focusing on benefiting urban and rural communities living with hardship. The NFA outlined the importance of having a nationally designed strategy for reducing risks from natural disasters that focuses on the agricultural and urban sectors. The strategy ensures that national policy-making is directed towards reducing the impacts of weather- and animal-related disasters. However, to effectively provide comprehensive policy to deal with these problems, the national action plan must also employ a bottom-up design approach, using the principles of poverty reduction, community participation, environmental protection, and sustainable development with an emphasis on the human element to ensure that affected communities actively voice their needs during the action planning process. A long-term solution for dealing with increasing risk in the lowest level of societal administration requires a community-focused disaster risk reduction plan and institutional arrangements to support it. Principles inherent in developing the NAP include a focus on community, local leadership, and community cohesion as measures of resilience.

### ***Disaster Preparedness and Risk Mitigation National Program on Public Awareness and Advocacy***

The Disaster Preparedness and Risk Mitigation National Program on Public Awareness and Advocacy is proposed on the basis of execution the Disaster Protection Law of Mongolia (2003) and in conformity with the United National Disaster Assessment Committee (UNDAC) Team Recommendations (2004) on involvement of entities and public in disaster protection activities and instillment of safe lifestyle to population.

The goal of the National Program is to strengthen general knowledge on hazards and disaster and to instill safe tenor of life to public. Objectives are:

- To implement specific measures directed toward disaster prevention and risk mitigation, and adabtation of safety concerns;
- To revive traditional custom on prevention of natural disasters and hazards, and advocate it amongst youth and children;
- To provide complex public advocacy, ensuring message uniformity;
- To accomodate a public opinion in Government and NGO policy agendas and performances, to encourage public participation in disaster prevention activities.

The program implemented starting from 2006 to 2010. The State Agency on Advertisement is responsible body to manage the implementation process and to coordinate all related activities. The financing of the current program will come from central and local budgets annually, loan and aid resources, international organizations and donor countries, disaster protection fund and donations from organizations, communities and private citizens. According to the programme MNE has co-responsible of in promoting public advocacy and awareness in a way of meeting, talk show, conference, workshop, movie, book, handouts, brochure, fliers, posters, artistic performance, campaigning, festivals, literature, library, training, lecture and other advocacy means and in delivering public advocacy to households with respect to varying geographical locations and climatic zones, adopting suitable contents and methodology. The research institute for this program will be selected. The institute will carry out initial assessment and will evaluate the implementation progress of the program and achieved results in accordance with selected criteria. The institute will also develop proposals and recommendations to improve and intensify the effectiveness of the program, will manage obtained information, control, monitor and evaluate departments of the relevant government organizations. The monitoring and evaluation process of program implementation progress in local level will be carried out by local Governors in cooperation with Emergency Management departments of Aimags and capital city. The expected outcomes of the program is to reduce damage caused by disasters to human lives, society and economy. The environmental protection in national and local level is anticipated to be improved.

All above mentioned plans are in stage of initial or further development and waiting for its approval by Government. Therefore Mongolia is under lack of planning in terms of chemical emergency preparedness and response. The main problem today is technical capacity for the emergency. For example, the disaster protection forces needs to develop extra capacity and to have sufficient resources to carry out their tasks more efficient. The quality of mechanical equipment and machinery's are not good and they need to be renovated. The example below will present & confirm emerging need for immediate actions on strengthening the technical capacity:

- The 161 special purpose fire trucks, from which 60.2% or 97 units used for more then 20 years. The 61 trucks exceeded their technical usage norms.
- The 74 special vehicles, mechanisms for rescue operations, constituting 50% or 37 counted technical units used for more then 20 years. The 7 of them exceeded their technical usage norms.
- The 100 cars used for the emergency units and by emergency services, constituting 49% or 49 units used for more then 10 years. The 17 units exceeded their technical usage norms.

- The 71 cars used by administration, constitute 60.5% or 43 units used for more than 15 years. The 13 units exceeded their technical usage norms.

According to recent studies the cars and other technical equipment at the units are used for more than 10 years and it is 21.5% or 92 units from all available equipment & cars. The equipment used for more than 20 years represents 31.4% or 137 technical units. At present technical equipment and cars at NEMA, which can be used on disaster prevention and disaster mitigation is only 47.1%. The supply of new equipment and technical devices for rescue operations is only 5% to 15%. From 4 motor and 8 inflatable boats used on rescue operations on water 4 of them are out of order. From 36 oxygen E-16 underwater masks for divers 47.2% or 17 units technically is not suitable anymore. From 196 KEEP-8 and AIR-317 masks to protect from poisonous gases and smoke 56.1% or 110 units is not suitable anymore. In order to implement rescue operations today more efficient the equipment and devices to detect and to rescue people from earthquake ruins, to clean ruin area, to conduct rescue operations, technical hardware and equipment to rescue people affected by flood, equipment for fighting wildfires, detecting explosives, radioactive substances and chemicals are required.

The NEMA and departments not implementing serious actions to strengthen the disaster protection forces and do not organizing required training and exercises, involving personnel and professional groups.

A key indicator measuring the status of disaster protection preparedness is transmission of accurate and correct information in efficient and timely manner. To make announcements through effective functioning communication network and to have related infrastructure is very important. The prompt in-time transmission of information during the disaster is one of the main services provided by staff of the NEMA to the public.

The Governors of aimag and capital city and NEMA administration together with branch departments should have knowledge at any situation and to have awareness in case of any disaster, as well as to have ability to conduct prompt communication with neighboring aimags and cities.

### ***Chemical classification and labelling***

Until 2007 Mongolia has been considered as country with no intention of implementing GHS in Asia Pacific. But since 2007 MNE has put into attention to develop GHS system and MNE and National Chemical Council are working on it actively. In 2002 Minister of Nature and Environment has approved Order on Approval of Classification of Hazardous Chemicals and Amendment into Classification of Extremely Toxic Chemicals /Full text of the Order # 63/89 at Annex 1/. According to the Ordinance list of toxic chemicals are indicated into Annex 1 and classification by impacts to the human and animal body is indicated into Annex 2 of the Ordinance. The chemicals specified in Rotterdam and Stockholm Conventions are approved by Annex 3, 4 and all these chemicals are involved into Classification of Extremely Toxic Chemicals at national classification. According to the national classification there are following categories and chemicals:

|    | Category                                                                         | Chemicals |
|----|----------------------------------------------------------------------------------|-----------|
|    | Chemicals restricted in Rotterdam Convention                                     | 27        |
|    | Chemicals restricted or banned in Stockholm Convention                           | 12        |
| 1  | Extremely, very, powerful, high explosive                                        | 12        |
| 2  | explosive                                                                        | 84        |
| 3  | Extremely, very powerful oxidant                                                 | 7         |
| 4  | oxidant                                                                          | 2         |
| 5  | Extremely, highly flammable                                                      | 110       |
| 6  | Flammable, ignitable                                                             | 70        |
| 7  | Highly, very, extremely corrosive<br>Extremely, very destructive, severe burning | 50        |
| 8  | Corrosive, burning                                                               | 23        |
| 9  | Highly irritant, severely irritant, strongly irritant, very irritant             | 35        |
| 10 | Irritant                                                                         | 169       |
| 11 | Nervously paralytic exposure                                                     | 22        |
| 12 | Suffocative exposure                                                             | 40        |
| 13 | Skin irritant                                                                    | 4         |
| 14 | Aggregative exposure                                                             | 40        |

According to Law on Toxic and Hazardous Chemicals, legal person who wish to take permission to export, import, transfer and produce chemicals Mongolia have to support by following information:

- name and formula of the substance
- technical or commercial name
- CAS no
- place, occasion, quantity and purpose of usage
- Reference about physical, chemical and hazardous
- measure in potential accident and incident
- conclusion on work place
- disposal and transportation arrangement of chemicals and its waste

The reference shall cover following demonstrations:

- name of the substance /chemical, technical and commercial/
- CAS no and GHS code
- Producer's name and address
- Formula, compound and its concentration
- Physical and chemical feature (condition, color, odor, pH, temperature to freeze, burn and melt, boiling temperature and its interval, evaporation, inflammable or explosive feature, steam pressure, density and solubility, temperature to decompose etc)
- stable characteristic and reactant
- impacts to the human health (poisonous characteristic, penetrative way etc)
- impacts to the environment (permissible level to the water, soil, air and work place)

- hazardous characteristic (hazard class, warning sign, signal words; hazard statement)
- first aid measure
- fire downing method, equipments and tools
- response in event of releasing chemicals
- cautions to transfer and handle
- disposal method

The legal person who is going to produce, sell and use of chemicals have to be taken EIA (risk assessment) pursuant to the law. In order to produce, import, export, use, transport and dispose chemicals conclusion and guidelines to maintain safety requirement shall be given by NEMA. Risk assessment shall cover hazardous characteristic of chemicals and potential risk and preventive measures and method to dispose and decontamination.

By Ordinance issued by Minister of Health in 2003, Poison's Information Center established under Medical Service Agency with its responsibilities of:

- Recieve information about medicine and chemical poisons and give precautionary information to the public.
- Create informational database
- Support by professional guidance and recommendation to the citizen, enterprise and other organisations.
- Proceed public awareness activity and training
- National Center for Poison Emergency is responsible of taking call, and providing by assistance and advice in chemical emergency for around the clock.

Currently National Poison Council in regulating at policy level and in supporting by integrated professional administration is not working in Mongolia. Poison protection issue is dispersed under several institutions such as MoH, Medical Service Agency and Public Health Institution. In addition some challenges are exist such as lack of laboratory to diagnose poison and facilities and appropriate equipments and necessary training at all level. Moreover antidotes are not included into first aid package for emergency doctor of medical service. Emergency service is not equipped for transportation of chemically exposed persons in Mongolia.

## 10.2. Chemical Incident Response

| Date of Incident | Location                                  | Type of Incident | Chemical(s) Involved | Number of Deaths, Injuries, Evacuated                              | Environmental Contamination or Damage |
|------------------|-------------------------------------------|------------------|----------------------|--------------------------------------------------------------------|---------------------------------------|
| 2006             | "Mavsen" Co.ltd Bayanzurkh district of UB | Chemical misuse  | Petroleum waste      | 1 person died<br>Number of people living around have been poisoned | Air pollution soil pollution          |

|              |                                                                                                                                       |                     |                 |                                                      |                                                                                                   |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| April 2007   | At an informal mining installation at the premises of an abandoned factory located in the village of Khongor Soum, Darkhan –Uul aimag | Chemical misuse     | Cyanide mercury | Number of person poisoned<br>3 cows and a sheep died | Air pollution, ground/drinking water pollution<br>Soil contamination<br>Loss of livestock animals |
| April 2007   | Bayangol district “Bogd ar”khoroolol                                                                                                  | Chemical handling   | mercury         | -                                                    | Air pollution                                                                                     |
| May 2007     | Bayanzurkh district “Xinzou” Hotel                                                                                                    | Chemical handling   | mercury         | -                                                    | Air pollution                                                                                     |
| May 2007     | Chinggeltei district Bayanburd Center                                                                                                 | Chemical handling   | mercury         | -                                                    | Air and drinking water pollution                                                                  |
| January 2008 | Oil processing company Daachin Co.ltd, Matad soum of Dornod aimag                                                                     | Industrial accident | oil             | Injured 2 people                                     | -                                                                                                 |

Above mentioned incidents are belong to the chemical accident terminology by the law. Last year a number of incidents in chemical storage are inspected and preventive measure taken by NEMA. Chemical accidents and incidents mostly cause of breach technical requirements and maintenance, careless and adventitious activities of person who are using chemicals, out of dated facilities and equipments, wrong storage and transportation, without having awareness to use chemicals and wrong disposal of chemicals. After all these incidents following lessons learnt have been identified:

- Lack of laboratory capacity to analyze content of toxic chemicals in urine and animal and plant- origin products.
- Lack of mobile laboratory and quick analysers and resource of decontamination substances in event of emergency
- Lack of clothing and appropriate equipments in emergency
- A lot of, comprehensive public awareness activities need to be carried out
- Still having gaps in hazardous waste regulation.
- Weak attention on workers /doctors, analysers, experts and emergency officers etc/ at front line in emergency.

### **10.3. Chemical Incident Follow-up and Evaluation**

There is only formal mechanism in place to investigate a chemical incident. The main role is implemented by NEMA as mentioned before and by Police office in case of incident have criminal cause. MNE and Chemical Council have responsibility to take policy measure and organise in framework of chemical incident follow-ups. Government has taken several measures after a number of accidents and incidents. By Government Resolution in 2006 borders to pass chemicals have decreased from 18 to 4. Also list of banned and severely restricted chemicals are renewed, therefore, mercury and cyanide are included into list of severely restricted chemicals. In order to improve chemical regulation and requirements Minister of Nature and Environment, Minister of Health and Minister in charge of Emergency Management are issued Ordinance “Regulation on storing, transporting, using and disposing of toxic and hazardous chemicals”. Moreover procedure to permit chemical exportation, importation, transportation, production, selling, storage, usage and disposal is changed. Previously, only toxic chemicals were permitted by MNE and others are permitted by Governors of aimag and city. By Law on Toxic and Hazardous Chemicals adopted in 2006 and Amendments into Law on License all importation and usage of chemicals beside explosives shall be permitted by MNE. In 2006 business entities to import cyanide are decreased and only 2 of companies have been permitted in 2007. Joint nation wide investigation by MNE, NEMA, MIC, SPIA and General Police Office was carried out 2 times in 2007-2008 and confiscated 145 mills at informal mining. Investigation has concluded, overall 53940 m<sup>3</sup> of tailings in 56.2 hec area are contaminated by mercury and cyanide in 25 soums of 10 aimags. All that contaminated tailings are taken into protection and collected into 4 integrated site and have taken measure of decontamination.

### **10.4. Comments/Analysis**

The Mongolian country affected very often on small or large scale due to features of continental climate, environmental degradation, ecological unbalance and inappropriate human activities and it is happened with particular frequency. The Mongolian territory affected by drought, extreme winter, snow & dust storms, floods, earthquakes, forest and steppe fires, desertification, lighting & other hazards, insects, Brandt's vole disease, infectious human and animal diseases, industrial accidents, spills of chemicals & radioactive substances and traffic accidents, which has tendency to increase in the last years.

The Mongolian Government recognized the importance of situation and during last years considered to high priority the disaster protection issues and started to implement the particular response measures. The new “Law on Protection from Disaster” established a new disaster protection system in Mongolia, managed to determine responsibilities on emergency management field, clarified professional terminology to be used and created understanding about disaster & emergency, opened for public information on disaster mitigation activities in Mongolia, determined authority, outlined framework of activities for National Agency and clarified role & responsibilities for governmental & provincial organizations, business entities and citizens. After the formulation and adoption of the law a number of policy documents were developed such as Draft National Framework of Actions, Draft National Action Plan and Disaster Preparedness and Risk Mitigation National Program on Public Awareness and

Advocacy. All these policy documents waiting for its approval and further update. In addition informal mining relation is waiting for legal regulation.

At local level the Governors of aimag and capital city and NEMA administration together with branch departments should have knowledge at any situation and to have awareness in case of any chemical emergency, as well as to have ability to conduct prompt actions. On the other hand, there is still a huge gap in capacity of local communities to cope with the chemical emergency. The main reason is because the full-time emergency management personnel that can support soum governors to develop a technically feasible chemical accident protection plan and to implement National policies is not available. Moreover chemical emergency plan still hasn't developed or harmonised into other emergency policy. The emergency medical supply for the people and animals is very limited. Local units don't have sufficient financial budget to buy and to store required medicines for emergency cases. The medical shops and veterinary pharmacies are all private and therefore, our citizens have a very small storage of medicines barely enough to treat some very simple cases of occasional headaches and fevers.

In field of chemical emergency management training is needed for not only citizen and private enterprises and also NEMA officers and other governmental and professional bodies

Actions to ensure the disaster preparedness and readiness at all level and to strengthen the present capacity are still need to be taken. Particularly chemical emergency preparedness and response issue is still at insufficient attention to the national emergency policy. In order to implement decontamination operation today more efficient the equipment and facilities to detect explosives, radioactive substances and analyse chemicals are required. Poison's Research Center need to be established, not Poison Information Center and technical capacity at medical emergency service need to be strengthened.

## CHAPTER 11

### AWARENESS/UNDERSTANDING OF WORKERS AND THE PUBLIC

However Mongolia haven't yet developed programme in protection public health and environment from chemical hazards, there are a lot of programs in environmental and health sector. As we mentioned before in the Chapter 4, Mongolia hasn't under lack of the planning and programming. A problem mainly goes to harmonization of those policy documents. Root cause of this problem is again lack of public involvement into policy formulation, and policy documents often were born not through public discussion but from decision makers. Nevertheless, the negative and threatening effects of chemicals on public health and the environment are still growing, getting more complex and cross-related. In occupational setting, major accidents and illness of workers are often associated with the exposure to chemicals. The problems mainly resulted from the lack of knowledge and understandings among workers and the public. But legally, employee mean in Mongolia, according to Law on Labor, citizen who has been contracted with employer. But safety issues in working place of workers except employee are still in cap of legal system in Mongolia. Most accidents and occupational chemical hazard belong to that people who are working in informal mining, construction and other industrial sector. In preventing workmen and the public from chemical hazards, the most efficient measure remains to be the provision of relevant and comprehensible information so as to instill the awareness and incorporate knowledge of chemical dangers, and the proper and safe use of the chemicals. The measure has been taken by concerned government agencies, non-governmental organizations, academia, business, and civil society, at various degrees. The followings provide details of the ongoing activities that strengthen public awareness and understanding, aiming to promote the sound management of chemicals.

#### 11.1. Awareness and Understanding of Chemical Safety Issues

##### **Related law and standards**

The purpose of the Law on Labour is to determine the general rights and duties of employers and employees who are parties to a labour relationship based on a contract of employment, collective agreement. "Collective agreement" means an agreement between an employer and the representatives of employees of a business entity or organization ensuring labor rights and legal interests more favorable to the employees. This agreement shall be monitored by the parties or the representatives of the parties. One of the relations regulated by collective agreements is standards and requirements of ecological safety, labour safety and sanitation. Toxic or hazardous chemical, physical, or biological conditions in the workplace shall not exceed the permitted labor and sanitation standards.

An employer shall inform the labor monitoring organization, and other relevant professional organizations, of the employer's use of chemical, poisonous, explosive, radioactive, or biologically active substances in production and shall comply with applicable regulations established by authorized organizations. The MoH shall publish a list of professional diseases. Further this law states about non-compliance that: if it is determined that the activities of a business entity or organization are having an adverse impact on the health or safety of employees, Inspector in charge of Labor, may terminate the employer's business activities or

suspension of such activities until the conditions have been remedied or may terminate such business activities permanently. Also if a business entity has not complied with applicable labor safety and sanitation regulations, an inspector shall impose a fine on the business entity of from 150,000-200,000 tug. From Standardization and Measurement Agency shall approve standards at workplace and Inspector in charge of Labor issue shall enforce laws and legal acts.

### **Public Awareness Activities**

Giving knowledge and making concern of chemical hazards to workers and publics is one of the main duties of several ministries, namely, Ministry of Health, Ministry of Social Welfare and Labor, Ministry of Natural and Environment. In fulfilling this duty, each government agency has performed various types of activities using numerous means and methods. A few elaborated examples are described.

Public Health Institute is disseminating information and news of chemical hazard and safety in public health products and consumer goods, communicates with public.

MNE and some projects (project by SIDA, Netherlands and WB) are carrying out public awareness activities on the site of informal mining. Also with cooperation of GTZ, the environmental education project has begun to implement in Mongolia.

Ministry of Food and Agriculture, directly educates the farmers and public about the harmful agricultural chemicals and pesticides.

### **Television Programs**

Since 2007 MNE has actively cooperating with TV channel MN25 in environmental protection in terms of improving ecological education. 3 series of TV programs in field of chemical usage are broadcasted through TVs. WWF in Mongolia is actively working on public awareness in chemical issue, in result, 2 series of documentaries were broadcasted.

## **11.2. Education and Training for Sound Management of Chemicals and Waste**

In Mongolia chemical education is gathered through secondary and higher educational level. Amongst curricula for the secondary school, chemistry is one of the subjects for 8-11<sup>th</sup> grade and general understandings of inorganic and organic disciplines and analytical chemistry are studied during 3 years. General understandings of coordination compounds, main group compounds, transition metal compounds, cluster compound, solid state compounds, molecular symmetry group theory, reaction, characterization of inorganic compounds are studied by 2 hours in a week at secondary school. Undergraduate and graduate level the Bachelor of Science (B.S.) degree and Master's degree with M. S. (thesis option) and M. A. (non-thesis option) in chemistry and chemical technology are gained at Mongolian National University /MNU/ and Mongolian University of Science and Technology /MUST/. Variety of courses offered at that universities such as Special Topics in Inorganic Chemistry, Advanced Inorganic Chemistry, Chemical technology, Special Topics in Physical Chemistry, Solid compound chemistry and physics, Nanotechnology, Quantum Chemistry, Computer chemistry, Chemical instrument, Chemical factory management and economic, Laboratory Safety, Biochemistry, Biophysical Chemistry, Agrochemistry, Mineral chemistry, Physical Organic Chemistry, Environmental management etc.

However general knowledge about chemistry has been studied from secondary education and have specific educational programme for graduate and undergraduate level in the chemistry and environmental science, education and training for sound Management of chemicals and waste is still insufficient to the public. Of course lack of quality of education and relationship among universities, enterprises and government should be mentioned in this situation. Actually in Mongolia no any public awareness programme to address sound management of chemicals and waste

### **11.3. Comments/Analysis**

Enhancement of workers' and public awareness and knowledge is an essential element for the success of national chemical safety management since it will enable them to safeguard their health and the environment from avoidable chemical hazards. At present, all stakeholders including government, academic, and business sectors, as well as NGOs, are involved in educating workers and the public about chemical risks and the proper management, through different approaches. This has resulted in a considerable rise of the public concerns and responses to chemical-related problems in the last one year. However, in order to achieve the public capacity building, there is a need for continued commitments of all partners. Besides, more participation of mass media, civil society organizations and local communities is needed for further public mobilization and empowerment. Education and awareness building of chemical hazard in Mongolia is very weak. Regarding laws, owners have to provide information to the workers about the chemicals and raw materials used in the factory, their harmful effect to human and environment and the environmental quality at workplace but these regulations not so good implemented. It is shown by recent accidents in Mongolia. Laws are not protecting independent workers who are not contracted such as small miners, shoe makers, car washers etc. In addition there are almost no any sufficient information database about chemicals which able to use by owners, workers and ordinary people. There are several problems arising from the current awareness raising and education activities on chemical safety. Some approaches of information dissemination are not easily accessible to the public. Most of the chemical information cannot be readily understood due to the appearance of technical terminology. This emphasizes a need to expand the outreach and educational programs to the vulnerable groups of the population. In addition financial allocation for public awareness raising programme is insufficient. For example as looking at budget in MNE for 2007, there is no any public awareness activity in chemical management budgeted. Furthermore, there is needed to be elaborate chemical curricula in secondary school, even for 3 years have been studying chemistry.

In order to deal with these problems, the following describes the suggested recommendations.

- To develop regulation focusing on protection from chemical hazards to the workers who are not contracted (small miners, car washer, shoe maker etc)
- The government should set a policy to systematically and continuously monitor and investigate the health impact as well as the accumulation of harmful chemical substances in human body, food chain, environment, and other components in the ecosystem.
- The government agencies and academic / research institutions should cooperate to support and promote dissemination of integrated knowledge related to chemicals to workers and consumers.
- More research and development activities should be strengthen and expanded in the areas of human health and impact of harmful chemicals covering the worker and consumer.

- Labor unions and other civil society organization should be driven to play more roles in providing chemical knowledge and information including the suggestion and advice to the target groups.
- Easy to use database for the owners, workers and consumers. In this regard, to use and put big consideration in development of a chemical safety database, as part of the Pilot Project.

## CHAPTER 12. INTERNATIONAL LINKAGES

### 12.1. Co-operation and involvement with International Organisations, Bodies and Agreements

Mongolia is a member of numerous international programs / agreements (Agenda21, FAO Code of Conduct, Montreal Protocol, Basel Convention, Stockholm Convention, Vienna Convention and GATT / WTO agreements, ILO Convention 155). It has good linkages with international organizations such as IFCS, IPCS, UNEP, WHO, FAO, UNIDO, ILO, WTO, ADB and UNITAR. The focal point for each of the international cooperation is usually located at the institution considered to be the prime responsible agency. Also Mongolia is participating in international/regional SAICM meetings, and has a National SAICM Focal Point and in the QSP Pilot Project and QSPTF Project.

Through the international linkages, several projects have been funded and given technical assistance in the areas of chemical safety, risk reduction, environment quality monitoring system, and environmental health impact assessment. Assistance has been provided by various organizations, such as GEF, UNIDO, UNITAR, Netherlands Government, Government of Luxemburg and WHO. Mongolia has long committed to work for global chemical safety, since the establishment of IFCS in 1994.

**Table. 12.A. Membership in International Organizations, Programmes and Bodies**

| International Organization/ Body/ Activity        | National Focal Point (Ministry/Agency & Primary Contact Point)                                                                                                                                                                                                                               | Other Ministries/Agencies Involved                  | Related National Activities                                                                                                                                                                        |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Intergovernmental Forum on Chemical Safety (IFCS) | Department of Information and Monitoring Division of Ministry of Nature and Environment<br>Mr Sharav Dagva<br>Government Building-3<br>Baga Toiruu-44<br>Ulaanbaatar-11<br>Mongolia<br>Tel: (976) 1 31 13 79<br>Fax: (976) 1 32 14 01<br>email:<br>baigyam@magicnet.mn /<br>dagvas@yahoo.com |                                                     | <ul style="list-style-type: none"> <li>• Setting National Priority for Chemical Management</li> <li>• Facilitating the establishment of National Information Network on Chemical Safety</li> </ul> |
| IPCS                                              | J.Choikhand<br>Ministry of Nature and Environment<br>Government Building-3<br>Baga Toiruu-44<br>Ulaanbaatar-11<br>Mongolia<br>Fax:976-11-321401                                                                                                                                              | Hydrology, Meteorology Agency<br>Tel: 976-11-264711 | Assisting to develop National Chemical Management Profile and Capacity Assessment and Priority Setting                                                                                             |

|       |                                                                                                                                                                                                                     |                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | Tel: 976-11-266197<br>E:mail: <a href="mailto:mne@mongol.net">mne@mongol.net</a>                                                                                                                                    |                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| SAICM | J.Choikhand<br>Ministry of Nature and Environment<br>Government Building-3<br>Baga Toiruu -44<br>Ulaanbaatar-11<br>Mongolia<br>Fax:976-11-321401                                                                    | -                                                                                                                                                                                                                       | To coordinate chemicals management in framework of SAICM strategies and actions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| WHO   | WHO Representative<br>P.O. Box 663<br>Ulaanbaatar 13, Mongolia<br><br>Government Building No.8<br>3d Floor, Olympic street-2<br>Phone: 976-11-327870,<br>322430<br>Fax:976-11-324683<br>E-Mail:who@mog.wpro.who.int | All relevant, e.g. academic and other concerned institutions                                                                                                                                                            | Provide assistances in the following technical areas and consultants (2006 - 2007)<br>Expanded Programme On Immunization and Vaccine development<br>Emergency preparedness and response<br>Epidemic alert and response (CSR)<br>Violence, injuries and disabilities<br>Environmental Health<br>Child And Adolescent Health<br>Making pregnancy safer<br>Surveillance, prevention and management of chronic non-communicable diseases<br>Mental Health<br>Health financing and social protection<br>Health system policies and service delivery<br>Human Resources For Health<br>Health information, evidence and research policy<br>Tobacco<br>Food Safety<br>Health Promotion<br>Nutrition<br>Essential health technologies<br>Essential Medicines |
| FAO   | FAO Representation in Mongolia<br>FAO Representative<br>Ms. Victoria<br>SEKITOLEKO<br>e-mail: fao-chn@fao.org                                                                                                       | All relevant, e.g. academic and other concerned institutions                                                                                                                                                            | Now working on UNICEF/UNDP Joint Food Security Assessment and project<br>Special Programme for Food Security<br>To increase supply dairy products in Mongolia by reducing post-harvest losses and re-stocking.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| ILO   | The Ministry of Social Welfare and Labour<br><br>The Ministry of Social Welfare and Labour represents government.<br>Ms. Ts. Gerelgua,<br>Head of the International Relations Division<br>Tel: 976-11-264918, 976-  | Workers - Confederation of Mongolian Trade Unions (CMTU)<br><br>Employees are represented by the Confederation of Mongolian Trade Unions (CMTU) which represents 12 independent trade unions with approximately 430,000 | Formulating Plan on the Safety in Occupational Health and Environment<br>Implementing project in child labor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

|            |                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            | 11-262021                                                                                                                                                                                                                                                                                                                 | <p>members. The President of CMTU is Mr. G. Adiya, while Mr. Z. Sukhbaatar, Assistant President for International Relations</p> <p>Employers - The Mongolian Employers Federation (MONEF, formerly MEA)</p> <p>The Mongolian Employers' Federation has approximately 6,500 members. It deals with all matters related to the interests of the employers in collaboration with the Government/Parliament as well as CMTU. Mr. L. Nyamsambuu is President, while Ms. Z. Shurenchimeg, International Relations Officer, is responsible for relations with the ILO.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| World Bank | <p>Mr. Arshad Sayed<br/>The World Bank<br/>5 F, MCS Plaza Building<br/>Seoul Street-4<br/>Ulaanbaatar 210644,<br/>Mongolia<br/>Tel: (976-11) 312-647 or<br/>312-654<br/>Fax: (976-11) 312-645<br/>E-mail:<br/>Asayed@worldbank.org<br/>Web:<br/><a href="http://www.worldbank.org.mn">http://www.worldbank.org.mn</a></p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>The Netherlands-Mongolia Trust Fund for Environmental Reform was established in April 2005 with the objective of strengthening and advancing the environment and natural resources agenda in Mongolia. The initial grant of US\$6 million from the Netherlands Government was allocated among three categories: (i) World Bank-executed technical assistance; (ii) Government of Mongolia-executed support for ongoing World Bank projects; and (iii) Government-executed preparation of new World Bank-financed projects.</p> <p>Building on the successful results and lessons learned during the implementation of NEMO I, a second phase (NEMO II) was initiated in 2007 with a total endowment of ^ 3.9 million. The Government of Mongolia (MNE), the Netherlands (Royal Netherlands Embassy in Beijing and Ministry of Development Cooperation), and the World Bank agreed that activities under NEMO II (2007-2010) would focus on :(i) Natural Resources Management; (ii) Pollution Management; and (iii) Environmental Governance.</p> |
| ADB        | Mongolia Resident Mission<br>MCS Plaza, Second Floor                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Assisting to implement multisectoral projects. Support by loan and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|         |                                                                                                                                                                                                                             |  |                                                                                                                                             |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------|
|         | Seoul Street 4<br>Ulaanbaatar 46, Mongolia<br><br>Tel: + 976 11 329 836<br>Fax. + 976 11 311 795<br>Email: adbmnm@adb.org                                                                                                   |  | technical assistance in education, agriculture, industry and trade, water supply, health, finance and energy sector                         |
| UNESCAP | For environmental issue<br>J.Choikhand<br>Ministry of Nature and Environment<br>Government Building-3<br>Baga Toiruu-44<br>Ulaanbaatar-11<br>Mongolia<br>Fax:976-11-32140 1<br>Tel: 976-11-266197<br>E:mail: mne@mongol.net |  | Transboundary air pollution monitoring<br>Developing strategy to renovate PowerPlant 4 /PP4/<br>and<br>developing emission standard for PP4 |

**Table. 12.B. Participation in International Agreements/ Producers Related to Chemicals Management**

| <b>International Agreements</b>                                                                                                 | <b>Primary Responsible Agency</b>  | <b>Relevant National Implementation Activities</b>                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Agenda-21 Commission for Sustainable Development                                                                                | Ministry of Nature and Environment | Development of Pilot projects of National Sustainable Development Strategy                                                                                                                               |
| SAICM                                                                                                                           | Ministry of Nature and Environment | Development of National Chemicals Management Profile and Capacity Assessment, Priority Setting for the chemicals management and Development Integrated National Chemicals and Waste Management Programme |
| Montreal Protocol                                                                                                               | National Ozone Authority           | Project “Institutional Strengthening for the Implementation of the Montreal Protocol in Mongolia “ is implemented                                                                                        |
| Vienna Convention for the Protection of the Ozone Layer (1985) and Montreal Protocol on Substances that Deplete the Ozone Layer | Ministry of Nature and Environment | Defining legal measure for the restricted monitoring of the Chemicals governed by the Convention.                                                                                                        |

|                                                                                                   |                                                                |                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (1987) and Its Amendment                                                                          |                                                                |                                                                                                                                                                                                                                                                                                                                                         |
| ILO Convention 155<br>Concerning occupational<br>safety and health and the<br>working environment | Ministry of Social Welfare<br>and Labor                        | Strategy development on<br>occupational health in the<br>industry                                                                                                                                                                                                                                                                                       |
| Basel Convention                                                                                  | Ministry of Nature and<br>Environment                          | Implementation Report on<br>Basel Convention<br>Secretariat<br>Programme Development<br>on Hazardous Waste                                                                                                                                                                                                                                              |
| Stockholm Convention on<br>Persistent Organic<br>Pollutants(POPs)                                 | Ministry of Nature and<br>Environment                          | Organizing implementation<br>of NIP                                                                                                                                                                                                                                                                                                                     |
| SAICM                                                                                             | Ministry of Nature and<br>Environment                          | Updating National<br>Chemical Management<br>Profile, Development of<br>National SAICM Capacity<br>Assessment, and holding<br>National SAICM Priority<br>Settings project<br>Strengthening Governance,<br>Civil Society Participation<br>and Partnerships within an<br>Integrated National<br>Chemicals and<br>Waste Management<br>Programme in Mongolia |
| UN Convention against<br>Illicit Traffic in Narcotic<br>Drugs and Psychotropic<br>Substances      | Ministry of Health                                             |                                                                                                                                                                                                                                                                                                                                                         |
| Chemicals Weapon<br>Convention                                                                    | National Authority of<br>Mongolia for<br>Implementation of CWC |                                                                                                                                                                                                                                                                                                                                                         |
| International Development<br>Association                                                          | Ministry of Finance                                            | Sustainable livelihood<br>Project                                                                                                                                                                                                                                                                                                                       |

## 12.2. Participation in Relevant Technical Assistance Project

Since 2006, Mongolia has participated in the in the QSP Pilot Project (Donor: Federal Office for the Environment (FOEN) of the Government of Switzerland / International executing agency: UNITAR) and QSPTF Project. In framework of this cooperation Mongolia could be have National Updated Chemicals Profile and Capacity Assessment for the chemicals management and Integrated National Chemicals and Waste Management Programme. Outcomes of the projects have great significances for Mongolia in terms of improving chemicals and waste management, which have still overlooked in the national priorities and strategies.

**Table. Participation in Relevant Technical Assistance Project**

| Name of Project                                                                                                                                                                                   | International/Bi-lateral Donor Agency                                                                               | National Contact Point                                                                                                                                                                                                                    | Relevant Activities                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Updating a National Chemicals Management Profile, Development of a National SAICM Capacity Assessment, and Holding of a National SAICM Priority Setting Workshop”<br><br>Sept 2007- February 2009 | Federal Office for the Environment (FOEN) of the Government of Switzerland / International executing agency: UNITAR | J.Choikhand<br>Ministry of Nature and Environment<br>Government<br>Building-3<br>Baga Toiruu-44<br>Ulaanbaatar-11<br>Mongolia<br>Fax:976-11-321401<br>Tel: 976-11-266197<br>E:mail:<br><a href="mailto:mne@mongol.net">mne@mongol.net</a> | To update national chemicals profile developed in 1999 and to conduct capacity assessment, to hold priority setting workshop                                                                                                         |
| Strengthening Governance, Civil Society Participation and Partnerships within an Integrated National Chemicals and Waste Management Programme<br><br>May 2008- November 2009                      | Federal Office for the Environment (FOEN) of the Government of Switzerland / International executing agency: UNITAR | J.Choikhand<br>Ministry of Nature and Environment<br>Government<br>Building-3<br>Baga Toiruu-44<br>Ulaanbaatar-11<br>Mongolia<br>Fax:976-11-321401<br>Tel: 976-11-266197<br>E:mail:<br><a href="mailto:mne@mongol.net">mne@mongol.net</a> | To develop National Programmatic Framework for Sound Chemicals and Waste Management and SAICM implementation and Two Partnership projects.                                                                                           |
| Geoinformation center of natural resources                                                                                                                                                        | Netherlands Government                                                                                              | Mrs.Marantuya                                                                                                                                                                                                                             | To develop legal act to exchange information in field of environment. Database standard development.<br>Satellite station installation<br>Related training and workshops among information developers.<br>Public awarness activities |
| “Strengthening Integrated Water Resources Management in Mongolia” project                                                                                                                         | Netherlands Government                                                                                              | Mr. Bayarsaikhan                                                                                                                                                                                                                          | Development of Master Plan on Water management<br>Attending to the inventory of water resources                                                                                                                                      |
| Biosafety informational                                                                                                                                                                           | GEF/UNEP                                                                                                            | Mrs. Sarangerel                                                                                                                                                                                                                           | Objective of this project is to create database for biosafety issue and implementation of                                                                                                                                            |

|                                                                                                     |                                |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------|--------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| database project                                                                                    |                                |                 | Cartagena Protocol. Expected output is a special website to manage importation and exportation of living modified organism and to raise awareness among public.                                                                                                                                                                                                                                                                                                                                                              |
| Institutional Strengthening for the Implementation of the Montreal Protocol in Mongolia / Phase IV/ |                                |                 | Expected outputs<br>-legislative framework in place:<br>- the system in place to monitor the use of ODS by sector or application<br>- Meeting, training and public awareness activities                                                                                                                                                                                                                                                                                                                                      |
| Best available techniques and best environmental practices (BAT/BEP) for POPs                       | UNIDO/GEF                      |                 | Just beginning:<br>addressing specific features of industry, common practices in the region and related socio-economic considerations.<br>Pollution prevention measures (cleaner production) applied prior to introducing BAT/BEP (Annex C, Part V, A).<br>Unintentional POPs baselines/inventories derived from representative industrial sources and projected at regional scale.<br>Established regional coordination of developing human resources.<br>Adequate capacity in sampling and analysis of unintentional POPs. |
| Environmental Health                                                                                | WHO                            | Mrs.Enkhtsetseg | Expected results<br>1. Support provided to assess, plan, and implement a safe water and sanitation programme in selected soum health facilities.<br>2. Support provided to assess, plan, and implement safe care waste disposal in remote health care facilities.<br>3. Support provided for expansion of healthy cities/workplace/soums.<br>4. Support provided to strengthen occupational diseases and injury surveillance.                                                                                                |
| Food Safety                                                                                         | WHO                            | Mrs.Enkhtsetseg | Expected results<br>1. Support provided to develop a food contaminant and surveillance system.<br>2. Support provided to strengthen the intersectoral committee and team on WHO/FAO Codex Standards.                                                                                                                                                                                                                                                                                                                         |
| Essential Medicines                                                                                 | WHO                            | Mrs.Enkhtsetseg | Expected results<br>1. Support provided to improve access to essential medicines, especially to rural health facilities.<br>2. Support provided to strengthen regulatory and quality assurance system for essential medicines.<br>3. Support provided to improve rational and cost-effective use of essential medicines by providers and consumers.<br>4. Support provided for the development of traditional medicine and practice.                                                                                         |
| Strengthening the Disaster Mitigation and Management System in                                      | UNDP, Government of Luxembourg |                 | Risks and consequences of natural disasters are minimized.<br>Legal/policy environment for disaster                                                                                                                                                                                                                                                                                                                                                                                                                          |

|                      |  |  |                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mongolia - Phase III |  |  | <p>prevention is improved enabling community groups, local governments and the national institutions to coordinate and enhance their systems for disaster preparedness.</p> <p>Public education and awareness of disaster preparedness and mitigation enhanced.</p> <p>Capacity strengthened at national and local levels to prevent, mitigate and cope with emergencies and disasters.</p> |
|----------------------|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 12.3. Comments/analysis

Mongolia has signed nearly all the important international conventions related to the environment and has been actively involved in all intergovernmental negotiations from 1990s. The signature of international agreements were undertaken through the Ministry of Foreign Affairs. Implementation of the commitments and obligations outlined within these UN Conventions is then delegated to the relevant ministries and departments with the appropriate national mandates. According to the Cabinet Resolution, the Minister of Nature and Environment is responsible of management in coordination international convention in field of chemical management. Therefore, international agreements such as Stockholm, Basel, and Vienna Conventions and Montreal Protocol are under coordination of MNE in Mongolia. All day- to- day process involving MEAs is going on International Cooperation Department of MNE, which is actually as division status, has 4 officers and director at all. But all conventions have National Committee except UNFCCC and Montreal Protocol, approved by Minister of Nature and Environment and mostly comprised from MNE delegates, in function of coordination MEAs. Unfortunately, due to political instability and lack of coordination the Committees have not perform their roles as well as planned. This means that the national committee on implementation of most conventions in environmental field can not be truly inter-agency commission, because the members of the National Committees do not have power in their respective areas. Actually, this mechanism is inadequate and it curbs interaction between line ministries and involvement in decision making. But as mentioned above as a result of recent chemical accident Government has appointed inter-ministerial Committee on Chemical management: the “National Chemical Committee”. However, the duties and responsibilities with regard to convention implementation assigned to the Focal Points are additional work overload on the shoulders of a particular person. Therefore, the focal point basically over pressured and lacks time to be doing extra in addition his/her routine work. The liasoning officer for implementation of UN Conventions is based at the International Cooperation Division of MNE, and again, it is simply too much work for one person to handle all over 10 Conventions, to which Mongolia ratified. In terms of other conventions in field of ILO and Health issue are belonged to the coordination of MoH and MIC in Mongolia as filled Table 12B. Those ministries comparatively have sufficient staff to coordinate MEAs and coordinates less than in MNE. At local level situation is more worse, is that, there are no any institutional mechanism involved in MEAs implementation in the local.

With the increase in attention paid to chemical management at the international level, Mongolia has developed strong partnerships with international organizations, in order to

address the challenges posed by chemicals. For example by support of Global Environment Facility/United Nations Industrial Development Organization "Strengthening Stockholm Convention Implementation on POPs" projects had been implemented 2003-2006 and developed National Implementation Plan and approved by Government at session of 03 May 2006. Significance of this project was it is first project in chemical management in Mongolia and introduced awareness about chemical management. NIP is valued by GEF/UNIDO experts and now Mongolia is putting foot on the implementation stage.

The National Implementation Plan on the Persistent Organic Pollutants is planned to be implemented in 2 stages in Mongolia.

STAGE I (2006-2010) legal framework to implement the plan will be improved, quantity, sources, wastes volume and contaminated sites of POPs will be identified precisely, preparatory measures for actions to reduce emissions and decontamination will be taken and a national capacity will be strengthened.

STAGE II (2011-2020) actions to stop usage of POPs containing equipment, eliminate stockpiles, decontaminate polluted sites and reduce emissions will be implemented.

The lead agency to implement the National Implementation Plan is the Ministry for Nature and Environment and it takes responsibilities of administering, coordinating and supervising and will work together with other relevant ministries, agencies, research institutes and non-governmental organizations.

Similarly, Mongolia is increasing its attention on implementation of SAICM, for example through the 2007-09 SAICM Quick Start Programme Trust Fund project SAICM ("Updating a National Chemicals Management Profile, Development of a National SAICM Capacity Assessment, and Holding of a National SAICM Priority Setting Workshop") and the 2008-09 SAICM Pilot Project ("Strengthening Governance, Civil Society Participation and Partnerships within an Integrated National Chemicals and Waste Management Programme"), implemented in cooperation with UNITAR."

However other mentioned projects at Table 12.2 are not directly focused on to the chemical issue but will contribute chemical management.

## CHAPTER 13.

### RESOURCES AVAILABLE AND NEEDED FOR CHEMICALS MANAGEMENT

#### 13.1. Resources Available in Government Ministries/Institutions

Resources for chemical management in Mongolia are distributed to different agencies, mainly in Ministry of Nature and Environment, Ministry of Industry, Ministry of Health, and Ministry of Food and Agriculture, and State Professional Agency, for implementing technical and administrative works. In serving the related issues of import-export control, chemical disaster prevention / mitigation, labor protection, some resources are also available in Ministry of Finance, Ministry of Interior, Ministry of Labor, Ministry of Transport and NEMA.

**Table 13.A. Resource Available in Government Ministries/Institutions**

| Ministry/Agency Concerned | Number of Professional Staff Involved | Type of Expertise Available                                                                                                                                                                                  | Financial Resources Available (per year) |
|---------------------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Environment               | 5                                     | Environmental sciences and Chemical management<br>Environmental Lawyer                                                                                                                                       | n/a                                      |
| Health                    | 8                                     | Environmental health, Sanitation, Health impact assessment, Health promotion<br>Toxicology, Biochemistry, Chemistry, Biology, Industrial hygiene,<br>Environmental health, Epidemiology, Occupational health | n/a                                      |
| Agriculture               | 2                                     | - Chemistry, Sciences                                                                                                                                                                                        | n/a                                      |
| Labour                    | 2                                     | Occupational Safety and Health (OSH), Safety sciences, OSH and environment, Industrial hygiene, Chemistry, Engineering, Occupational medicine, Ergonomics                                                    | n/a                                      |
| Trade/Commerce            | -                                     | Chemistry, Toxicology, Environmental engineering, Chemical engineering, Industrial engineering                                                                                                               | n/a                                      |
| Finance                   | -                                     | -                                                                                                                                                                                                            |                                          |
| Transport                 | -                                     | -                                                                                                                                                                                                            |                                          |
| Interior/Civil Defence    | -                                     | -                                                                                                                                                                                                            |                                          |
| Justice                   | -                                     | Environmental Lawyer                                                                                                                                                                                         | n/a                                      |
| Customs                   | 4                                     | Industrial chemistry, Technical chemistry, Biology, Nutrition                                                                                                                                                | n/a                                      |
| Foreign Affairs           | -                                     | -                                                                                                                                                                                                            |                                          |
| Laboratories              | 8                                     | Technicians<br>Programmer and Engineer                                                                                                                                                                       | n/a                                      |

### 13.2. Resources Needed by Government Institutions to Fulfill Responsibilities related to Chemicals Management

**Table 13.B. Resources Needed by Institutions to Fulfill Responsibilities related to Chemicals Management**

| Ministry/Agency Concerned | Number/Type of Professional Staff Needed                                                                                                                                        | Training Requirements                                                                                                                                                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environment               | Environmental engineers, Chemists, Biologists, Microbiologists, Toxicologists, Programmers, Environmental training staffs, Environmental toxicologists, Environmental chemists, | Risk assessment, Method for handling, transport and treatment of hazardous waste and chemicals, Management of toxic hydrocarbons in petrochemical industry<br>Environmental toxicology, Environmental chemistry, IT for environmental management, |
| Health                    | Chemical risk assessors, Epidemiologists, Scientists for chemicals analysis, Statisticians, Public health economists, Policy analysts                                           | Risk management and assessment for chemicals, Epidemiology, Chemicals analysis and management, Toxicology, Environment Health impact assessment for chemicals application, Policy process, Economic analysis                                      |
| Agriculture               | Chemical risk assessors                                                                                                                                                         | Occupational safety, Ecological risk assessment of pesticide use                                                                                                                                                                                  |

### 13.3. Resources Available in Non-government Institutions for Chemicals and Related Waste Management

However Mongolian Law on NGO is stated that government may take contribution execution from NGO by their own activities in terms of governmental responsibility implementation. As mentioned in the Chapter 6, Mongolia so far hasn't allocated any resource to address governmental responsibilities with respect to the sound life cycle management of chemicals to the NGOs.

**Table 13.C: Resources Available in Non-government Institutions**

| Concerned Institution                    | Specific Responsibilities for which Resources are Allocated | Number of Professional Staff Involved | Type of Expertise Available                                     | Financial Resources Available (per year) |
|------------------------------------------|-------------------------------------------------------------|---------------------------------------|-----------------------------------------------------------------|------------------------------------------|
| Ecology Education Society                | -                                                           | 5                                     | Training in field of ecological education                       | 15000                                    |
| Chemistry and Environment                | -                                                           | 8                                     | Training and public awareness activities in chemical management | 20000                                    |
| Mongolian National Environmental Society |                                                             | 15                                    | Training in the sustainable development                         | 18000                                    |

#### 13.4 Comments/ Diagnosis

The number of staffs and experts present at each institution is basically dependent on the related ministry and budget available. Environmental scientists, physicians, toxicologists, pharmacists, public health officers, nurses, chemists, food scientists, policy analysts and many other related disciplines are required for chemical management. In this regard, specific trainings in the fields of chemical safety, poisoning prevention & treatment, environmental management, toxicology, epidemiology, risk analysis, logistics, conventions & international agreements, socioeconomic & policy analysis and other related topics are needed to enhance the capability and capacity of the existing human resources.

## **CHAPTER 14**

### **OVERALL CONCLUSION AND RECOMMENDATION**

#### **14.1. CONCLUSION**

The development of Chemical Management Profile is second profile after 1999 and has significance with its development under stakeholders' participation and UNITAR comprehensive guidelines. However due to lack of information and database at institutional level it was difficult to develop profile in chemical management, it has achieved successful result by its first integrated profile ever been in Mongolia. Profile development faced with many challenges related in political instability situation in Mongolia and accessing information at government agencies. Project team was selected in January 2008 and contracted in April 2008. First meeting of newly established National Coordinating Team placed in 21st April of 2008 and discussed about first plan of the profile drafted by the project team.

National Coordinating Team wasn't representing various concerned parties within and outside of government with an interest in chemicals management such as members from NEMA, SPIA and Standards and Metrology Center. Therefore newly established Coordinating Team renewed by additional stakeholders from governmental institutions with important role in chemical management. During the profile development important process to elaborate profile had been done by project team such as questionnaire among private enterprises and research institutions and hospitals. Most important research is the comprehensive research on laboratories' capacity had been done by cooperation with National Chemical Council.

The Mongolian Chemicals Management Profile 2008 is an important component of the national information system prepared for exchanging information of all existing structures and implementations relating to chemicals management in Mongolia. The scope of the national profile covers facts and information where possible for the period of 2006 to 2008, presented in 14 chapters according to UNITAR guideline and Supplementary Note to the UNITAR/IOMC National Profile Guidance Document. Its resulted beneficial tangible output and outcome are the synergies for integrated development of the National Master Plan on Chemical Management and capacity building programs, expected shortly following the preparation of the national profile. The Profile made a considerable contribution in taking comprehensive information and defining further priorities in chemical management to the MNE, NEMA, SPIA and other agencies. It is anticipated to provide some insights to decision making processes to guide Mongolia towards sustainable development and to respond in pace with the dynamics of the world economy and international relations.

#### **Background Information about Mongolia**

Mongolia is located in Northeast Asia covering an area of 1,564,000 km<sup>2</sup>. It borders with the Russian Federation and the People's Republic of China, and stretches for 2,392 km from west to east and 1,259 km from north to south. Mongolia is one of the largest land-locked countries in the world. The population of the country was 2635.1 million, with an average population density of about 1.6 persons per km<sup>2</sup>. Mongolia is Parliamentary republic and election of State Great Khural (Parliament) takes place once in every four years and local elections also take place once in every four years. The official language is Mongolian. The traditional religion in Mongolia is Lamaist Buddhism. The Capital city is Ulaanbaatar.

Legally, Mongolia has a type of federal system wherein the power to govern is legally divided by constitution between central and local governments. The local governments are divided into Aimag, Soum and Bag. The capital Ulaanbaatar is similarly divided into Duureg and Khoroо. During the last 3 years period inflation rate has radically declined and macroeconomic stability can be observed as a result of the private sector encouraging Government towards enhancing structural adjustment measures, improving banking, finance, budget, tax, social insurance, price liberalization and social security systems. GDP per capita in 2007 was estimated as 1742.8 thous tugrigns (or about US\$ 1502.4). Mining 27.96% and agriculture 22.84% place in GDP. The major products of the agricultural sector are; meat (beef, mutton and goat), hide and skin (horse, cattle, sheep and goat) and cashmere, sheep wool, milk, wheat, eggs, potato and vegetables (cabbage, carrot, onion, cucumber, tomato etc). For mining and quarrying sector the majors are coal, crude oil, copper concentrate, molybdenum concentrate, gold, fluor spar, iron ore, zincium concentrate, salt mining. For manufacturing sector, major products are; copper, copper foundries, metal steel, metal foundries, cement, lime, installed metal, Khurmen block, combed down, scoured wool, carpet, knitted goods, meat, dairy products. Exports are concentrated in mineral-based commodities, accounting for 57.9% in 2006, 66.8% in 2007 of total exports, while natural or cultured pearls, precious metal and jeweler accounts for 12.1%, and textiles and related articles account for 13.5% in 2007. Mongolia is dependable from its import; particularly about 70% of consumption is based on import that most importing commodities are mineral products including fuel and energy, placed about 27.8% of total commodities, and food products including wheat, flour, potato and fruits are placed about 7.3% of total commodities. Unemployment has remained stable at around 3.2-3.5% for the last five years.

The proportion of population below the national poverty line decreased from 36.3 percent in 1990 to 32.2 percent in 2006. The depth of poverty, which shows average deficiency in consumption of the poor from the national poverty line, also decreased from 11.0 percent in 2002-2003 to 10.1 percent in 2006. The level of poverty is, however, higher in rural areas compared to urban areas. While urban poverty decreased from 30.3 percent in 2002-2003 to 27.9 percent in 2006, rural poverty decreased from 43.4 percent to 37.0 percent during the same period. However due to poverty in rural areas, informal mining and migration to the mining site are increased. Along with the increase of formal employment in the mining sector, informal employment has been growing intensively in recent years. There are about 20000 small miners are belonged in this category. Mostly they are working by all family members involving children in illegal gold mining and illegal use of chemicals with mercury and cyanide.

The climate is harsh continental with sharply defined seasons, high annual and diurnal temperature fluctuations and low rainfall. Because of the high altitude, Mongolia's climate is generally colder than other countries of the same latitude. The extreme minimum temperature is -31.1OC to -52.9OC in January and the extreme maximum temperature is +28.5OC to +42.2OC in July. In addition while migration to the mining site in rural area, the another migration to the UB city is increased. It becomes a major cause of increasing of air pollution at UB city. In UB around 5 million ton of coals are used and approximately 380,000-420,000 ton/year of coal is consumed in the ger district. There are also 230 coal-fueled heating boilers in UB, consuming 1 million ton of coal per year. 3 central power stations are now consuming approximately 3.5 million t/year of coal.

Agriculture is the mainstay of Mongolia's 2.6 million people. It contributes about 22.84 % of gross domestic product almost equal with mining sector. The major products of

the agricultural sector are; meat (beef, mutton and goat), hide and skin (horse, cattle, sheep and goat) and cashmere, sheep wool, milk, wheat, eggs, potato and vegetables (cabbage, carrot, onion, cucumber, tomato etc). Due to that feature in Mongolia, tanneries are important enterprises of the industry in Mongolia. There has been increased number of tanneries that discharge yellowish untreated wastewater directly to the central wastewater treatment plant, causing serious ground water contamination.

### **Chemical Production, Import, Export and Use**

According to data from MNE, Ozone National Authority and Ministry of Food and Agriculture, Statistical Office totally 240873.24 ton of chemicals were imported in 2006-2007 and most of that about 200903.8 ton of chemicals were imported for industrial use. Mongolia is not as large producer but main importer of chemicals in industrial use. There are number of illegal import of chemicals had been inspected and there is not possible to identify how many of that were imported in hidden way.

The basic act of law for regulating relations of waste in Mongolia is the Law on Household and Industrial Wastes, which was ratified in 2003. In addition, Government resolution on Some Measures for Improving Waste Management (No 256 of 2001), Government resolution on Classification, Collection, Packing, Temporary Storage, Decontamination, Storage and Disposal (No 135 of 2002), Ministers' Order on Guidance on classification, collection, storage, transportation and disposal of medical wastes (No 249/201 of 2002), and Ministers' order on Methodological guidance on environmentally friendly collection, transportation and landfilling of chemical wastes were approved (No 126/171 of 2003).

There is no any specific provisions and articles on how to dispose of, and decontaminate wastes containing POPs chemicals, and how to reduce emission of POPs chemicals produced during the process of waste recycling and disposal.

Within this context, amendments and changes to the law regulations is necessary and need to carry out more activities and take measures for awareness raising among organizations and companies that produce POPs containing wastes and for the workers who handle these type of wastes. Mongolia doesn't have any appropriate facilities or equipments to treat or dispose of hazardous waste. Also does not have disposal sites and methods/technologies for eliminating POPs containing wastes, which consequently contributes to environmental pollution, by way of open dumping, re-using etc.

According to the preliminary inventory conducted in 2005 in framework of project in Stockholm Convention, the following sources were identified for the emissions and production of POPs containing wastes in Mongolia, including:

- PCBs containing equipment and obsolete oil
- sludge from treatment facilities
- residues of ashes from waste dumping areas
- ashes of medical wastes
- waste metal processors
- power and thermal plants, individual boilers and household stove ashes
- filter dusts from power and thermal plants

- filter dusts and ashes from minerals industries

Wastes from the aforementioned sources are dumped in open areas as they are not considered as a hazardous waste and they pollute soil, water and air through wind and water. Improving the waste management would have a significant impetus for reducing the environmental pollution, caused by POPs.

With regard to stockpiles, Mongolia does not have stockpiles of the chemicals. However, by inventory in 2007 obsolete chemicals were found and registered at all aimags, the all are stored in the special preserve, which is land filled and located within the territory of the particular organization. For POPs it is same and by inventory there are 17, 76 tones of waste oil, temporarily stored in the special preserve are registered and stored in the particular organization.

However it is difficult to define total contaminated area due to chemicals, State of Environment in 2007 prepared by MNE, has described that totally 120 illegal site in the 36 soums of 11 aimags are operating in gold extraction field and 203508.8 m<sup>3</sup> of tailings were contaminated by mercury and 53.5 hec of area under risk of giving contamination to the human and biodiversity.

After all that facts in Mongolia, there is no appropriate monitoring system in chemical management, particularly in chemical transportation, storage and disposal. In addition comprehensive research and analyse of chemical lifecycle management is needed. Data collecting mechanism is very difficult and not under integrated management.

### **Priority Concerns Related to Chemicals at All Stages in Their Life Cycle**

Problems related to chemical production, import, export and use were identified and prioritized for the environmental and health areas.

High priorities of concern are air pollution from ger district, power plant and vehicles, occupational health problems from industries such as mining (use of mercury and hazardous waste treatment such as cyanide), chemical residues in food - pesticides, chemicals and veterinary drugs; and storage/disposal of obsolete chemicals - POPs, forest fire, illegal import of chemicals - mercury and cyanide and unknown chemical import.

Problems of medium rank include air pollution from petroleum stations; hazardous waste treatment and disposal; occupational health occurring in industrial and SMEs' activities; drinking water contamination; adverse reactions of health and consumer products; and import of unknown chemicals.

Other problems in the chemicals issues are air pollution and occupational health problems in healthcare and service workplace; soil and water (inland waterways, coastal areas and ground water) contamination of insecticides, herbicides and heavy metals; and public health problems - residues of banned chemicals in traditional medicines and chemicals poisoning / suicides.

The problems are addressed by the responsible agencies and relevant regulatory bodies, namely the MoH, MFA, MNE, MLSF, and MIC. In essence, an effective management scheme at the national level requires a strong coordinating effort and deserves to be seriously considered as a high priority since chemical management has become an issue affecting trade and economic expansion as well as social security.

### **Legal Instruments and Non-Regulatory Mechanisms for Managing Chemicals**

Since 1994 in area of environmental management, a lot of laws have been adopted. In Mongolia most of violation in field of chemical management address to the i) illegal import of chemicals from China, ii) illegal use of chemicals, particularly in mining sector, iii) illegal trade of chemicals in open-market.

All in all, there are a total of 32 laws relating to environmental management in Mongolia and some 150 associated regulatory documents (in excess of 40 in the case of forests, 20 for water etc.). Dealing with the chemical management, there are 19 laws in the chemicals management in effective.

In addition there are 30 programmes and plans have been formulated in Mongolia and some of them already finished and some of them are developed recently, such as National Implementation Plan on POPs. Moreover there are number of important sectoral policies and plans such as; National Development Concept, Road Master Plan, Power Sector Master Plan, Renewable Energy Master Plan, Food Security Programme, Health Master Plan, Environmental Health Programme, Healthy-Mongolia Programme, Ecological Education programme and most recently “3d Uncultivated Land Campaign” Programme etc. “Father” policy documents already developed such as Government Action Program (2004-2008), the Millennium Development Goals (1990-2015), and the annual Socio-Economic Guidelines and MDG-Based National Development Strategy (NDS) of Mongolia.

The body law in chemical management is Mongolian Law on Toxic and Hazardous Chemicals adopted in 2006. Chemical categorization is classified as toxic and hazardous according to the law. Toxic means chemicals and substances which influence human health, environment, livestock and wild animals and pose a risk of death or extermination, hazardous means chemicals and substances which have reaction of explosives, flammable, corrosive, oxidant and irritant. According to the law MNE is responsible of approving regulation on production, exportation, importation, selling and transportation /through border/ of toxic and hazardous chemicals, and approving of regulation on storage, transportation, usage and disposal of toxic and hazardous chemicals, and approving of list on pesticides, fertilizers, household and sanitary insecticides and renew its available volume to use in each year by cooperation with MoH, MFA, MIC. Moreover Law on Household and Industry Waste /2003/, Law on transportation and import of hazardous substances /2000/ Law on Sanitary /1998/, Law on Control on Narcotic and Psychotropic substances etc are regulating relationship in chemical management and following important legislative acts also in effective in Mongolia. For example the ordination on:

- The Ordination on permission in producing, importing, trading and using of hazardous chemicals
- Regulation on storing, transporting and disposing of toxic and hazardous chemicals
- Approval of classification on toxic chemicals, amendments into classification of extremely toxic chemicals
- Borders to pass toxic and hazardous chemicals

- List of banned and severely restricted chemicals to use in Mongolia
- List of permissible pesticides for agricultural and plant protection need in 2008
- To ban mercury usage in mining activities
- Resolution on classification, collecting, packaging, handling, transportation, securing and disposal of hazardous waste
- Regulation on involving to passport system of hazardous waste
- Instruction on collecting, store, transportation and disposal of waste from health organisation
- Procedure on controlling of production, utilization and importation of chemicals

Along with above mentioned laws, several important laws such as Law on State Audit and Inspection, and Law on Special License and Law on Local Administrative Units and Its Administration of Mongolia, which address chemicals management. All these laws are very important and play as main regulation at the enforcement level.

In Mongolia exceeds of responsibility have been given to the State Professional Inspection Agency according to current law. This system more capacity and resources requires from SPIA. Currently over 700 inspectors in SPIA are executing monitoring of chemical management. However we can increase number of inspectors, it will not give alone any contribution to the law enforcement effectiveness. Moreover the amounts of fines and penalties have not increased in parallel with inflation rates and don't act as a deterrent. Particularly in mining sector fine and penalties at any violation are in range of 250000-500000 tug are not reasonable, comparing to the profit from business activities. According to Law on Toxic and Hazardous Chemicals, average fines described to the citizen about 30000-60000 tug /25-52USD/ and to business entity 150000-250000 tug /150-215USD/. At the local level due to lack of financial capacity, local inspectors and authorities can't catch-up the violation.

Non-compliance measure in Mongolia is not sufficient to prevent from violation in chemical issue and very weak and sometimes ineffective. Ministerial Order to promote by incentive for information about illegal chemical usage and storage issued by Minister of Nature and Environment gave considerable contribution to reveal illegal import and usage of chemicals. Most recently, from Municipality has issued Decree to ban usage of plastic sacks and bags in Ulaanbaatar city. But lack of incentive mechanism, this regulation is not so good enforced.

A lot of National Standards developed in the environment field such as Water standard /MNS 4586-1998/, Waste water standard /MNS 4943-2000/, Air quality standard /MNS 4585-2007/. Totally, 140 standards in environmental field have been effective in Mongolia and 2/3 of standards have been developed before 1989. Most of them defined general requirements and method of measure.

In general Mongolia hasn't got under lack of legal regulation but main challenge is harmonization between laws and legal acts. In addition law enforcement is big cause of any illegal activities at any sector. There are also some overlaps and gaps in the laws regulating chemical management in Mongolia. According to the Law on Licence, Governors of Aimag and City shall responsible of issuing license in importing and producing of toxic and less toxic chemicals. This regulation is overlapped with Law on Toxic and Hazardous Chemicals adopted in 2006.

## **Ministries, Agencies and Other Institutions Managing Chemicals**

Information provided in the national profile give the overview of ministerial responsibilities in managing chemicals considered vital for Mongolia, namely pesticides, industrial chemicals and consumer products, in different phases of their life cycles. The National Disaster Prevention Authority, State Professional Inspection Agency, General Customs Authority, Standards and Metrology Center are played main role in chemical management with its responsibilities along with ministries.

Because chemicals are widely used for different purposes, the many ministries conduct their mandate using their own systems and protocols which often become an obstacle for effective chemical management, due to unavailability of necessary information and data, or incomplete set of data if available.

Several attempts have been made to set up a national harmonized system in managing chemical safety through operational research. The challenging success relies heavily on the partnership between involved government agencies, academic, industries and other stakeholder groups and coordinating leadership. Ministry of Food and Agriculture is primarily responsible for the consumption of a given amount of pesticides in the country in order to be able to produce an agreed amount of agricultural products in a year, while Ministry of Health keeps an eye on household pesticides. However, this gap is fulfilled when both of ministries work together and exchange relevant information. In other hand, existing system is requiring leadership role from Ministry of Nature and Environment and close cooperation between Ministry of Health and Ministry of Food and Agriculture.

Effective chemical management depends on financial allocation to implement strategy and plan. Since the Government policy is focused more on looking on day to day social well-beings of citizens and lacks long term visioned approach it allocates more budget to short term actions and very little to future oriented actions, such as environmental issues.

## **Relevant Activities of Industry, Public Interest Groups and the Research Sector**

There are universities and research institutions offering courses in various disciplines related to chemistry science ranging from fundamental chemistry, analytical chemistry, food chemistry, environmental chemistry, eco-toxicology, and so on. A number of research institutions conduct researches on chemical safety and environmental protection. Unfortunately, relationship between policy makers and research institutions is not sufficient and there is no any mechanism to support by involvement into development of policy document from research institutions.

Recent 2 years the number of citizen's movement, coalition and association have been increased and amongst it citizen's environmental participation raised year by year. Most of the policy documents and acts, developed after 1996, always stressed about public involvement into policy development process. But lack of compliance mechanism and gaps in knowledge about activities and resources, that acts have remained as just promulgation. In 2007 totally 6197 NGO have been registered in Ministry of Justice and Internal Affairs. 6.5% of them in ecology and environment field, 4.1% of in the health sector and 13.4 % is in economic, agriculture and business field. Currently over 400 NGOs are working in the

environmental field. But involvement into environmental laws, strategy and policy document development is very insufficient.

### **Inter-ministerial Commissions and Coordinating Mechanisms**

In Mongolia 13 ministries have authority under laws and regulations addressing diverse chemical groups as well as different stages in their life cycle. In addition there are 8 inter-ministerial commissions that undertake work related to chemicals issues such as National Council in charge of Policy Regulation of Toxic and Hazardous Chemicals (so called as “National Council”), National Committee on Drug, National Committee on Public Health, National Committee on Food security, National Committee on 3d Campaign of Cropping, National Committee of Implementation of the Stockholom Convention, National Ozone Committee, Committee on Impementation of Basel Convention. Each inter-ministerial commissions established for development of respective strategic plan and programme for short or long term and organize its implementation. Therefore they comprised from different level of representitives. The National Council has been established in 2006 and chaired by Minister of Nature and Environment, and composed of high-level representatives from 19 concerned governmental agencies and ministries, 3 science and research institutions, 1 NGO. But the Council is needed to be evolved in terms of their structure and scope of participation as seen from members.

In Mongolia’s situation strategic priorities for the future national chemical management need to be identified by integrated and multi-sectoral approach. Besides, a shared sense of responsibility and accountability for chemical safety should be taken root not only in public sector---political, managerial, technical levels, but also in business sector. There is needed to be put more consideration in public involvement into development of chemical strategy.

### **Data Access and Use**

According to the Constitution, everyone has the right to access government information in Mongolia. But in terms of accessing information at government agencies is very difficult. This relation is regulated by “Mongolian Law on Procedure to Receive and Solve of Compliance and Request from Citizen”. Some times the bureaucracy of government administration became one of the challenges to access any information. However citizens like to have information at respective website of government agencies, the usage of website at government agencies is insufficient and almost impossible to have updated data and report. Mongolia has lack of integrated database on the chemical management and necessary reports and data have been dispersed among ministries and agencies. Moreover, there is no any data location of scientific and research institutions.

Not only chemicals data but also environmental and health databases are probably not widely used. Data is produced by various authorities and at different levels of detail and in some cases it is difficult to access data and information internal side in the government. Moreover every agency that works in relation to chemical management has their own literature or databases, and do not share the information with others.

International literature and databases on chemicals safety management are not available to the ordinary person and government body, due to lack of integrated library

acquisition in the government. Therefore in Mongolia integrated database and information in chemical management is big challenge and in some way it impacts to the government bureaucracy and corruption, as people always complain about it.

### **Technical Infrastructure**

Along with rapid development of industrial and foreign trade sector, requirements to have accurate knowledge about minerals and ability to control on importation and production are priorities in Mongolia. There are a lot of harm to the environment and human health and genetic fund due to toxic and hazardous chemicals such as mercury, cyanide, lead, cadmium, ODS, dioxins/furans etc. Therefore chemicals laboratories with advanced technology and equipment and experts, well developed standards, methodologies are needed to analyze and control situation. Currently there are 73 accredited laboratories in analyzing and controlling on all kind of importing goods such as food products, drinking water, minerals, petroleum products, building materials and animal originated products, as well as water and air, are working in Mongolia. 56 of these are state owned, 17 are private and 32 of total laboratories are working at rural area under respective local administration and directions.

In state level there are 12 laboratories are working such as Central Laboratory of Geology, Central Laboratory of Veterinary and Sanitary, Central Laboratory of Customs, National Center of Natural Infectious Disease. These laboratories have comparatively well equipment and substances for its capacity, but laboratories at rural area have insufficient capacity. All mentioned laboratories are certified by National Center of Standardization and Measurements. Central Laboratory of Geology is only one laboratory providing international standard ISO 9000, 9001 and get international accreditation by Germany Accreditation Organisation in 2005, ability to be accepted to 43 countries of its analyses. Laboratory of State Professional Inspection Agency also was given certificate valid at international level due to accepted by FAPAS for analysing salmonella. Moreover a number of laboratories such as Laboratory of SPIA and Laboratory of Biotechnology Institute of Science and Technology University of Mongolia have been attended to the Capability Challenge Programme from APLAS TO21 and valued in alcohol and seafood analyses. Popular challenges faced in terms of laboratory capabilities are:

- All of the laboratories are using outdated equipment and tools which are produced in Russia during 1970-1980 and most of it hand working.
- Lack of chemical analysing substances due to financial capacity.
- Lack of standard solution to compare result of analyse
- Lack of professionals, able to work or use advanced equipments and tools
- Lack of engineer and programmer to make basic repair and adjustment on the software of the equipment
- Loss of independent status due to lack of financial investment

All laboratories have sufficient human capacity with over 500 experts, researcher, doctors, and scientific professionals. But human capacity challenge more addressed to the technicians, electronic engineer and programmer to adjust and make repairs in maintenance of tools and equipment. Therefore regular training among technicians and engineers is needed foremost. Experts at inspectional organisations have insufficient involvement into exchange programme in developed countries and need to focus to the human capacity strengthening working at inspectional organisations.

## **Chemical Emergency Preparedness, Response, and Follow-up**

The Mongolian country affected very often on small or large scale due to features of continental climate, environmental degradation, ecological unbalance and inappropriate human activities and it is happened with particular frequency. The Mongolian territory affected by drought, extreme winter, snow & dust storms, floods, earthquakes, forest and steppe fires, desertification, lighting & other hazards, insects, Brandt's vole disease, infectious human and animal diseases, industrial accidents, spills of chemicals & radioactive substances and traffic accidents, which has tendency to increase in the last years.

The Mongolian Government recognized the importance of situation and during last years considered to high priority the disaster protection issues and started to implement the particular response measures. The new "Law on Protection from Disaster" established a new disaster protection system in Mongolia, managed to determine responsibilities on emergency management field, clarified professional terminology to be used and created understanding about disaster & emergency, opened for public information on disaster mitigation activities in Mongolia, determined authority, outlined framework of activities for National Agency and clarified role & responsibilities for governmental & provincial organizations, business entities and citizens. After the formulation and adoption of the law a number of policy documents were developed such as Draft National Framework of Actions, Draft National Action Plan and Disaster Preparedness and Risk Mitigation National Program on Public Awareness and Advocacy. All these policy documents waiting for its approval and further update. In addition informal mining relation is waiting for legal regulation.

At local level the Governors of aimag and capital city and NEMA administration together with branch departments should have knowledge at any situation and to have awareness in case of any chemical emergency, as well as to have ability to conduct prompt actions. On the other hand, there is still a huge gap in capacity of local communities to cope with the chemical emergency. The main reason is because the full-time emergency management personal that can support soum governors to develop a technically feasible chemical accident protection plan and to implement National policies is not available. Moreover chemical emergency plan still hasn't developed or harmonised into other emergency policy. The emergency medical supply for the people and animals is very limited. Local units don't have sufficient financial budget to buy and to store required medicines for emergency cases. The medical shops and veterinary pharmacies are all private and therefore, our citizens have a very small storage of medicines barely enough to treat some very simple cases of occasional headaches and fevers.

In field of chemical emergency management training is needed for not only citizen and private enterprises and also NEMA officers and other governmental and professional bodies.

Actions to ensure the disaster preparedness and readiness at all level, and to strengthen the present capacity are still need to be taken. Particularly chemical emergency preparedness and response issue is still at insufficient attention to the national emergency policy. In order to implement decontamination operation today more efficient the equipment and facilities to detect explosives, radioactive substances and analyse chemicals

are required. Poison's Research Center need to be established, not Poison Information Center and technical capacity at medical emergency service need to be strengthened.

### **Awareness/Understanding of workers and the public**

Enhancement of workers' and public awareness and knowledge is an essential element for the success of national chemical safety management since it will enable them to safeguard their health and the environment from avoidable chemical hazards. At present, all stakeholders including government, academic, and business sectors, as well as NGOs, are involved in educating workers and public about chemical risks and the proper management, through different approaches. The purpose of the Law on Labour is to determine the general rights and duties of employers and employees who are parties to a labour relationship based on a contract of employment, collective agreement. An employer shall inform the labor monitoring organization, and other relevant professional organizations, of the employer's use of chemical, poisonous, explosive, radioactive, or biologically active substances in production and shall comply with applicable regulations established by authorized organizations. Further this law states about non-compliance "... if it is determined that the activities of a business entity or organization are having an adverse impact on the health or safety of employees, inspector in charge of labor, may terminate the employer's business activities or suspension of such activities until the conditions have been remedied or may terminate such business activities permanently". Owners have to provide information to the workers about the chemicals and raw materials used in the factory, their harmful effect to human and environment and the environmental quality at workplace but these regulations not so good implemented as seen from recent accidents in Mongolia. Laws are not protecting independent workers who are not contracted such as small miners, shoe makers, car washers etc. In addition there are no any sufficient information database about chemicals which able to use by owners, workers and ordinary people.

In Mongolia chemical education is gathered through secondary and higher educational level. Amongst curricula for the secondary school, chemistry science is one of the subject for 8-11<sup>th</sup> grade and general understandings of inorganic and organic disciplines and analytical chemistry are studied during 3 years. Undergraduate and graduate level the Bachelor of Science (B.S.) degree and Master's degree with M. S. (thesis option) and M. A. (non-thesis option) in chemistry and chemical technology are gained at Mongolian National University /MNU/ and Mongolian University of Science and Technology /MUST/. However general knowledge about chemistry has been studied from secondary education and have specific educational programme for graduate and undergraduate level in the chemistry and environmental science, education and training for sound management of chemicals and waste is still insufficient to the public. Of course lack of quality of education and relationship among universities, enterprises and government should be mentioned in this situation. In addition financial allocation for public awareness raising programme is insufficient. For example as looking at budget in MNE for 2007, there is no any public awareness activity allocation in chemicals management budgeted.

### **International Linkage**

Mongolia is a member of numerous international programs / agreements (Agenda21, FAO Code of Conduct, Montreal Protocol, Basel Convention, Stockholm Convention, Vienna Convention and GATT / WTO agreements, ILO Convention 155 ). It has good linkages with

international organizations such as IFCS, IPCS, UNEP, WHO, FAO, UNIDO, ILO, WTO, ADB and UNITAR. The focal point for each of the international cooperation is usually located at the institution considered to be the prime responsible agency. Also Mongolia is participating in international/regional SAICM meetings, and has a National SAICM Focal Point and in the QSP Pilot Project and QSPTF Project.

Through the international linkages, several projects have been funded and given technical assistance in the areas of chemical safety, risk reduction, environment quality monitoring system, and environmental health impact assessment. Assistance has been provided by various organizations, such as GEF, UNIDO, UNITAR, Netherlands Government, Government of Luxemburg and WHO. Mongolia has long committed to work for global chemical safety, since the establishment of IFCS in 1994.

Since 2006, Mongolia has participated in the in the QSP Pilot Project (Donor: Federal Office for the Environment (FOEN) of the Government of Switzerland / International executing agency: UNITAR) and QSPTF Project. In framework of this cooperation Mongolia could be have National Updated Chemicals Profile and Capacity Assessment for the chemicals management and Integrated National Chemicals and Waste Management Programme. Outcomes of the projects have great significances for Mongolia in terms of improving chemicals and waste management, which have still overlooked in the national priorities and strategies.

### **Resources Available and Needed for Chemical Management**

Resources for chemical management in Mongolia are distributed to different agencies, mainly in Ministry of Nature and Environment, Ministry of Industry, Ministry of Health, and Ministry of Food and Agriculture, and State Professional Agency, for implementing technical and administrative works. In serving the related issues of import-export control, chemical disaster prevention / mitigation, labor protection, some resources are also available in Ministry of Finance, Ministry of Interior, Ministry of Labor, Ministry of Transport and NEMA.

Environmental scientists, physicians, toxicologists, pharmacists, public health officers, nurses, chemists, food scientists, policy analysts and many other related disciplines are required for chemical management. In this regard, specific trainings in the fields of chemical safety, poisoning prevention & treatment, environmental management, toxicology, epidemiology, risk analysis, logistics, conventions & international agreements, socioeconomic & policy analysis and other related topics are needed to enhance the capability and capacity of the existing human resources.

## 14.2. RECOMMENDATIONS

After all of analysis and survey on chemical management situation in Mongolia, we have reached following conclusions:

1. Legal environment , standards and norms have a lot of gaps and overlaps as well as have weak non-regulatory mechanisms.
2. The strategies and plans in different sectors are contradicted each other and developed without public involvement, therefore, enforcement is not so good.
3. Public awareness programme is too insufficient. There is need to be allocated from state treasury in raising public awareness in chemical management.
4. There is no any integrated database easy to use for public and government agencies. All information and data are kept in hand in different authority in different agencies and difficult to have international literature.
5. Lack of capacity of technical infrastructure, difficult to obtain operative and right analyses on chemicals.

The following recommendations are made to improve chemical management in Mongolia. They are expressed in 8 key areas which can provide focus for future concentration of attention and resources.

- Develop public awareness programme to support sound management of chemical and waste
- Develop chemical accident management and emergency response strategy and carry out inventory on technical and material resource and describe capacity needs
- Health and environmental risk assessment management plan should be developed
- Hazardous waste management programme or strategy should be developed and harmonized national waste management plan.
- Build effective national infrastructure to implement international conventions and agreement in chemical management.
- Socio-economic and policy analysis pertaining to chemical management by strong involvement of public
- Plan to improve chemical management in specific area such as informal mining sector
- Create integrated database on chemical management and waste management

## ANNEX 1

### Project team.

#### List of Contributors to the development of Chemicals Management Profile 2008

##### National Coordinating Team:

|                       |                                                            |
|-----------------------|------------------------------------------------------------|
| Dr.T.Gantulga         | State Secretary of MNE                                     |
| PhD. J.Choikhand      | Director of International Cooperation Department of MNE    |
| L.Jargalsaikhan (Phd) | Secretary of National Chemical Council                     |
| Mr. Sh.Dagva          | Officer in charge of chemical issue in MNE                 |
| Mrs. Erdenebayasgalan | Officer in charge of waste issue in MNE                    |
| Mrs.Tsetsegsaikhan    | Officer in charge of environmental health in MoH           |
| Mrs.Enkhjargal        | University of Medical Science                              |
| Mr. Mendjargal        | Officer of MFA                                             |
| Mr.Burneebaatar       | Chemist in Ministry of Defence                             |
| Mr. Buyantogtokh      | Officer in charge of chemical issue in NEMA                |
| Mrs. D.Amarjargal     | Officer of Ministry of Industry                            |
| Mr.D.Batbaatar        | Officer of Transport Service Agency                        |
| Mrs.Otgon             | Environmental inspector of SPIA                            |
| Mr.Delgerbayar        | Environmental officer in Municipality                      |
| Mrs.Gandulam          | Officer in Ministry of Construction and Urban Construction |
| Mrs. GanErdene        | Chistry and environment NGO                                |
| Mr. Ragchaa           | Tanneries Association NGO                                  |

##### Project working team

|                       |                                                         |
|-----------------------|---------------------------------------------------------|
| J.Choikhand           | Director of International Cooperation Department of MNE |
| L.Jargalsaikhan (Phd) | National Chemical Council                               |
| D.Purevsuren (Phd),   | Bio-Chemist                                             |
| B.Munkhzul            | Lawyer                                                  |
| B.Munkhchimeg         | B.A in chemical science                                 |

Annex 2

Unofficial translation

**APPROVAL OF CLASSIFICATION OF TOXIC CHEMICALS, AMENDMENTS  
INTO CLASSIFICATION OF EXTREMELY TOXIC CHEMICALS**

22 March 2002

# 63/89

Pursuant to the Article 3 of “Law on Protection from Toxic Chemicals” to be ordered:

1. List of chemicals in category of toxic characteristics shall be approved by Annex 1, list of chemicals in category of impacts to the human and animal body shall be approved by Annex 2.
2. Chemicals under control of Rotterdam and Stockholm Conventions shall be at Annex 3, 4 and that chemicals shall be belonged into category of extremely toxic category in Annex 1.

MINISTER OF NATURE AND ENVIRONMENT  
U.BARSBOLD

MINISTER OF HEALTH  
P.NYAMDAAVAA

Chemicals under control of Stockholm and Rotterdam Convention

| ä/ä | International name                                                                                                             | GHS code | CAS no    |
|-----|--------------------------------------------------------------------------------------------------------------------------------|----------|-----------|
| 1   | 2                                                                                                                              | 3        | 4         |
| 1.  | 2,4,5-O                                                                                                                        |          | 93-76-5   |
| 2   | Aldrin                                                                                                                         |          | 309-00-2  |
| 3   | Captafol                                                                                                                       |          | 2425-06-1 |
| 4   | Chlordane                                                                                                                      |          | 57-74-9   |
| 5   | Chlordimeform                                                                                                                  |          | 6164-98-3 |
| 6   | Chlorobenzilate                                                                                                                |          | 510-15-6  |
| 7   | DDT                                                                                                                            |          | 50-29-3   |
| 8   | Dieldrin                                                                                                                       |          | 60-57-1   |
| 9   | Dinoseb and dinoseb salts                                                                                                      |          | 88-85-7   |
| 10  | 1,2-dibromoethane (EDB)                                                                                                        |          | 106-63-4  |
| 11  | Fluoroacetamide                                                                                                                |          | 640-19-7  |
| 12  | I NI (mixed isomers)                                                                                                           |          | 608-73-1  |
| 13  | Heptachlor                                                                                                                     |          | 76-44-8   |
| 14  | Hexachlorobenzene                                                                                                              |          | 118-74-1  |
| 15  | Lindane                                                                                                                        |          | 58-89-9   |
| 16  | Mercury compounds, including inorganic mercury compounds, alkyl mercury compounds and alkyloxyalkyl and aryl mercury compounds |          |           |

|    |                                                                                                                                                                                                    |  |                                                                              |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------|
| 17 | Pentachlorophenol                                                                                                                                                                                  |  | 87-86-5                                                                      |
| 18 | Monocrotophos (Soluble liquid formulations of the substance that exceed 600 g active ingredient/l)                                                                                                 |  | 6923-22-4                                                                    |
| 19 | Methamidophos (Soluble liquid formulations of the substance that exceed 600 g active ingrediend/l)                                                                                                 |  | 10265-92-6                                                                   |
| 20 | Phosphamidon (Soluble liquid formulations of the substancethat exceed 1000 g active ingredient/l)                                                                                                  |  | 13171-21-6<br>(mixture,<br>(E)@(Z)<br>isomers)<br>23783-98-4<br>((Z)-isomer) |
| 21 | Methyl-parathion (emulsifiable concentrates (EC) with 19.5%, 40%, 50%, 60% active ingredient and dusts containing 1.5 %, 2% and v 3% activeingredient)                                             |  | 298-00-0                                                                     |
|    |                                                                                                                                                                                                    |  |                                                                              |
| 22 | Parathion (all formulations- aerosols, dustable powder (DP), emulsifiable concentrate (ES), granuls(GR) and wettable powders (WP)-of this substance are included, except capsule suspensions (CS)) |  | 56-38-2                                                                      |
| 23 | Crocidolite                                                                                                                                                                                        |  | 12001-28-4                                                                   |

|    |                                    |  |                                                                   |
|----|------------------------------------|--|-------------------------------------------------------------------|
| 24 | Polybrominated biphenyls (PBB)     |  | 36355-01-8<br>(hexa-) 27858-07-7 (octa-)<br>13654-09-6<br>(deca-) |
| 25 | Polychlorinated biphenyls (PCB)    |  | 11336-39-3                                                        |
| 26 | Polychlorinated terphenyls (PCT)   |  | 61788-33-8                                                        |
| 27 | Tris (2,3-dibromopropyl) phosphate |  | 126-72-7                                                          |

| no | International name                                  | GHS code | CAS no    |
|----|-----------------------------------------------------|----------|-----------|
| 1  | 2                                                   | 3        | 4         |
| 1  | Aldrin                                              |          | 309-00-2  |
| 2  | Chlordane                                           |          | 57-74-9   |
| 3  | Dieldrin                                            |          | 60-57-1   |
| 4  | Endrin                                              |          | 72-20-8   |
| 5  | Heptachlor                                          |          | 76-44-8   |
| 6  | Hexachlorobenzene                                   |          | 118-74-1  |
| 7  | Mirex                                               |          | 2385-85-5 |
| 8  | Toxaphene                                           |          | 8001-35-2 |
| 9  | Polychlorinated Biphenyls (PCBs)                    |          |           |
| 10 | DDT (1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane) |          | 50-29-3   |
| 11 | Polychlorinated dibenzo-p-dioxins(PCDD)             |          |           |
| 12 | Polychlorinated dibenzofurans(PCDF)                 |          |           |

**List of chemical in category of toxic**

| no | International name and formula                             | GHS code   | /CAS/           |
|----|------------------------------------------------------------|------------|-----------------|
| 1  | <b>Extremely, Very, Powerful high explosive)</b>           | 3          | 4               |
| 1  | Butadiyne/V/ , N4I 6                                       | 2711.14.00 | 181, 460-12-8   |
| 2  | Dibenzoyl peroxide/E/, (N6I 5NI )2I 2                      | 2916.32.00 | 387, 94-36-0    |
| 3  | Diboron tetrafluoride/E/, B2F4H2                           | 2811.19.00 | 393, 13965-73-6 |
| 4  | 1,6-Dichloro-2,4-hexadiyne , C6H4Cl2                       |            | 424, 16260-59-6 |
| 5  | Dicrotonoyl peroxide , (CH3CH:CHCO)2O2                     | 2909.60.00 | 438, 93506-63-9 |
| 6  | Diethyl azoformate , (NCOOC2H5)2                           |            | 451, 1972-28-7  |
| 7  | Difluoramine , NHF2                                        |            | 469, 10405-27-3 |
| 8  | Difluorodiazene, N2C4H2F2                                  |            | 470, 10578-16-2 |
| 9  | Hexahydro-1,3,5-trinitro-1,3,5-triazine/P/, (NO?)3(CH?)3N3 | 2933.69.00 | 665, 121-82-4   |

|    |                                                                                                                                  |            |                  |
|----|----------------------------------------------------------------------------------------------------------------------------------|------------|------------------|
|    |                                                                                                                                  |            |                  |
| 10 | Hyponitrous acid , H <sub>2</sub> N <sub>2</sub> O <sub>2</sub>                                                                  | 2808.00.00 | 708, 14448-38-5  |
| 11 | Pentafluoroguanidine/E/, FN:C(NF <sub>2</sub> ) <sub>2</sub>                                                                     |            | 969, 10051-06-6  |
| 12 | Silver amide (dry), AgNH <sub>2</sub>                                                                                            | 2851.00.00 | 1112, 65235-79-2 |
|    | B. Explosive                                                                                                                     |            |                  |
| 1  | Acetylenebis (triethyltin) (C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> Sn-C:C-Sn (C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> |            | 13, 994-99-0     |
| 2  | Allyl benzenesulfonate, C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> CH=CHSO <sub>3</sub>                                       |            | 25, 7575-57-7    |
| 3  | Allyl ethyl ether, C <sub>3</sub> H <sub>5</sub> OC <sub>2</sub> H <sub>5</sub>                                                  |            | 28, 557-31-3     |
| 4  | Ammonium chlorate, NH <sub>4</sub> ClO <sub>3</sub>                                                                              | 2829.19.00 | 64, 10192-29-7   |
| 5  | Ammonium dichromate, (NH <sub>4</sub> ) <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>                                              | 2841.50.00 | 67, 7789-09-5    |
| 6  | Ammonium peroxodisulfate, (NH <sub>4</sub> ) <sub>2</sub> S <sub>2</sub> O <sub>8</sub>                                          |            | 72, 7727-54-0    |
| 7  | Ammonium picrate, C <sub>6</sub> H <sub>2</sub> (NO <sub>2</sub> ) <sub>3</sub> ONH <sub>4</sub>                                 |            | 73, 131-74-8     |
| 8  | Azoisobutyronitrile, (NC <sub>3</sub> H <sub>6</sub> CN) <sub>2</sub>                                                            |            | 100, 78-67-1     |
| 9  | Azo-N-nitroformamidine, CH(NO <sub>2</sub> ) <sub>3</sub>                                                                        |            | 101, 53144-61-2  |
| 10 | Benzoyl nitrate, C <sub>6</sub> H <sub>5</sub> CONO <sub>2</sub>                                                                 |            | 118, 6786-32-9   |

|    |                                                                                                      |            |                  |
|----|------------------------------------------------------------------------------------------------------|------------|------------------|
| 11 | Benzvaline, C <sub>6</sub> H <sub>5</sub> (CH <sub>3</sub> ) <sub>2</sub> CHCH(NH <sub>2</sub> )COOH |            | 119, 659-85-8    |
| 12 | Benzyloxyacetylene, C <sub>6</sub> H <sub>5</sub> COOC <sub>2</sub> H <sub>5</sub>                   |            | 130, 40089-12-1  |
| 13 | Bis(trichloroacetyl) peroxide, (Cl <sub>3</sub> COO) <sub>2</sub>                                    |            | 148, 2629-78-9   |
| 14 | Bis(trifluoroacetyl) peroxide, (F <sub>3</sub> CCOO) <sub>2</sub>                                    |            | 149, 383-73-3    |
| 15 | Bromoacetone oxime, C <sub>3</sub> H <sub>6</sub> BrNO                                               |            | 164, 62116-25-0  |
| 16 | Bromoacetylene, C <sub>2</sub> HBr                                                                   | 2903.30.00 | 165, 593-61-3    |
| 17 | Bromoaziridine, C <sub>2</sub> H <sub>4</sub> NBr                                                    |            | 166, 19816-89-8  |
| 18 | Bromoethylfuran, C <sub>4</sub> H <sub>3</sub> BrO <sub>2</sub> C <sub>2</sub> H <sub>5</sub>        |            | 171, 4437-18-7   |
| 19 | Butane-2,3-dione monoxime, C <sub>19</sub> H <sub>20</sub> N <sub>2</sub> O <sub>2</sub>             |            | 183, 57-71-6     |
| 20 | But-1-en-3-yne, C <sub>4</sub> H <sub>4</sub>                                                        | 2901.24.00 | 189, 689-97-4    |
| 21 | Butoxyacetylene, C <sub>4</sub> H <sub>9</sub> OC <sub>2</sub> H <sub>5</sub>                        |            | 190, 3329-56-4   |
| 22 | Butyl peracetate, CH <sub>3</sub> COOO C <sub>4</sub> H <sub>9</sub>                                 |            | 207, 107-71-1    |
| 23 | Butynedinitrile, C <sub>4</sub> N <sub>2</sub>                                                       |            | 211, 1071-98-3   |
| 24 | Butynethiol, C <sub>4</sub> H <sub>6</sub> S                                                         |            | 213, 101672-05-3 |
| 25 | Chlorine dioxide, ClO <sub>2</sub>                                                                   |            | 273, 10049-04-4  |
| 26 | N-Chloroacetamide, ClCH <sub>2</sub> CONH <sub>2</sub>                                               |            | 280, 598-49-2    |
| 27 | 3-Chlorocyclopentene, C <sub>5</sub> H <sub>7</sub> Cl                                               |            | 294, 96-40-2     |

|    |                                                                                                                                |  |                                |
|----|--------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------|
| 28 | 3-Chloro-2-hydroxypropyl perchlorate,<br>C <sub>3</sub> H <sub>5</sub> ClO <sub>5</sub>                                        |  | 306, 101672-07-5               |
| 29 | N-Chlorotetramethylguanidine, C <sub>4</sub> H <sub>10</sub> N <sub>2</sub> Cl                                                 |  | 326, 6926-39-2                 |
| 30 | Chloryl hypofluorite, CaF <sub>2</sub> ClO                                                                                     |  | 329                            |
| 31 | Chromyl perchlorate, CrO(ClO <sub>4</sub> ) <sub>2</sub>                                                                       |  | 101672-08-6<br>337, 62597-99-3 |
| 32 | Diallyl sulfate, (C <sub>3</sub> H <sub>5</sub> ) <sub>2</sub> SO <sub>4</sub>                                                 |  | 375, 27063-40-7                |
| 33 | Diazocyclopentadiene, C <sub>5</sub> H <sub>7</sub> N <sub>2</sub>                                                             |  | 382, 1192-27-4                 |
| 34 | Dibenzyl ether, C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> OCH <sub>2</sub> C <sub>6</sub> H <sub>5</sub>                   |  | 389, 103-50-4                  |
| 35 | Diboron tetrachloride, B <sub>2</sub> Cl <sub>4</sub> H <sub>2</sub>                                                           |  | 392, 13701-67-2                |
| 36 | Dibromobenzoquinone chloroimide,<br>C <sub>6</sub> H <sub>2</sub> Br <sub>2</sub> ClN <sub>2</sub> O <sub>2</sub>              |  | 395, 537-45-1                  |
| 37 | Di- <i>t</i> -butylnitrophenol, (C <sub>4</sub> H <sub>9</sub> ) <sub>2</sub> NO <sub>2</sub> C <sub>6</sub> H <sub>2</sub> OH |  | 404, 728-40-5                  |
| 38 | Dichlorine oxide, Cl <sub>2</sub> O                                                                                            |  | 407, 7791-21-1                 |
| 39 | Dichlorine trioxide, Cl <sub>2</sub> O <sub>3</sub>                                                                            |  | 408, 17496-59-2                |
| 40 | N,N-Dichloromethylamine, CH <sub>3</sub> NC <sub>2</sub>                                                                       |  | 426, 7651-91-4                 |
| 41 | Diethyl peroxide, (C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> O <sub>2</sub>                                                 |  | 462, 628-37-5                  |
| 42 | Di-2-furoyl peroxide, C <sub>5</sub> H <sub>3</sub> O <sub>2</sub> C <sub>5</sub> H <sub>3</sub> O <sub>2</sub>                |  | 472, 25639-45-6                |
| 43 | Dihexanoyl peroxide, N <sub>2</sub> C <sub>12</sub> H <sub>24</sub> O <sub>2</sub>                                             |  | 473, 2400-59-1                 |

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| 44 | Di-iodoacetylene, C <sub>2</sub> I <sub>2</sub>                                                         | 2903.49.00 | 474, 624-74-8    |
| 45 | Di-iodoamine, NHI <sub>2</sub>                                                                          |            | 475, 15587-44-7  |
| 46 | Dimethylzinc, (CH <sub>3</sub> ) <sub>2</sub> Zn                                                        |            | 526, 544-97-8    |
| 47 | Dinaphthoyl peroxide, C <sub>10</sub> H <sub>7</sub> COO <sub>2</sub> C <sub>10</sub> H <sub>7</sub> CO |            | 527, 29903-04-6  |
| 48 | Dipropionyl peroxide, C <sub>2</sub> H <sub>5</sub> COO <sub>2</sub> C <sub>2</sub> H <sub>5</sub> CO   |            | 559, 3248-28-0   |
| 50 | Disulfur heptaoxide, S <sub>2</sub> O <sub>7</sub>                                                      |            | 565, 12065-85-9  |
| 51 | Ethoxyacetylene, C <sub>2</sub> H <sub>5</sub> OC <sub>2</sub> H                                        |            | 579, 927-80-0    |
| 52 | Ethoxypropane, C <sub>2</sub> H <sub>5</sub> OC <sub>3</sub> H <sub>7</sub>                             |            | 581, 628-33-1    |
| 53 | 2-Ethylfuran, C <sub>6</sub> H <sub>8</sub> O                                                           |            | 618, 18649-64-4  |
| 54 | Ethyl vinyl selenide, C <sub>2</sub> H <sub>5</sub> Se C <sub>2</sub> H <sub>3</sub>                    |            | 619, 101672-11-1 |
| 55 | Hexamethyldiplatinum, (CH <sub>3</sub> ) <sub>6</sub> Pt <sub>2</sub>                                   |            | 667, 4711-74-4   |
| 56 | Hydrazinium chlorate, N <sub>2</sub> H <sub>3</sub> ClO <sub>3</sub>                                    |            | 677, 66326-46-3  |
| 57 | Hydrazinium nitrate, N <sub>2</sub> H <sub>3</sub> NO <sub>3</sub>                                      |            | 679, 13464-97-6  |
| 58 | Methyl perchlorate, CH <sub>3</sub> ClO <sub>4</sub>                                                    |            | 863, 17043-56-0  |
| 59 | 3-Nitrobenzoyl nitrate, C <sub>7</sub> H <sub>4</sub> N <sub>2</sub> O <sub>6</sub>                     |            | 905, 101672-19-9 |
| 60 | Nitromethane, CH <sub>3</sub> NO <sub>2</sub>                                                           | 2904.20.00 | 913, 75-52-5     |
| 61 | Perchloric acid />50%/, HClO <sub>4</sub>                                                               | 2811.19.00 | 978, 7601-90-3   |

|    |                                                                                                                           |            |                   |
|----|---------------------------------------------------------------------------------------------------------------------------|------------|-------------------|
| 62 | 1 -Perchlorylpiperidine, C <sub>5</sub> H <sub>10</sub> NCIO <sub>4</sub>                                                 |            | 981, 768-34-3     |
| 63 | Phenylsilver, C <sub>6</sub> H <sub>5</sub> Ag                                                                            |            | 1009, 5274-48-6   |
| 64 | 5-Phenyltetrazole, C <sub>6</sub> H <sub>6</sub> N <sub>4</sub>                                                           |            | 1010, 3999-10-8   |
| 65 | Phosphonium perchlorate, PH <sub>4</sub> CIO <sub>4</sub>                                                                 |            | 1014, 101672-21-3 |
| 66 | Phosphorus tricyanida, P(CN) <sub>3</sub>                                                                                 |            | 1027, 1116-01-4   |
| 67 | Potassium bromate, KBrO <sub>3</sub>                                                                                      | 2829.90.00 | 1043, 7758-01-2   |
| 68 | Potassium chlorate, KClO <sub>3</sub>                                                                                     | 2829.19.00 | 1044, 3811-04-9   |
| 69 | 3-Propyldiaziridine, C <sub>3</sub> H <sub>7</sub> N <sub>2</sub> CH <sub>3</sub>                                         |            | 1074, 7348-66-2   |
| 70 | Propylene glycol monomethyl ether, CH <sub>3</sub> CH:CH <sub>2</sub> OHCH <sub>2</sub> CH <sub>2</sub> OHCH <sub>3</sub> |            | 1076, 107-98-2    |
| 71 | Pyridinium nitrate, C <sub>5</sub> H <sub>4</sub> N <sub>2</sub> O <sub>3</sub>                                           |            | 1086, 543-53-3    |
| 72 | Silver chlorate, AgClO <sub>3</sub>                                                                                       | 2829.19.00 | 1113, 7783-92-8   |
| 73 | Silver chlorite, AgClO <sub>2</sub>                                                                                       | 2828.90.00 | 1114, 7783-91-7   |
| 74 | Sodium benzenhexoxide, C <sub>6</sub> H <sub>5</sub> O <sub>6</sub> Na                                                    |            | 1126,             |
| 75 | Sulfur hexafluoride, SF <sub>6</sub>                                                                                      | 2812.90.00 | 1169, 2551-62-4   |
| 76 | Tetramethylammonium chlorite, (CH <sub>3</sub> ) <sub>4</sub> NCIO?                                                       |            | 1197, 67922-18-3  |
| 77 | Tributylbismuth, (C <sub>4</sub> H <sub>9</sub> ) <sub>3</sub> Bi                                                         |            | 1231, 3692-81-7   |
| 78 | Triethylphosphine, (C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> P                                                        |            | 1265,             |

|    |                                                                                             |            |                   |
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|    |                                                                                             |            | 554-70-1          |
| 79 | Triethynylantimony, (CH <sub>2</sub> :CH) <sub>3</sub> Sb                                   |            | 1267, 687-81-0    |
| 80 | Triethynylarsine, (CH <sub>2</sub> :CH) <sub>3</sub> As                                     |            | 1268, 687-78-5    |
| 81 | 1,3,5-Triethynylbenzene, (CH <sub>2</sub> :CH) <sub>3</sub> C <sub>6</sub> H <sub>5</sub>   | 2902.20.00 | 1269, 17814-74-3  |
| 82 | Triethynylphosphine, (CH <sub>2</sub> :CH) <sub>3</sub> P                                   |            | 1270, 687-80-9    |
| 83 | Vanadyl triperchlorate, VO(ClO <sub>4</sub> ) <sub>3</sub>                                  |            | 1315, 67632-69-3  |
| 84 | Vinyl acetate ozonide /dry/ CH <sub>3</sub> COOC <sub>2</sub> H <sub>2</sub> O <sub>3</sub> |            | 1318, 101672-23-5 |

|   |                                                                     |            |                 |
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|   | <b>B. Extremely, very powerful oxidant</b>                          |            |                 |
| 1 | Chlorosulphonic acid, SO <sub>2</sub> Cl(OH)                        |            | 325 7790-94-5   |
| 2 | Chloryl perchlorate, Cl <sub>2</sub> O <sub>6</sub>                 |            | 330, 12442-63-6 |
| 3 | Chromium trioxide, CrO <sub>3</sub>                                 | 2819.10.00 | 333, 1333-82-0  |
| 4 | Chromyl nitrate, CrO <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub>   |            | 336, 16017-38-2 |
| 5 | Dioxygen difluoride, O <sub>2</sub> F <sub>2</sub>                  |            | 546, 7782-44-0  |
| 6 | Peroxodisulfuric acid, H <sub>2</sub> S <sub>2</sub> O <sub>8</sub> | 2811.29.00 | 984, 13445-49-3 |
| 7 | Trifluoroperoxyacetic acid/E/, CF <sub>3</sub> COOOH                |            | 1273, 359-48-8  |

|    | Oxidant                                                                                                                                               |            |                 |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------------|
| 1  | Benzyltriethylammonium permanganate,<br>C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> (C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> NMnO <sub>4</sub> |            | 131, 68844-25-7 |
| 2  | Tribenzylamine, (C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> ) <sub>3</sub> N                                                                       |            | 1229, 5888-61-9 |
|    | Extremely, Highly flammable                                                                                                                           |            |                 |
| 1. | Acetaldehyde/Extremely/, CH <sub>3</sub> CHO                                                                                                          |            | 2, 75-07-0      |
| 2  | Acetone /Highly/, C <sub>3</sub> H <sub>6</sub> O                                                                                                     | 2914.11.00 | 7, 67-64-1      |
| 3  | Acetonitrile/H/, CH <sub>3</sub> CN                                                                                                                   | 2926.90.00 | 8, 75-05-8      |
| 4  | Acetyl chloride/H/, CH <sub>3</sub> COCl                                                                                                              | 9903.26.00 | 11, 75-36-5     |
| 5  | Acetylene/E/, C <sub>2</sub> H <sub>2</sub>                                                                                                           |            | 12, 74-86-2     |
| 6  | Acrolein/H/, CH <sub>2</sub> :CHCHO                                                                                                                   | 2912.19.00 | 18, 107-02-8    |
| 7  | Acrylonitrile/H/, CH <sub>2</sub> :CHCN                                                                                                               | 2926.10.00 | 21, 107-13-1    |
| 8  | Allyl alcohol/H/, C <sub>3</sub> H <sub>5</sub> OH                                                                                                    | 2905.29.00 | 23, 107-18-6    |
| 9  | Allylamine/H/, C <sub>3</sub> H <sub>5</sub> NH <sub>2</sub>                                                                                          |            | 24, 107-11-9    |
| 10 | Allyl chloride/H/, C <sub>3</sub> H <sub>5</sub> Cl                                                                                                   |            | 27, 107-05-1    |
| 11 | Aluminium isopropoxide/H/, (C <sub>3</sub> H <sub>7</sub> O) <sub>3</sub> Al                                                                          |            | 42, 555-31-7    |
| 12 | 2-Aminopropane/E/, CH <sub>3</sub> CH(NH <sub>2</sub> )CH <sub>3</sub>                                                                                |            | 55, 75-31-0     |

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|----|-----------------------------------------------------------------------------|------------|-------------------|
| 13 | Aziridine/H/, C <sub>2</sub> H <sub>5</sub> N                               |            | 98, 151-56-4      |
| 14 | Eenzene/H/, C <sub>6</sub> H <sub>6</sub>                                   | 2902.20.00 | 107, 71-43-2      |
| 15 | 1-Bromopropane/H/, N3I 7Aä                                                  |            | 174, 106-94-5     |
| 16 | Buta-1,3-diene/E/, C <sub>4</sub> H <sub>6</sub>                            | 2901.24.00 | 179, 106-99-0     |
| 17 | Butane/E/, C <sub>4</sub> H <sub>10</sub>                                   | 2901.10.00 | 182, 106-97-8.    |
| 18 | Butan-2—one/H/, C <sub>4</sub> H <sub>8</sub> O                             |            | 186, 78-93-3      |
| 19 | Butene/E/, C <sub>4</sub> H <sub>8</sub>                                    | 2901.23.00 | 188, 106-98-9     |
| 20 | s- and t-Butyl acetate/H/, CH <sub>3</sub> COOC <sub>4</sub> H <sub>9</sub> |            | 192,193, 105-46-4 |
| 21 | Butylamines/H/, C <sub>4</sub> H <sub>9</sub> NH <sub>2</sub>               |            | 195, 78-81-9      |
| 22 | Butyraldehyde/H/, N3I 7Ni I                                                 |            | 214,              |
| 23 | Carbon disulfide/E/, CS <sub>2</sub>                                        | 2813.10.00 | 256, 75-15-0      |
| 24 | Carbon monoxide /E/, CO                                                     | 2811.29.00 | 257, 630-08-0     |
| 25 | Cellulose nitrate/H/,                                                       |            | 263, 9004-70-0    |
| 26 | 2-Chlorobuta-1,3-diene/E/, C <sub>4</sub> H <sub>6</sub> Cl                 |            | 291,              |
| 27 | Ci-iloromethane/E/, CH <sub>3</sub> Cl                                      | 2903.11.00 | 307, 74-87-3      |
| 28 | Chloromethyl methyl ether/H/, Cl CH <sub>2</sub> OCH <sub>3</sub>           |            | 309, 107-30-2     |
| 29 | Chloropropanes/H/, C <sup>^</sup> H <sub>7</sub> Cl                         |            | 319,              |

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|    |                                     |            | 75-29-6       |
| 30 | Crotonaldehyde /I È NI 3NI :NI NI Î |            | 347, 123-73-9 |
| 31 | Cyanogen/H/, CN; RCN                |            | 351, 460-19-5 |
| 32 | Cyclohexane /Î /, N6Î 12            | 2902.11.00 | 355, 110-82-7 |
| 33 | Cyclopentane/H/, N5Î 10             | 2909.90.00 | 364, 287-92-3 |
| 34 | Cyclopropane/E/, N3Î 6              | 2902.90.00 | 367, 75-19-4  |
| 35 | Di-t-butyl peroxide/H/, (N4Î Y)2Î 2 |            | 405, 110-05-4 |
| 36 | 1,1-Dichloroethane/E/, C2H4Cl2      | 2903.15.00 | 418, 75-34-3  |
| 37 | 1,2-Dichloroethane/H/, C2H4Cl2      |            | 419, 107-06-2 |
| 38 | 1,1-Dichloroethylene/E/, C2H2Cl2    |            | 421, 75-35-4  |
| 39 | 1,2-Dichloroethylene/H/ ClCH:CHCl   |            | 422, 540-59-0 |
| 40 | 1,2-Dichloropropane/H/, C3H6Cl2     |            | 432, 78-87-5  |
| 41 | 1,1-DiethoxyethaneM, (C2H5O)2C2H4   |            | 445, 105-57-7 |
| 42 | Diethylamine/H/, (C2H5)2NH          |            | 446, 109-89-7 |
| 43 | Diethyl ether/E/, (NâÎ 5)2Î         |            | 457, 60-29-7  |
| 44 | Di-isopropylamine/H/, (i-C3H7)2NH   |            | 482, 108-18-9 |
| 45 | Di-isopropyl ether/H/, (i-C3H7)2O   |            | 483, 108-20-3 |

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| 46 | Dimethylamine and solutions/E/, (CH <sub>3</sub> ) <sub>2</sub> NH                      |            | 492, 124-40-3 |
| 47 | Dimethyl carbonate/H/, (CH <sub>3</sub> ) <sub>2</sub> CO <sub>3</sub>                  |            | 504, 616-38-6 |
| 48 | Dimethyldichlorosilane/H/, (CH <sub>3</sub> ) <sub>2</sub> SiCl <sub>2</sub>            |            | 505, 75-78-5  |
| 49 | Dimethyl ether/E/, (CH <sub>3</sub> ) <sub>2</sub> O                                    |            | 506, 115-10-6 |
| 50 | 1,1-Dimethylhydrazine/H/, (CH <sub>3</sub> ) <sub>2</sub> N <sub>2</sub> H <sub>2</sub> |            | 510, 57-14-7  |
| 51 | 2,2-Dimethylpropane/E/, (CH <sub>3</sub> ) <sub>2</sub> C <sub>3</sub> H <sub>6</sub>   |            | 521, 463-82-1 |
| 52 | 1,4-Dioxane/H/, C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>                            |            | 544, 123-91-1 |
| 53 | Dioxolane/H/, C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>                              |            | 545, 646-06-0 |
| 54 | Ethane/E/, C <sub>2</sub> H <sub>6</sub>                                                | 2901.10.00 | 574, 74-84-0  |
| 55 | Ethanethiol/H/, C <sub>2</sub> H <sub>5</sub> SH                                        |            | 576, 75-08-1  |
| 56 | Ethyl acetate/H/, CH <sub>3</sub> COOC <sub>2</sub> H <sub>5</sub>                      |            | 582, 141-78-6 |
| 57 | Ethyl acrylate/H/, CH <sub>2</sub> :CHCOOC <sub>2</sub> H <sub>5</sub>                  |            | 584, 140-88-5 |
| 58 | Ethylamine and solutions/E/, C <sub>2</sub> H <sub>5</sub> NH <sub>2</sub>              |            | 585, 75-04-7  |
| 59 | Ethylbenzene/H/, C <sub>2</sub> H <sub>5</sub> C <sub>6</sub> H <sub>5</sub>            |            | 587, 100-41-4 |
| 60 | Ethyl chloroformate/H/, C <sub>2</sub> H <sub>5</sub> COOCI                             |            | 591, 541-41-3 |
| 61 | Ethylene/E/, CH <sub>2</sub> :CH <sub>2</sub>                                           | 2903.31.00 | 593, 74-85-1  |
| 62 | Ethylene oxide/E/, C <sub>2</sub> H <sub>2</sub> O                                      |            | 600, 75-21-8  |

|    |                                                  |            |                |
|----|--------------------------------------------------|------------|----------------|
| 63 | Ethyl formate/H/, <chem>HOCC2H5</chem>           |            | 602, 109-94-4  |
| 64 | Ethyl methacrylate/H/, <chem>CC(=C)C(OC)C</chem> |            | 609, 97-63-2   |
| 65 | Heptane/H/, <chem>C7H16</chem>                   | 2901.10.00 | 653, 142-82-5  |
| 66 | Hexane/H/, <chem>C6H14</chem>                    | 2901.10.00 | 670, 110-54-3  |
| 67 | Hexan-2-one/H/, <chem>CCCCC(=O)C</chem>          |            | 672, 591-78-6  |
| 68 | Hydrogen/E/, $H_2$                               | 2804.10.00 | 685, 1333-74-0 |
| 69 | Hydrogen cyanide/E/, <chem>HCN</chem>            | 2811.19.00 | 690, 74-90-8   |
| 70 | Hydrogen sulfide/E/, <chem>H2S</chem>            | 2811.19.00 | 694, 7783-06-4 |
| 71 | Isocyanatomethane/E/, <chem>CH3OCN</chem>        |            | 752, 624-83-9  |
| 72 | Isoprene/E/, <chem>CH2=C(CH3)CH=CH2</chem>       |            | 757, 78-79-5   |
| 73 | Isopropyl acetate/H/, <chem>(CH3)2CHCOO C</chem> |            | 758, 108-21-4  |
| 74 | Magnesium/H/, Mg                                 | 81.04      | 793, 7439-95-4 |
| 75 | Methacrylonitrile/H/, <chem>CH2=C(CH3)CN</chem>  |            | 814,           |
| 76 | Methane/E/, <chem>CH4</chem>                     | 2901.10.00 | 815, 74-82-8   |
| 77 | Methanol/H/, <chem>CO</chem>                     | 2905.11.00 | 818, 67-56-1   |
| 78 | Methyl acetate/H/, <chem>CH3COOCH3</chem>        | 2915.39.00 | 823, 79-20-9   |

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| 79 | Methyl acrylate/H/, $\text{CH}_2\text{:CHCOOCH}_3$                        | 2916.12.00 | 824, 96-33-3    |
| 80 | Methylamine/E/, $\text{CH}_3\text{NH}_2$                                  | 2921.14.00 | 825, 74-89-5    |
| 81 | 2-Methylaziridine/H/, $\text{CH}_3\text{NC}_2\text{H}_4$                  | 2933.90.00 | 829, 75-55-8    |
| 82 | Methylcyclohexane/H/, $\text{CH}_3 \text{C}_6\text{H}_{11}$               | 2914.22.00 | 835, 108-87-2   |
| 83 | Methyl methacrylate/H/, $\text{CH}_3\text{CH}(\text{CH}_3)\text{COOCH}_3$ | 2916.14.00 | 851, 80-62-6    |
| 84 | Methyl vinyl ether/E/, $\text{CH}_3\text{OCH}_2\text{:CH}_2$              | 2909.19.00 | 876, 107-25-5   |
| 85 | Nickel tetracarbonyl /H/, $\text{Ni(CO)}_4$                               | 2931.00.00 | 890,            |
| 86 | Octane/H/, $\text{C}_8\text{H}_{18}$                                      | 2901.10.00 | 942,            |
| 87 | Paraldehyde/H/, $\text{C}_6\text{H}_{12}\text{O}_3$                       | 2912.50.00 | 960, 123-63-7   |
| 88 | Pentane/H/, $\text{C}_5\text{H}_{12}$                                     | 2901.10.00 | 970, 109-66-0   |
| 89 | Pentan-3-one/H/, $\text{C}_5\text{H}_{10}\text{O}$                        | 2905.15.00 | 973,            |
| 90 | Phosphorus, red/H/, P                                                     | 2804.70.00 | 1016, 7723-14-0 |
| 91 | Phosphorus pentasulfide/H/, $\text{P}_2\text{S}_5$                        | 2813.90.00 | 1022, 1314-80-3 |
| 92 | Phosphorus sesquisulfide/H/, $\text{P}_4\text{S}_6$                       | 2813.90.00 | 1023, 1314-85-7 |
| 93 | Piperidine/H/, $\text{C}_4\text{H}_9\text{N}$                             | 2933.32.00 | 1037, 110-89-4  |
| 94 | Propane /E/, $\text{C}_3\text{H}_8$                                       | 2901.10.00 | 1059, 74-98-6   |
| 95 | Propan-1-ol/H/, $\text{C}_3\text{H}_7\text{OH}$                           | 2905.12.00 | 1061,           |

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|       |                                                                                      |            | 71-23-8        |
| 96    | Propan-2-ol/H/, C <sub>3</sub> H <sub>7</sub> OH                                     | 2905.12.00 | 1062, 67-63-0  |
| 97    | Propene/E/, C <sub>3</sub> H <sub>6</sub>                                            | 2901.22.00 | 1063,          |
| 98    | Propionaldehyde/H/, C <sub>2</sub> H <sub>5</sub> COCHO                              | 2912.12.00 | 1067, 123-38-6 |
| 99    | Propionyl chloride/H/, C <sub>2</sub> H <sub>5</sub> COCl                            | 2915.90.00 | 1070, 79-03-8  |
| 100   | Propyl acetate/H/, N3I 7 NI I NI 3                                                   | 2915.39.00 | 1071, 109-60-4 |
| 101   | Propylene oxide/E/, N3I 6I                                                           | 2910.20.00 | 1077, 75-56-9  |
| 102 - | Pyridine/H/, C <sub>5</sub> H <sub>5</sub> N                                         | 2933.31.00 | 1084, 110-86-1 |
| 103   | Tetrahydrofuran/H/, C <sub>4</sub> H <sub>8</sub> O                                  | 2932.11.00 | 1193, 109-99-9 |
| 104   | Toluene/H/, N6I 5NI 3                                                                | 2902.30.00 | 1222, 108-88-3 |
| 105   | Triethylamine/H/, (C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> N                    | 2921.19.00 | 1256,          |
| 106   | Trimethylamine and solutions/E/, (CH <sub>3</sub> ) <sub>3</sub> N                   | 2921.11.00 | 1280, 75-50-3  |
| 107   | 2,4,4-Trimethylpentene (CH <sub>3</sub> ) <sub>3</sub> C <sub>5</sub> H <sub>7</sub> | 2901.29.00 | 1288, 107-39-1 |
| 108   | Vinyl acetate/H/, CH <sub>3</sub> COOC <sub>2</sub> H <sub>3</sub>                   | 2915.32.00 | 1317,          |
| 109   | Vinyl bromide/E/, C <sub>2</sub> H <sub>3</sub> Br                                   | 2903.30.00 | 1319, 593-60-2 |
| 110   | Vinyl chloride/E/, C <sub>2</sub> H <sub>3</sub> Cl                                  | 2903.21.00 | 1320, 75-01-4  |

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|    | <b>Flammable, ignitable</b>                                                             |            |                 |
| 1  | Acetic acid/Flammable/, $\text{CH}_3\text{COOH}$                                        | 2915.21.00 | 5, 64-19-7      |
| 2  | Acetic anhydride/F/, $\text{C}_4\text{H}_6\text{O}_3$                                   | 2915.24.00 | 6, 108-24-7     |
| 3  | Acrylic acid/F/, $\text{CH}_2\text{:CHCOOH}$                                            | 2926.10.00 | 20, 79-10-7     |
| 4  | Allyl iodide/F/, $\text{CH}_2\text{:CHCH}_2\text{I}$                                    | 2903.30.00 | 30, 556-56-9    |
| 5  | Ammonia/F/, $\text{NH}_3$                                                               | 2814.10.00 | 60, 7664-41-71  |
| 6  | Amyl alcohol/F/, $\text{C}_5\text{H}_{11}\text{OH}$                                     | 2905.15.00 | 76,             |
| 7  | Bis(2-chloroethyl) ether/F/, $\text{ClCH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{Cl}$ | 2909.19.00 | 136, 111-44-4   |
| 8  | Bis(chloromethyl) ether/F/, $\text{ClCH}_2\text{OCH}_2\text{Cl}$                        | 2909.19.00 | 137, 542-88-1   |
| 9  | Bromobenzene/F/, $\text{C}_6\text{H}_5\text{Br}$                                        | 2903.69.00 | 167, 106-86-1   |
| 10 | Butan-1-ol/F/, $\text{C}_4\text{H}_9\text{OH}$                                          | 2905.13.00 | 184, 71-36-3    |
| 11 | Butan-2-ol/F/, $\text{C}_4\text{H}_9\text{OH}$                                          | 2905.14.00 | 185, 78-92-2    |
| 12 | Butyl acetate/F/, $\text{CH}_3\text{COOC}_4\text{H}_9$                                  | 2915.33.00 | 191, 123-86-4   |
| 13 | Butyl chloroformate/F/, $\text{ClCOOC}_4\text{H}_9$                                     | 2915.90.00 | 197, 592-34-7   |
| 14 | Butyl diazoacetate/ignitable/, $\text{C}_4\text{H}_9\text{COOCHN}_2$                    | 2915.39.00 | 198, 35059-50-8 |
| 15 | Butyldichloroborane/I/, $\text{C}_4\text{H}_9\text{BHCl}_2$                             |            | 199,            |

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| 16 | Butylethyl ketone/F/, $C_4H_9COC_2H_5$     | 2914.12.00 | 201, 106-35-4   |
| 17 | Butyronitrile/F/, $C_3H_7CON$              | 2926.90.00 | 218, 109-74-0   |
| 18 | Caesium and compounds/I/, Cs               | 2805.19.00 | 230, 7440-46-2  |
| 19 | Chlorobenzene/F/, $C_6H_5Cl$               | 2903.61.00 | 289, 108-90-7   |
| 20 | 1 -Chloro-2,3-epoxypropane/F/, $C_3H_6Ocl$ | 2910.30.00 | 298, 106-89-8   |
| 21 | 3-Chloropropiolonitrile/I/, $C_2HCOCIN$    |            | 320, 2003-31-8  |
| 22 | Cumene/F/, $C_9H_{12}$                     | 2902.70.00 | 348, 98-82-8    |
| 23 | Cyclohexanone/F/, $C_6H_{10}O$             | 2914.22.00 | 358, 108-94-1   |
| 24 | Cyclohexylamine/F/, $C_6H_{13}N$           | 2921.30.00 | 361, 108-91-8   |
| 25 | Cyclopentanone/F/, $C_5H_8O$               | 2914.29.00 | 365, 120-92-3   |
| 26 | 1,2-Dia minoethane/F/, $C_2H_7N_2$         | 2921.21.00 | 376, 107-15-3   |
| 27 | Diborane/I/, $B_2H_6$                      | 2850.00.00 | 391, 19287-45-7 |
| 28 | Dibromoacetylene/I/, $Br_2C_2$             | 2903.30.00 | 394, 624-61-3   |
| 29 | Dibutyl ether/F/, $(C_4H_9)_2O$            | 2909.19.00 | 402, 142-96-1   |
| 30 | Diethylberyllium/I/ $(C_2H_5)_2Be$         | 2909.49.00 | 452, 542-63-2   |
| 31 | Di-isobutyl ketone/F/, $(i-C_4H_9)_2CO$    | 2914.19.00 | 476,            |
| 32 | Diketene/F/, $C_4H_4O_9$                   | 2932.29.00 | 485,            |

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|    |                                                                                                                                            |            | 674-82-8          |
| 33 | 1,2-Dimethoxethane/F/, C <sub>4</sub> H <sub>10</sub> O <sub>2</sub>                                                                       | 2909.19.00 | 488, 110-71-4     |
| 34 | Dimethoxymethane/F/, C <sub>3</sub> H <sub>8</sub> O <sub>2</sub>                                                                          | 2911.00.00 | 489, 109-87-5     |
| 35 | 2-Dimethylaminoethanol/F/, (CH <sub>3</sub> ) <sub>2</sub> NC <sub>2</sub> H <sub>4</sub> OH                                               | 2922.19.00 | 493, 108-01-0     |
| 36 | Dimethylantimony chloride/I/, (CH <sub>3</sub> ) <sub>2</sub> SbCl                                                                         | 2931.00.00 | 496, 18380-68-2   |
| 37 | Dimethylberyllium/I/, (CH <sub>3</sub> ) <sub>2</sub> Be                                                                                   | 2931.00.00 | 499, 506-63-8     |
| 38 | Dimethylphosphine/I/, (CH <sub>3</sub> ) <sub>2</sub> PH                                                                                   | 2931.00.00 | 519, 676-59-5     |
| 39 | Dimethylzinc/I/, (CH <sub>3</sub> ) <sub>2</sub> Zi                                                                                        | 2931.00.00 | 526, 544-97-8     |
| 40 | Dipentene/F/, C <sub>10</sub> H <sub>16</sub>                                                                                              | 2902.19.00 | 547, 138-86-3     |
| 41 | Diphenylmagnesium/I/, (C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> Mg                                                                     | 2931.00.00 | 552, 555-54-4     |
| 42 | Diphenyltin/I/, (C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> Sn                                                                           | 2931.00.00 | 555 6381-06-2     |
| 43 | Diphosphane/I/,                                                                                                                            |            | 557<br>13445-50-6 |
| 44 | Ethylene glycol monoethyl ether/F/, C <sub>4</sub> H <sub>6</sub> O <sub>2</sub> OC <sub>2</sub> H <sub>5</sub>                            | 2909.41.00 | 598, 110-80-5     |
| 45 | Ethylene glycol monoethyl ether acetate/F/, C <sub>4</sub> H <sub>5</sub> O <sub>2</sub> OC <sub>2</sub> H <sub>5</sub> COOCH <sub>3</sub> | 2915.39.00 | 599, 111-15-9     |
| 46 | Ethyl lactate/F/, CH <sub>3</sub> CHOHCOOC <sub>2</sub> H <sub>5</sub>                                                                     | 2918.11.00 | 608, 97-64-3      |
| 47 | Ethylphosphine/I/, C <sub>2</sub> H <sub>5</sub> PH <sub>2</sub>                                                                           |            | 615, 593-68-0     |
| 48 | Hydrazine/F/, N <sub>2</sub> H <sub>4</sub>                                                                                                | 2825.10.00 | 675,              |

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| 49 | Iododimethylarsine/l/, $\text{I}(\text{CH}_3)_2\text{As}$                           |            | 732, 676-75-5               |
| 50 | Isobutyl methacrylate/F/, $(\text{i-C}_4\text{H}_9)\text{CH}:\text{C}(\text{CH}_3)$ | 2916.14.00 | 750, 97-86-9                |
| 51 | Mesitylene/F/, $\text{C}_6\text{H}_3(\text{CH}_3)_3$                                | 2902.90.00 | 810, 108-67-8               |
| 52 | 2-Methoxyethanol/F/, $\text{CH}_3\text{OC}_2\text{H}_4\text{OH}$                    | 2909.42.00 | 820, 109-86-4               |
| 53 | 2-Methoxyethyl acetate/F/, $\text{CH}_3\text{OC}_2\text{H}_4\text{COOCH}_3$         | 2915.39.00 | 821, 110-49-6               |
| 54 | Methyl n-amyl ketone/F/, $\text{Nİ çNäİ öNİ}$                                       | 2914.19.00 | 827, 110-43-0               |
| 55 | 2-Methylcyclohexanone/F/, $\text{CH}_3\text{C}_6\text{H}_{10}\text{O}$              | 2914.22.00 | 837, 583-60-8               |
| 56 | 5-Methyl-3-heptanone/F/, $\text{CH}_3\text{C}_7\text{H}_{13}\text{O}$               |            | 844, 541-85-5               |
| 57 | 5-Methylhexan-2-one/F/, $\text{CH}_3\text{C}_6\text{H}_{12}\text{O}$                | 2914.19.00 | 845, 110-12-3               |
| 58 | 4-Methyl-2-pentanol/F/, $\text{CH}_3\text{C}_5\text{H}_{11}\text{OH}$               | 2805.19.00 | 860, 108-11-2               |
| 59 | 4-Methylpent-3-en-2-one/F/, $\text{CH}_3\text{C}_5\text{H}_{10}\text{O}$            | 2914.19.00 | 862, 141-79-7               |
| 60 | Methylpyridines/F/, $\text{CH}_3\text{C}_5\text{H}_5\text{N}$                       | 2933.39.00 | 868, 108-99-6               |
| 61 | a-Methylstyrene/F/, $\text{CH}_3\text{C}_6\text{H}_5\text{CH}:\text{CH}$            |            | 871, 98-83-9                |
| 62 | Morpholine/F/, $\text{C}_4\text{H}_9\text{NO}$                                      | 2934.90.00 | 879, 110-91-8               |
| 63 | Nitroethane/F/, $\text{C}_2\text{H}_5\text{NO}_2$                                   | 2904.20.00 | 907, 79-24-3                |
| 64 | 1 and 2-nitropropane/F/, $\text{C}_3\text{H}_7\text{NO}_2$                          | 2904.20.00 | 921, 922, 108-03-2, 79-46-9 |

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| 65 | Pentane-2,4-dione/F/, C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>            |            | 971, 123-54-6   |
| 66 | Pentyl acetate/F/, C <sub>5</sub> H <sub>11</sub> COOCH <sub>3</sub>           |            | 975 123-92-2    |
| 67 | Propyl chloroformate/F/, C <sub>3</sub> H <sub>7</sub> COCl                    |            | 1073, 109-60-4  |
| 68 | Styrene/F/, C <sub>6</sub> H <sub>5</sub> CH=CH <sub>2</sub>                   | 2902.50.00 | 1161,           |
| 69 | Turpentine/F/,                                                                 |            | 1308, 8006-64-2 |
| 70 | Zinc/F/, Zn                                                                    | 7901.11.00 | 1329, 7440-66-6 |
|    | Highly, very, extremely corrosive, extremely, very destructive, severe burning |            |                 |
| 1  | 2-s-Butylphenol/ED-extremely destructive/, C <sub>10</sub> H <sub>12</sub> O   | 2907.30.00 | 209, 89-72-5    |
| 2  | Caesium fluorideA/D-very destructive/, CsF                                     | 2827.39.00 | 233, 13400-13-0 |
| 3  | Chloroacetaldehyde/VD/, ClCH <sub>2</sub> CHO                                  | 2913.00.00 | 278, 107-20-0   |
| 4  | Concentrated sulfuric acid /SB-severe burning/, H <sub>2</sub> SO <sub>4</sub> | 2807.00.00 | 1170, 7664-93-9 |
| 5  | Chromyl chloride/SB/, CrCl <sub>2</sub>                                        | 2827.39.00 | 335, 14977-61-8 |
| 6  | Dichloroacetic acid/SB/, Cl <sub>2</sub> CHCOOH                                | 2915.40.00 | 409, 79-43-6    |
| 7  | Dichloroacetyl chloride/SB/, Cl <sub>2</sub> CHCOCl                            |            | 410, 79-36-7    |
| 8  | 2,2-Dichloropropionic acid/ED/, Cl <sub>2</sub> CHCH <sub>2</sub> COOH         | 2915.90.00 | 435, 75-99-0    |
| 9  | Dichlorosilane/ED/, Cl <sub>2</sub> SiH <sub>2</sub>                           | 2812.90.00 | 436, 4109-96-0  |

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| 10 | N,N-Dimethylethylamine/ED/, (CH <sub>3</sub> ) <sub>2</sub> C <sub>2</sub> H <sub>5</sub> N |            | 507, 598-56-1   |
| 11 | Diphenylmercury/ED/, (C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> Hg                       |            | 553, 587-85-9   |
| 12 | 2-Ethylhexyl chloroformate/ED/,<br>ÑöÍ ^ÑöÍ ^Ñ^ÑÑÎ                                          |            | 604, 24468-13-1 |
| 13 | Ethylmorpholine/ED/, C <sub>2</sub> H <sub>5</sub> C <sub>4</sub> H <sub>8</sub> NO         |            | 611, 100-74-3   |
| 14 | Fluoroboric acid/ED/, FH <sub>2</sub> BO <sub>3</sub>                                       |            | 627, 16872-11-0 |
| 15 | Hexachlorobutadiene/ED/, C <sub>4</sub> Cl <sub>6</sub>                                     | 2903.29.00 | 658, 87-68-3    |
| 16 | Hexachlorocyclopentadiene/ED/, C <sub>5</sub> Cl <sub>6</sub>                               | 2903.59.00 | 660, 77-47-4    |
| 17 | Hexafluoroacetone/ED/, C <sub>3</sub> F <sub>6</sub> O                                      |            | 663, 684-16-2   |
| 18 | Hydrofluoric acid/SB/, HF                                                                   | 2811.11.00 | 684, 7664-39-3  |
| 19 | Hydrogen bromide/SB/, HBr                                                                   | 2811.19.00 | 688, 10035-10-6 |
| 20 | Hydrogen chloride/SB/, HCl                                                                  | 2806.10.00 | 689, 7647-01-0  |
| 21 | Hydrogen iodide/SB/, HI                                                                     | 2811.19.00 | 692, 10034-85-2 |
| 22 | 2,2'-Iminodiethanol/ED/, NH(C <sub>2</sub> H <sub>5</sub> O) <sub>2</sub>                   |            | 710, 111-42-2   |
| 23 | 2,2'-Iminodi(ethylamine)/ED/, NHC <sub>2</sub> H <sub>5</sub> NH <sub>2</sub>               |            | 711, 111-40-0   |
| 24 | Iodine bromide/ED/, BrI                                                                     | 2812.90.00 | 721, 7789-33-5  |
| 25 | Iodine heptafluoride/HC-Highly corrosive/, IF <sub>7</sub>                                  | 2812.90.00 | 723, 16921-93-3 |
| 26 | Iodine(V) oxide/ED/, I <sub>2</sub> O <sub>5</sub>                                          | 2811.29.00 | 725,            |

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|    |                                                                          |            | 12029-98-0      |
| 27 | Iodine pentafluoride/HCl, IF <sub>5</sub>                                | 2812.90.00 | 726, 7783-66-6  |
| 28 | Magnesium chloride/VD/, MgCl <sub>2</sub>                                | 2827.31.00 | 794, 7786-30-3  |
| 29 | Methylhydrazine/ED/, CH <sub>3</sub> N <sub>2</sub> H <sub>3</sub>       |            | 846,            |
| 30 | Nitric acid (>20%)/SB/, HNO <sub>3</sub>                                 | 2808.00.00 | 893, 7697-37-2  |
| 31 | Nitrosylsulfuric acid/ED/, NO <sub>2</sub> HSO <sub>4</sub>              |            | 928,            |
| 32 | Oleum/SB/, H <sub>2</sub> SO <sub>4</sub> .SO <sub>3</sub>               | 2807.00.00 | 945, 8014-95-7  |
| 33 | Perchloric acid/SB/, HClO <sub>4</sub>                                   | 2811.19.00 | 978, 7601-90-3  |
| 34 | Phenacyl bromide/ED/, C <sub>6</sub> H <sub>5</sub> COCH <sub>2</sub> Br |            | 991, 70-11-1    |
| 35 | Phosphinic acid/ED/, R <sub>1</sub> R <sub>2</sub> POOH                  |            | 1013,           |
| 36 | Phosphorus pentaoxide/SB/, P <sub>2</sub> O <sub>5</sub>                 | 2809.10.00 | 1021, 1314-56-3 |
| 37 | Phosphorus trifluoride/HCl, PF <sub>3</sub>                              | 2812.90.00 | 1028, 7783-55-3 |
| 38 | Potassium hydride/ED/, KH                                                | 2850.00.00 | 1050,           |
| 39 | Potassium hydroxide/SB/, KOH                                             | 2815.20.00 | 1052,           |
| 40 | Rubidium/VD/, Rb                                                         | 2805.19.00 | 1094, 7440-17-7 |
| 41 | Sodium hydrogen sulfite/ED/, NaHSO <sub>3</sub>                          | 2832.10.00 | 1140, 7631-90-5 |
| 42 | Sodium hydroxide/SB/, NaOH                                               | 2815.12.00 | 1141, 1310-73-2 |
| 43 | Sodium peroxide /SB/, Na <sub>2</sub> O <sub>2</sub>                     | 2815.30.00 | 1147,           |

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|    |                                                                                             |            | 1313-60-6              |
| 44 | Sulfur trioxide/ED/, $\text{SO}_3$                                                          | 2811.29.00 | 1173, 7446-11-9        |
| 45 | Thionyl chloride/ED/, $\text{SOCl}_2$                                                       |            | 1206, 7719-09-7        |
| 46 | Titanium (III) chloride/ED/, $\text{TiCl}_3$                                                | 2827.39.00 | 1218,                  |
| 47 | p-Toluenesulfonyl chloride/ED/, $\text{CH}_3\text{C}_6\text{H}_4\text{SO}_2\text{Cl}$       |            | 1224, 98-59-9          |
| 48 | Triethylaluminium/ED/, $(\text{C}_2\text{H}_5)_3\text{Al}$                                  |            | 1255, 97-93-8          |
| 49 | Trifluoroacetic acid and anhydride/SB/, $\text{CF}_3\text{COOH}$ , $\text{CF}_3\text{CO}_2$ |            | 1271, 76-05-1 407-25-0 |
| 50 | Tri-isobutylaluminium/ED/, $(i\text{-C}_4\text{H}_9)_3\text{Al}$                            |            | 1275, 100-99-2         |

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|   | <b>Corrosive, burning</b>                                            |            |                |
| 1 | Acetyl nitrate/C- corrosive/, $\text{CH}_3\text{CONO}_2$             |            | 15, 591-09-3   |
| 2 | Aluminium chloride anhydrous/B-burning/, $\text{AlCl}_3$             | 2827.32.00 | 37, 7446-70-0  |
| 3 | Benzoyl chloride/B/, $\text{C}_6\text{H}_5\text{COCl}$               |            | 117,           |
| 4 | Benzylamine/B/, $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$         |            | 122, 100-46-9  |
| 5 | Benzyl chloroformate/B/, $\text{C}_6\text{H}_5\text{CCl}_3\text{HO}$ |            | 126,           |
| 6 | Butan-2-one peroxide/C/, $\text{C}_4\text{H}_{10}\text{O}_2$         |            | 187, 1338-23-4 |
| 7 | Butyric acid/B/, $\text{C}_3\text{H}_7\text{COOH}$                   | 2915.60.00 | 216,           |

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| 8  | Butyric and isobutyric anhydrides/B/, $C_3H_4O_3$            | 2828.10.00 | 217, 97-72-3<br>106-31-0 |
| 9  | Calcium hypochlorite/B/, $Ca(ClO)_2$                         |            | 244,                     |
| 10 | Chloroacetyl chloride/B/, $ClCH_2COCl$                       |            | 284, 79-04-9             |
| 11 | 2-Chlorobenzaldehyde/B/, $ClC_6H_4CHO$                       |            | 288,                     |
| 12 | Dibenzylamine/C/, $(C_6H_5CH_2)_2NH$                         |            | 388, 103-49-1            |
| 13 | Disulfur dichloride/B/, $S_2Cl_2$                            | 2812.10.00 | 564, 10025-67-9          |
| 14 | Disulfuryl dichloride/C/, $SO_2Cl_2$                         |            | 566, 7791-27-7           |
| 15 | Formic acid/B/, $HCOOH$                                      | 2915.11.00 | 633, 64-18-6             |
| 16 | Hexahydro-1,3,5-trinitro-1,3,5-triazine/C/, $H_6(NO_3)_3N_3$ |            | 665, 121-82-4            |
| 17 | Hexanoic acid/C/, $CH_3(CH_2)_4COOH$                         | 2915.90.00 | 671, 142-62-1            |
| 18 | Hydriodic acid/B/, $HI$                                      | 2811.19.00 | 681, 10034-85-2          |
| 19 | Hydrogen peroxide/B/, $H_2O_2$                               | 2842.00.00 | 693, 7722-84-1           |
| 20 | Methacrylic acid/B/, $C_4H_6O_2$                             |            | 813,                     |
| 21 | Pentaethylenhexamine/B/, $(C_2H_2)_5H_{10}N_6$               |            | 968, 4067-16-7           |
| 22 | Seleninyl chloride/C/, $SeCl_2$                              | 2812.90.00 | 1102, 7791-23-3          |
| 23 | Sodium hypochlorite solution/B/, $NaClO$                     | 2828.90.00 | 1142,                    |

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|    |                                                                             |            | 7681-52-9       |
|    | <b>Highly irritant, severely irritant, strongly irritant, very irritant</b> |            |                 |
| 1  | Bromine trifluoride/S- Severely irritant/, BrF3                             | 2812.90.00 | 161, 7787-71-5  |
| 2  | Caesium hydroxide/H-Highly irritant/, Cs(OH)?                               |            | 234, 21351-79-1 |
| 3  | Carbonyl difluoride/H/, COF2                                                |            | 260, 353-50-4   |
| 4  | Chloric acid/St- Strongly irritant/, HClO3                                  | 2811.19.00 | 269, 7790-93-4  |
| 5  | Chlorine fluoride/H/, ClF                                                   | 2812.90.00 | 274, 7790-89-8  |
| 6  | Cyanogen chloride/H/, CNCl                                                  |            | 352, 506-77-4   |
| 7  | Diaminohexane/St/, (NH2)2C6H12                                              |            | 377, 124-09-4   |
| 8  | 2-Dibutylaminoethanol/S/, (C4H9)2NCH2CH2OH                                  |            | 399, 102-81-8   |
| 9  | 1,4-Dichlorobut-2-yne/S/, C4H4Cl2                                           |            | 415, 821-10-3   |
| 10 | 1,1-Dichloro-1-nitroethane/St/, Cl2C2H3NO3                                  |            | 429, 594-72-9   |
| 11 | Di-isopropyl peroxydicarbonate/S/, C8H12O8                                  |            | 484, 105-64-6   |
| 12 | Gallium nitrate/St/, GaNO3                                                  |            | 640, 13494-90-1 |
| 13 | 2-Hydroxy-3-butenitrile/S/,                                                 |            | 697, 5809-59-6  |
| 14 | Indium trichloride/H/, InCl3                                                | 2812.90.00 | 717, 10025-82-8 |
| 15 | Lithium amide/St/, LiNH2                                                    |            | 784,            |

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|    |                                                                                                     |            | 7782-89-0        |
| 16 | Lithium carbonate/H/, $\text{LiCO}_3$                                                               |            | 787, 554-13-2    |
| 17 | 2-Nitrobenzoyl chloride/E-Extremely irritant/, $\text{C}_6\text{H}_4\text{CONO}_2\text{Cl}$         |            | 903, 610-14-0    |
| 18 | Nitrosyl fluoride/H/, $\text{NO}_2\text{F}$                                                         |            | 926, 7789-25-5   |
| 19 | Nitrosyl tribromide/S/, $\text{NO}_2\text{Br}_3$                                                    |            | 929, 13444-89-8  |
| 20 | Nitryl fluoride/S/, $\text{NF}_3$                                                                   | 2812.90.00 | 936, 10022-50-1  |
| 21 | 2-Mercaptoethanol/S/, $\text{C}_2\text{H}_5\text{SH}$                                               |            | 805,             |
| 22 | Peracetic acid/St/, $\text{CH}_3\text{COOOH}$                                                       |            | 976, 79-21-0     |
| 23 | Peroxomonophosphoric acid/V-Very irritant/, $\text{H}_3\text{PO}_6$                                 | 2809.20.00 | 985, 13598-52-5  |
| 24 | Peroxomonosulfuric acid/St/, $\text{H}_2\text{SO}_5$                                                | 2811.29.00 | 986, 7722-86-3   |
| 25 | Peroxonitric acid/V/, $\text{HNO}_4$                                                                | 2808.00.00 | 987,             |
| 26 | Pyrogallol/S/, $\text{C}_6\text{H}_3(\text{OH})_3$ -1,2,3                                           | 2826.19.00 | 1088, 87-66-1    |
| 27 | Rubidium fluoride/S/, $\text{RbF}$                                                                  |            | 1095, 13446-74-7 |
| 28 | Soda asbestos/S/,                                                                                   |            | 1121,            |
| 29 | Sodium amide/S/, $\text{NaNH}_2$                                                                    |            | 1123, 7782-92-5  |
| 30 | Sodium ethoxide and sodium methoxide/E/, $\text{C}_2\text{H}_5\text{ONa}$ , $\text{CH}_3\text{ONa}$ |            | 1135, 124-41-4   |
| 31 | Succinic anhydride/S/, $\text{C}_4\text{H}_4\text{O}_2$                                             |            | 1162, 108-30-5   |

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|    |                                                                                                                                 |       | 501-53-1        |
| 11 | Benzylidene chloride, C <sub>6</sub> H <sub>5</sub> CHCl                                                                        |       | 127, 98-87-3    |
| 12 | Bis{4-(2,3-epoxypropoxy) phenyl} propane, C <sub>3</sub> H <sub>7</sub> OC <sub>6</sub> H <sub>5</sub>                          |       | 138, 1675-54-3  |
| 13 | Bromoacetamide, BrCH <sub>2</sub> CONH <sub>2</sub>                                                                             |       | 162, 79-15-2    |
| 14 | Butyl acrylate, C <sub>4</sub> H <sub>9</sub> CH <sub>2</sub> :CHCOO                                                            |       | 194, 141-32-2   |
| 15 | 2-t-Butylaminoethyl methacrylate, C <sub>4</sub> H <sub>9</sub> NHC <sub>2</sub> H <sub>5</sub> C <sub>4</sub> H <sub>5</sub> O |       | 196, 3775-90-4  |
| 16 | Butyl methacrylate, H <sub>2</sub> C=C(CH <sub>3</sub> )COOC(CH <sub>3</sub> ) <sub>3</sub>                                     |       | 206, 97-88-1    |
| 17 | Caesium nitrate, CsNO <sub>3</sub>                                                                                              |       | 235 7789-18-6   |
| 18 | Chloronitrotoluenes, C <sub>6</sub> H <sub>5</sub> CHClNO <sub>2</sub>                                                          |       | 315, 121-86-8   |
| 19 | Chromium, Cr                                                                                                                    | 8105. | 331 7440-47-3   |
| 20 | Chromium salts                                                                                                                  |       | 332,            |
| 21 | Cinnamaldehyde, C <sub>6</sub> H <sub>5</sub> CH:CHCHO                                                                          |       | 338, 104-55-2   |
| 22 | Cobalt metal, Co                                                                                                                | 81.12 | 339, 7440-48-4  |
| 23 | Cresyl glycidyl ether, CH <sub>3</sub> C <sub>6</sub> H <sub>4</sub> OC <sub>3</sub> H <sub>6</sub>                             |       | 346, 26447-14-3 |
| 24 | 2-Diethylaminoethanol, (C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> NC <sub>2</sub> H <sub>5</sub> OH                          |       | 447, 100-37-8   |
| 25 | 2,6-Di-t-butyl-p-cresol, (C <sub>4</sub> H <sub>9</sub> ) <sub>2</sub> CH <sub>3</sub> C <sub>6</sub> H <sub>2</sub> OH         |       | 401, 128-37-0   |
| 26 | Dibutyl hydrogen phosphate, (C <sub>4</sub> H <sub>9</sub> ) <sub>2</sub> HPO <sub>4</sub>                                      |       | 403, 107-66-4   |

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| 32 | Sulfur pentafluoride/S/, SF <sub>5</sub>                                                                             | 2812.90.00 | 1171, 5714-22-7 |
| 33 | Tetramethyl orthosilicate/S/, (CH <sub>3</sub> ) <sub>4</sub> SiO <sub>4</sub>                                       |            | 1200, 681-84-5  |
| 34 | Thiophene/S/, C <sub>4</sub> H <sub>4</sub> S                                                                        |            | 1207, 110-02-1  |
| 35 | Tributylphosphine/V/, (C <sub>4</sub> H <sub>9</sub> ) <sub>3</sub> P                                                |            | 1234, 998-40-3  |
|    | <b>Irritant</b>                                                                                                      |            |                 |
| 1  | Acetamide, CH <sub>3</sub> CONH <sub>2</sub>                                                                         |            | 3, 60-35-5      |
| 2  | Acetanilide, CH <sub>3</sub> CONHC <sub>6</sub> H <sub>5</sub>                                                       |            | 4, 103-84-4     |
| 3  | Adipic acid, COOH(CH <sub>2</sub> ) <sub>4</sub> COOH                                                                |            | 22, 124-04-9    |
| 4  | 2-Amino-2-methylpropan-1-ol,<br>NH <sub>2</sub> CH <sub>3</sub> C <sub>3</sub> H <sub>5</sub> OH                     |            | 52, 124-68-5    |
| 5  | Antimony pentachloride, SbCl <sub>5</sub>                                                                            |            | 87, 7647-18-9   |
| 6  | Antimony trichloride, SbCl <sub>3</sub>                                                                              |            | 89, 10025-91-9  |
| 7  | Benzophenone-3,3',4,4'-tetracarboxylic dianhydride, C <sub>13</sub> H <sub>6</sub> O(CO) <sub>4</sub> O <sub>4</sub> |            | 113, 2421-28-5  |
| 8  | Benzyl bromide, C <sub>6</sub> H <sub>5</sub> Br                                                                     |            | 123, 100-39-0   |
| 9  | Benzyl chloride, C <sub>6</sub> H <sub>5</sub> Cl                                                                    |            | 125, 100-44-7   |
| 10 | Benzyl chloroformate, C <sub>6</sub> H <sub>4</sub> CCl <sub>2</sub> O                                               |            | 126,            |

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| 27 | Dibutyl phthalate, C <sub>6</sub> H <sub>4</sub> (COOC <sub>4</sub> H <sub>9</sub> ) <sub>2</sub>                             |            | 406, 84-74-2    |
| 28 | Dicyclohexyl phthalate, C <sub>20</sub> H <sub>26</sub> O <sub>4</sub>                                                        |            | 443, 84-61-7    |
| 28 | 1,3-Dichloro-5,5-dimethylimidazolidindione, Cl <sub>2</sub> (CH <sub>3</sub> ) <sub>2</sub> CHNHN <sub>2</sub> O <sub>2</sub> |            | 417, 118-52-5   |
| 29 | 3-(Diethylamino) propylamine, (C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> N(CH <sub>2</sub> ) <sub>3</sub> NH <sub>2</sub>  |            | 448, 104-78-9   |
| 30 | Diethyl malonate, (C <sub>2</sub> H <sub>5</sub> COO) <sub>2</sub> CH <sub>2</sub>                                            |            | 459, 105-53-3   |
| 31 | Diethyl phthalate, N <sub>6</sub> I <sub>4</sub> (N <sub>1</sub> I <sub>1</sub> N <sub>2</sub> I <sub>5</sub> ) <sub>2</sub>  |            | 466, 84-66-2    |
| 31 | Diethyl phosphite, (C <sub>2</sub> H <sub>5</sub> O) <sub>2</sub> POH                                                         |            | 465, 762-04-9   |
| 32 | Di-isobutyryl peroxide, (i-C <sub>3</sub> H <sub>7</sub> CO) <sub>2</sub> HO <sub>2</sub>                                     |            | 477, 3437-84-1  |
| 33 | Di-isodecyl phthalate, C <sub>6</sub> H <sub>4</sub> (COOi-C <sub>10</sub> H <sub>21</sub> ) <sub>2</sub>                     |            | 479, 26761-40-0 |
| 34 | Di-isononyl phthalate, C <sub>6</sub> H <sub>4</sub> (COO C <sub>9</sub> H <sub>19</sub> ) <sub>2</sub>                       |            | 480, 28553-12-0 |
| 35 | Di-linear 79 phthalate,                                                                                                       | 2917.39.00 | 486,            |
| 36 | 2,2-Dimethoxypropane, (CH <sub>3</sub> O) <sub>2</sub> C <sub>3</sub> H <sub>4</sub>                                          | 2911.00.00 | 490,            |
| 37 | 3,5-Dimethylbenzoic acid, (CH <sub>3</sub> ) <sub>2</sub> C <sub>6</sub> H <sub>3</sub> COOH                                  | 2901.29.   | 498, 499-06-9   |
| 38 | 2,3-Dimethylbuta-1,3-diene, (CH <sub>3</sub> ) <sub>2</sub> C <sub>4</sub> H <sub>4</sub>                                     | 2901.29.00 | 500, 513-81-5   |
| 39 | Dimethyl phthalate, C <sub>6</sub> H <sub>4</sub> (COOCH <sub>3</sub> ) <sub>2</sub>                                          | 2917.34.00 | 520,            |
| 40 | Dinitrophenylhydrazine, (NO <sub>2</sub> ) <sub>2</sub> C <sub>6</sub> H <sub>3</sub> NHNH <sub>2</sub>                       | 2928.00.00 | 539,            |

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| 41 | 1,2-Dinitropropane, (NO <sub>2</sub> ) <sub>2</sub> C <sub>3</sub> H <sub>6</sub>                                                       |            | 540,                     |
| 42 | Dinonyl phthalate, C <sub>6</sub> H <sub>4</sub> (COOC <sub>9</sub> H <sub>19</sub> ) <sub>2</sub>                                      | 2917.33.00 | 543, 84-76-4             |
| 43 | Diphenyl ether, (C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> O                                                                         | 2909.30.00 | 550, 101-84-8            |
| 44 | 1,1 -Diphenylethylene, (C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> C <sub>2</sub> H <sub>2</sub>                                      | 2902.90.00 | 551 530 <sup>^</sup> 8-3 |
| 45 | Diphenyl thiocarbazon, (C <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> SC <sub>12</sub> H <sub>8</sub> N                                  | 2930.90.00 | 554, 60-10-6             |
| 46 | Dipropylene glycol methyl ether, (CH <sub>3</sub> CH:CH <sub>2</sub> ) <sub>2</sub> OHCH <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub> O | 2909.49.00 | 560, 34590-94-8          |
| 47 | Disodium peroxodisulfate, Na <sub>2</sub> S <sub>2</sub> O <sub>8</sub>                                                                 | 2833.40.00 | 563, 7775-27             |
| 48 | Divinylbenzene, C <sub>4</sub> H <sub>6</sub> C <sub>6</sub> H <sub>4</sub>                                                             | 2902.90.00 | 569,                     |
| 49 | Dodecanoyl peroxide, CH <sub>3</sub> (CH <sub>2</sub> ) <sub>10</sub> CO <sub>3</sub> H                                                 | 2915.90.00 | 570, 105-74-8            |
| 50 | Ethane-1,2-dione,                                                                                                                       | 2939.50.00 | 575, 107-22-2            |
| 51 | Ethyl acetoacetate, C <sub>2</sub> H <sub>5</sub> CH <sub>3</sub> COCH <sub>2</sub> COO                                                 | 2918.30.00 | 583, 141-97-9            |
| 52 | Ethyl diazoacetate, C <sub>2</sub> H <sub>5</sub> CH <sub>2</sub> COON <sub>2</sub>                                                     | 2923.00.00 | 592, 623-73-4            |
| 53 | 2-Ethylhexyl acrylate, C <sub>2</sub> H <sub>5</sub> C <sub>6</sub> H <sub>13</sub> CH <sub>2</sub> :CCOO                               | 2916.12.00 | 603, 103-11-7            |
| 54 | Ethylidene norbornene, C <sub>9</sub> H <sub>14</sub>                                                                                   | 2902.19.00 | 606, 16219-75-3          |
| 55 | Ethylene dimethacrylate, C <sub>2</sub> H <sub>4</sub> CH <sub>3</sub> C:CH                                                             | 2916.14.00 | 594, 97-90-5             |
| 56 | Ethyl methyl peroxide, C <sub>2</sub> H <sub>5</sub> CH <sub>3</sub> HO <sub>2</sub>                                                    | 290960.00  | 610, 70299-48-8          |
| 57 | N-Ethylpiperidine, C <sub>2</sub> H <sub>5</sub> C <sub>5</sub> H <sub>10</sub> N                                                       | 2933.39.00 | 616, 766-09-6            |

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| 58 | Ethyl vinyl ether, C <sub>2</sub> H <sub>5</sub> OCH <sub>2</sub> :CH               | 2909.19.00 | 617, 109-92-2   |
| 59 | Formamide, HCONH <sub>2</sub>                                                       | 2924.10.00 | 632,            |
| 60 | Fumaric acid, HOOCCH:CHCOOH                                                         | 2917.19.00 | 634, 110-17-8   |
| 61 | Gallium chloride, GaCl <sub>3</sub>                                                 | 2827.39.00 | 639,            |
| 62 | Germanium dioxide, GeO <sub>2</sub>                                                 | 2825.60.00 | 643, 1310-53-8  |
| 63 | Glutaraldehyde, HCO(CH <sub>2</sub> ) <sub>3</sub> COH                              | 2912.19.00 | 647, 111-30-8   |
| 64 | Glycolonitrile, HOCH <sub>2</sub> CN                                                | 2926.90.00 | 650, 107-16-4   |
| 65 | Hexachloroethane, Cl <sub>6</sub> C <sub>2</sub>                                    | 2903.19.00 | 661,            |
| 66 | Hexahydrophthalic anhydride, N <sub>2</sub> H <sub>8</sub> O <sub>3</sub>           | 2917.20.00 | 664, 85-42-7    |
| 67 | Hexamethylene diacrylate, (CH <sub>2</sub> ) <sub>6</sub> (CH <sub>2</sub> :CHCOO)? | 2916.12.00 | 668, 13048-33-4 |
| 68 | Hex-3-enedinitrile, C <sub>6</sub> H <sub>10</sub> N <sub>2</sub>                   | 2926.90.00 | 673, 1119-69-3  |
| 69 | s-Hexyl acetate, C <sub>6</sub> H <sub>13</sub> OOCCH <sub>3</sub>                  | 2915.39.00 | 674, 142-92-7   |
| 68 | Hydrobromic acid, HBr                                                               | 2811.19.00 | 682, 10035-10-6 |
| 69 | Hydrochloric acid, HCl                                                              |            | 683, 76-47-01-0 |
| 70 | Hydroxylamine, NH <sub>2</sub> OH                                                   | 2825.10.00 | 700,            |
| 71 | 2-Hydroxyethyl methacrylate, OH C <sub>9</sub> H <sub>9</sub> O <sub>2</sub>        | 2916.14.00 | 698, 868-77-9   |
| 72 | 4-hydroxy-4-methylpentan-2-one, C <sub>7</sub> H <sub>14</sub> O <sub>2</sub>       | 2914.40.00 | 702, 123-42-2   |
| 73 | Hydroxypropyl methacrylate, C <sub>9</sub> H <sub>10</sub> O <sub>3</sub>           | 2916.14.00 | 705,            |

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|    | OHCHp CH <sub>2</sub> :CCOOCH <sub>3</sub> ,                                              |            | 923-26-2        |
| 74 | 8-hydroxyquinoline, OHC <sub>8</sub> H <sub>6</sub> N                                     | 2933.40.00 | 706,            |
| 75 | Indene, C <sub>9</sub> H <sub>8</sub>                                                     | 2902.90.00 | 713,            |
| 76 | Indium oxide, InO                                                                         | 2825.90.00 | 715, 1312-43-2  |
| 77 | Indole, C <sub>8</sub> H <sub>7</sub> N                                                   | 2933.79.00 | 718,            |
| 78 | Isophorone, C <sub>9</sub> H <sub>14</sub> O                                              | 2914.29.00 | 755,            |
| 79 | Methyl hydroperoxide, CH <sub>3</sub> HO <sub>2</sub>                                     | 2909.60.00 | 847, 3031-73-0  |
| 80 | 2-Methyl-1-pentan-1-ol, CH <sub>3</sub> C <sub>5</sub> H <sub>10</sub> OH                 | 2905.19.00 | 859, 105-30-6   |
| 81 | 2-Methylpentane-2,4-diol, CH <sub>3</sub> C <sub>5</sub> H <sub>9</sub> (OH) <sub>2</sub> | 2905.39.00 | 858, 107-41-5   |
| 82 | Nitryl chloride, ClCN                                                                     | 2812.10.00 | 935, 13444-90-1 |
| 83 | Nitryl hypofluorite, NFO                                                                  | 2812.90.00 | 938, 7789-26-6  |
| 84 | Nonane, C <sub>9</sub> H <sub>20</sub>                                                    | 2901.10.00 | 940, 111-84-2   |
| 85 | 1-Octanol, C <sub>8</sub> H <sub>17</sub> OH                                              | 2905.16.00 | 943, 111-87-5   |
| 86 | Oleic acid, C <sub>18</sub> H <sub>33</sub> CH:CH(CH <sub>2</sub> ) <sub>7</sub> COOH     | 2916.15.00 | 944, 112-80-1   |
| 87 | Osmium, Os                                                                                | 2118.11.00 | 947, 7440-04-2  |
| 88 | Oxygen difluoride, OF <sub>2</sub>                                                        |            | 954,            |
| 89 | Pentaerythritol, C(CH <sub>2</sub> OH) <sub>4</sub>                                       | 2905.42.00 | 965, 115-77-5   |
| 90 | Pentaerythritol tetraacrylate, C(CH <sub>2</sub> OCH <sub>2</sub> :CCOO) <sub>4</sub>     | 2916.12.00 | 966, 4986-89-4  |
| 91 | Pentaerythritol triacrylate, C(CH <sub>2</sub> OCH <sub>2</sub> :CCOO) <sub>3</sub>       | 2916.12.00 | 967, 3524-68-3  |

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| 92  | Pentaethylenhexamine, C <sub>8</sub> (NH <sub>2</sub> ) <sub>6</sub>                                   | 2921.29.00 | 968, 4067-16-7   |
| 92  | Phenothiazine, C <sub>12</sub> H <sub>9</sub> NS                                                       | 2934.30.00 | 995, 92-84-2     |
| 93  | Phenyl ethanol, C <sub>6</sub> H <sub>4</sub> C <sub>2</sub> H <sub>4</sub> OH                         | 2930.90.00 | 1001, 60-12-8    |
| 94  | N-Phenyl-2-naphthylamine, C <sub>6</sub> H <sub>4</sub> C <sub>10</sub> H <sub>7</sub> NH <sub>2</sub> | 2921.45.00 | 1006, 135-88-6   |
| 95  | Phosphorus pentachloride, PCI <sub>5</sub>                                                             | 2812.90.00 | 1019, 10026-13-8 |
| 96  | Phosphorus tribromide, PBr <sub>3</sub>                                                                | 2812.90.00 | 1025, 7789-60-8  |
| 97  | Phosphorus trichloride, PCI <sub>3</sub>                                                               | 2812.10.00 | 1026, 7719-12-2  |
| 98  | Phosphoryl chloride, PCI                                                                               | 2812.10.00 | 1029,            |
| 99  | Phthalic anhydride, C <sub>8</sub> H <sub>6</sub> O <sub>2</sub>                                       | 2917.35.00 | 1030, 85-44-9    |
| 100 | Phthalimide, C <sub>8</sub> H <sub>5</sub> NO <sub>2</sub>                                             | 2925.19.00 | 1031, 85-41-6    |
| 101 | m-Phthalodinitrile, C <sub>8</sub> H <sub>4</sub> N <sub>2</sub>                                       | 2917.39.00 | 1032, 626-17-5   |
| 102 | Phthaloyl peroxide, OHCOC <sub>6</sub> H <sub>4</sub> COHO                                             | 2917.39.00 | 1033, 4733-52-2  |
| 103 | Piperazine dihydrochloride, C <sub>4</sub> H <sub>8</sub> N <sub>2</sub> H <sub>2</sub> Cl             | 2933.59.00 | 1036, 142-64-3   |
| 104 | Potassium ferricyanide, K <sub>3</sub> Fe(CK) <sub>6</sub>                                             | 2837.20.00 | 1046, 13746-66-2 |
| 105 | Potassium ferrocyanide, K <sub>4</sub> Fe(CN) <sub>6</sub>                                             | 2837.20.00 | 1047, 13943-58-3 |
| 106 | Potassium hexacyanoferrate, K <sub>2</sub> Fe(CN) <sub>6</sub>                                         | 2837.20.00 | 1049, 13746-66-2 |
| 107 | Potassium nitrate, K <sub>2</sub> NO <sub>3</sub>                                                      | 2834.21.00 | 1054, 7757-79-1  |
| 108 | Potassium nitrite, KNO <sub>2</sub>                                                                    | 2834.10.00 | 1055,            |

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|     |                                                                                                                    |            | 7758-09-0        |
| 109 | Potassium peroxodisulfate, K <sub>2</sub> S <sub>2</sub> O <sub>8</sub>                                            | 2833.40.00 | 1057, 7727-21-1  |
| 110 | Propionic acid(>10%<25%), C <sub>2</sub> H <sub>5</sub> COOH                                                       | 2915.50.00 | 1068, 79-09-4    |
| 111 | Pseudocumene, C <sub>9</sub> H <sub>12</sub>                                                                       | 2902.90.00 | 1083, 95-63-6    |
| 112 | Pyromellitic dianhydride, C <sub>6</sub> (CH <sub>3</sub> ) <sub>4</sub> O <sub>2</sub>                            | 2917.39.00 | 1089, 89-32-7    |
| 113 | Quinoline, C <sub>9</sub> H <sub>7</sub> N                                                                         | 2707.90.00 | 1091, 91-22-5    |
| 114 | Rubidium hydroxide, RbOH                                                                                           | 2825.90.00 | 1097,            |
| 115 | Salicylic acid, OHC <sub>6</sub> H <sub>4</sub> COOH                                                               | 2918.21.00 | 1099, 69-72-7    |
| 116 | Sebacoyl dichloride, ClCO(CH <sub>2</sub> ) <sub>8</sub> COCl                                                      | 2917.19.00 | 1100, 111-19-3   |
| 117 | Silicon, Si                                                                                                        | 2804.69.00 | 1108,            |
| 118 | Silicon carbide, SiC                                                                                               | 2849.20.00 | 1109, 409-21-2   |
| 119 | Silicon tetrachloride, SiCl <sub>4</sub>                                                                           | 2812.10.00 | 1110, 10026-04-7 |
| 120 | Silver fluoride, AgF                                                                                               | 2826.19.00 | 1115, 7775-41-9  |
| 121 | Silver perchlorate, AgClO <sub>4</sub>                                                                             | 2843.29.00 | 1120, 7783-93-9  |
| 122 | Sodium borate, NaBO <sub>2</sub> ; Na <sub>3</sub> BO <sub>3</sub> ; Na <sub>7</sub> B <sub>4</sub> O <sub>7</sub> | 2840.20.00 | 1127,            |
| 123 | Sodium borohydride, NaBH <sub>4</sub>                                                                              | 2850.00.00 | 1128, 16940-66-2 |
| 124 | Sodium chlorite, NaClO <sub>2</sub>                                                                                | 2828.00.00 | 1130, 7758-19-2  |
| 125 | Sodium disulfite, Na <sub>2</sub> (SO <sub>3</sub> ) <sub>2</sub>                                                  | 2832.10.00 | 1133,            |

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|     |                                                                                                                       |            | 7681-57-4                |
| 126 | Sodium hydride, NaH                                                                                                   | 2850.00.00 | 1138, 7646-69-7          |
| 127 | Sodium iodate, NaIO <sub>3</sub>                                                                                      | 2829.90.00 | 1143, 7681-55-2          |
| 128 | Sodium periodate, NaIO <sub>4</sub>                                                                                   | 2829.90.00 | 1146, 7790-28-5          |
| 129 | Sodium phosphate, NaPO <sub>3</sub> ; Na <sub>3</sub> PO <sub>4</sub> ; Na <sub>4</sub> P <sub>2</sub> O <sub>7</sub> | 2835.92.00 | 1149, 7558-79-4          |
| 130 | Stearic acid, C <sub>17</sub> H <sub>35</sub> COOH                                                                    | 2915.70.00 | 1156, 57-11-4            |
| 131 | Strontium, Sr                                                                                                         | 2805.22.00 | 1157, 7440-24-6          |
| 132 | Sulphur dichloride, SCl <sub>2</sub>                                                                                  | 2812.10.00 | 1167, 10545-99-0         |
| 133 | Sulphuryl chloride, SO <sub>2</sub> Cl <sub>2</sub>                                                                   | 2812.10.00 | 1174, 7791-25-5          |
| 134 | Terphenyls, C <sub>18</sub> H <sub>14</sub>                                                                           | 2902.90.00 | 1178, 92-94-4            |
| 135 | 1,2,4,5-Tetrachlorobenzene, C <sub>6</sub> H <sub>2</sub> Cl <sub>4</sub>                                             | 2903.69.00 | 1182, 95-94-3            |
| 136 | Tetrachlorodifluoroethanes, C <sub>2</sub> Cl <sub>4</sub> F <sub>2</sub>                                             | 2903.45.00 | 1183, 76-11-9<br>76-12-0 |
| 137 | Tetrachloronaphtalene, C <sub>10</sub> H <sub>4</sub> Cl <sub>4</sub>                                                 | 2903.69.00 | 1186, 1335-88-2          |
| 138 | Tetrafluoroethylene, F <sub>4</sub> C <sub>2</sub>                                                                    | 2903.30.00 | 1191, 116-14-3           |
| 139 | Tetrafluorohydrazine, F <sub>4</sub> N <sub>2</sub>                                                                   | 2903.45.00 | 1192, 10036-47-2         |
| 140 | Tetrahydrophthalic anhydride, C <sub>8</sub> H <sub>4</sub> O <sub>3</sub>                                            | 2917.20.00 | 1194,                    |
| 141 | Tetramethyl succinonitrile,                                                                                           |            | 1201,                    |

|     |                                                                                                                           |            |                                      |
|-----|---------------------------------------------------------------------------------------------------------------------------|------------|--------------------------------------|
|     | (CH <sub>3</sub> ) <sub>4</sub> COCH <sub>2</sub> CH <sub>2</sub> CON                                                     |            | 3333-52-6                            |
| 142 | Thiophosphoryl fluoride, PSF <sub>2</sub>                                                                                 | 2851.00.00 | 1208, 2404-52-6                      |
| 143 | Tin(II) chloride, SnCl <sub>2</sub>                                                                                       | 2827.39.00 | 1213, 7772-99-8                      |
| 144 | Tin(IV) chloride, SnCl <sub>4</sub>                                                                                       | 2827.39.00 | 1214, 7646-78-8                      |
| 145 | Titanium(IV) chloride, TiCl <sub>4</sub>                                                                                  | 2827.39.00 | 1217, 10049-06-6                     |
| 146 | Titanium dioxide, TiO <sub>2</sub>                                                                                        | 2823.00.00 | 1220, 1317-70-0 1317-80-2 13463-67-7 |
| 147 | Tribromosilane, Br <sub>3</sub> SiH                                                                                       | 2812.00.00 | 1230, 7789-57-3                      |
| 149 | Tributylborane, (C <sub>4</sub> H <sub>9</sub> ) <sub>3</sub> B                                                           | 2920.90.00 | 1232, 1116-39-8                      |
| 150 | 1,2,4-Trichlorobenzene, C <sub>6</sub> H <sub>3</sub> Cl <sub>3</sub>                                                     | 2903.69.00 | 1241, 120-82-1                       |
| 151 | Trichlorofluoromethane, CCl <sub>3</sub> F                                                                                | 2903.41.00 | 1246, 75-69-4                        |
| 152 | 2,4,6-Trichloro-s-triazine, Cl <sub>3</sub> N <sub>3</sub> H <sub>3</sub>                                                 | 2933.69.00 | 1252, 108-77-0                       |
| 153 | Triethanolamine, (C <sub>2</sub> H <sub>5</sub> O) <sub>3</sub> N                                                         | 2922.13.00 | 1254, 102-71-6                       |
| 154 | Triethylborane, (C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> B                                                           | 2931.00.00 | 1260, 97-94-9                        |
| 155 | Triethylene glycol diacrylate, (C <sub>2</sub> H <sub>3</sub> ) <sub>3</sub> OHCH <sub>2</sub> C(CH <sub>2</sub> :CHCOO)? | 2909.49.00 | 1261, 1680-21-3                      |
| 156 | Trifluoroacetic acid and anhydride, F <sub>3</sub> CCOOH                                                                  | 2915.90.00 | 1271, 76-05-1 407-25-0               |
| 157 | Trifluoromethanesulfonic acid, F <sub>3</sub> CSO <sub>3</sub> H                                                          | 2904.90.00 | 1272, 1493-13-6                      |

|     |                                                                                                                                       |            |                  |
|-----|---------------------------------------------------------------------------------------------------------------------------------------|------------|------------------|
| 158 | Trimellitic anhydride, C <sub>9</sub> H <sub>4</sub> O <sub>5</sub>                                                                   | 2917.39.00 | 1277, 552-30-7   |
| 159 | Trimethylaluminium, (CH <sub>3</sub> ) <sub>3</sub> Al                                                                                | 2931.00.00 | 1279, 75-24-1    |
| 160 | Trimethylolpropane triacrylate, (CH <sub>2</sub> ) <sub>3</sub> C(CH <sub>2</sub> ) <sub>2</sub> OC(CH <sub>3</sub> )=CH <sub>2</sub> | 2905.99.00 | 1287, 15625-89-5 |
| 161 | Trinitromethane, (NO <sub>2</sub> ) <sub>3</sub> CH                                                                                   | 2904.20.00 | 1295, 517-25-9   |
| 162 | Triphenyl phosphate, (C <sub>6</sub> H <sub>5</sub> ) <sub>3</sub> PO <sub>4</sub>                                                    | 2919.00.00 | 1298, 115-86-6   |
| 163 | Triphenyl phosphite, (C <sub>6</sub> H <sub>5</sub> ) <sub>3</sub> PO <sub>3</sub>                                                    | 2819.00.00 | 1299, 101-02-0   |
| 164 | Urea, NH <sub>2</sub> CONH <sub>2</sub>                                                                                               | 2924.10.00 | 1311, 57-13-6    |
| 165 | Valeraldehyde, C <sub>4</sub> H <sub>9</sub> CHO                                                                                      | 2912.19.00 | 1312, 110-62-3   |
| 166 | Vanadium trichloride, VCl <sub>3</sub>                                                                                                | 2823.39.00 | 1314,            |
| 167 | Zinc permanganate, Zn(MnO <sub>4</sub> ) <sub>2</sub>                                                                                 | 2841.69.00 | 1333, 23414-72-4 |
| 168 | Zinc peroxide, ZnO <sub>2</sub>                                                                                                       | 2817.00.00 | 1334, 1314-22-3  |
| 169 | Zirconium tetrachloride, ZrCl <sub>4</sub>                                                                                            | 2827.39.00 | 1339, 10026-11-6 |

| A/ä | International name and formula                        | GHS code | (CAS)            |
|-----|-------------------------------------------------------|----------|------------------|
| 1   | 2                                                     | 3        | 4                |
|     | <b>Nervously paralytic exposure</b>                   |          |                  |
| 1   | Phosphorium perchlorate, $\text{Cl}_4\text{NP}$       |          | 1014,101672-21-3 |
| 2   | Phosphorus tricyanide, $\text{P}(\text{CN})_3$        |          | 1027, 1116-01-4  |
| 3   | Triethylphosphine, $(\text{C}_2\text{H}_5)_3\text{P}$ |          | 1265,            |
| 4   | Triphenylphosphine $(\text{C}_6\text{H}_5)_3\text{P}$ |          | 1270,687-80-9    |
| 5   | Dimethylphosphine, $(\text{CH}_3)_2\text{P}$          |          | 519,676-59-5     |
| 6   | Diphosphane                                           |          | 557, 13445-50-6  |
| 7   | Ethylphosphine, $\text{C}_2\text{H}_5\text{P}$        |          | 615,593-68-0     |
| 8   | Phosphinic acid $\text{R}^*\text{POOH}$               |          | 1013,            |
| 9   | Phosphorus pentaoxide, $\text{P}_2\text{O}_5$         |          | 1021, 1314-56-3  |
| 10  | Phosphorus trifluoride, $\text{PF}_3$                 |          | 1028,7783-55-3   |
| 11  | Thionyl chloride, $\text{SOCl}_2$                     |          | 1206,7719-09-7   |
| 12  | Thiophen, $\text{C}_4\text{H}_4\text{S}$              |          | 1207, 110-02-1   |
| 13  | Tributylphosphine $(\text{C}_4\text{H}_9)_3\text{P}$  |          | 1234,998-40-3    |

|    |                                                                                             |            |                  |
|----|---------------------------------------------------------------------------------------------|------------|------------------|
| 14 | Dibutyrylhydrogen phosphate, (C <sub>4</sub> H <sub>9</sub> ) <sub>2</sub> HPO <sub>4</sub> |            | 403,107-66-4     |
| 15 | Diethyl phosphite, (C <sub>2</sub> H <sub>5</sub> O) <sub>2</sub> POH                       |            | 465, 762-04-9    |
| 16 | Phenothiazine, C <sub>15</sub> H <sub>9</sub> NS                                            | 2934.30.00 | 995, 92-84-2     |
| 17 | Phosphorus pentachloride, PCl <sub>5</sub>                                                  | 2812.90.00 | 1019, 10026-13-8 |
| 18 | Phosphorus tribromide, PBr <sub>3</sub>                                                     | 2812.90.00 | 1025,7789-60-8   |
| 19 | Phosphorus trichloride, PCl <sub>3</sub>                                                    | 2812.10.00 | 1026,7719-12-2   |
| 20 | Thiophosphoryl fluoride, PSF <sub>2</sub>                                                   | 2851.00.00 | 1208,2404-52-6   |
| 21 | Triphenyl phosphate, (C <sub>6</sub> H <sub>5</sub> ) <sub>3</sub> PO <sub>4</sub>          | 2919.00.00 | 1298, 115-86-6   |
| 22 | Triphenyl phosphite, (C <sub>6</sub> H <sub>5</sub> ) <sub>3</sub> PO <sub>3</sub>          | 2819.00.00 | 1299, 101-02-0   |

|    |                                                                                               |             |                 |
|----|-----------------------------------------------------------------------------------------------|-------------|-----------------|
|    | <b>Saffocative exposure</b>                                                                   |             |                 |
| 1  | Dibenzoyl peroxide, (C <sub>6</sub> H <sub>5</sub> CO) <sub>2</sub> O <sub>2</sub>            | 2916.32.0 0 | 387, 94-36-0    |
|    | Dicrotonoyl peroxide, (CH <sub>3</sub> CHCHCO) <sub>2</sub> O <sub>2</sub>                    | 2909.60.0 0 | 438, 93506-63-9 |
| 3  | Diethyl azoformate, (NCOOC <sub>2</sub> H <sub>5</sub> ) <sub>2</sub>                         |             | 451, 1972-28-7  |
| 4  | Benzvaline, aH <sub>5</sub> (CH <sub>3</sub> ) <sub>2</sub> CHCH(NH <sub>2</sub> )COOH        |             | 119,659-85-8    |
| 5  | Benzyloxyacetylene, C <sub>6</sub> H <sub>5</sub> COOC <sub>2</sub> H <sub>5</sub>            |             | 130,40089-12-1  |
| 6  | Bis(trichloroacetyl) peroxide, (Cl <sub>3</sub> COO) <sub>2</sub>                             |             | 148,2629-78-9   |
| 7  | Bis(trifluoroacetyl) peroxide, (F <sub>3</sub> COO) <sub>2</sub>                              |             | 149, 383-73-3   |
| 8  | Bromoethylfuran, C <sub>4</sub> H <sub>3</sub> BrO <sub>2</sub> C <sub>2</sub> H <sub>5</sub> |             | 171,4437-18-7   |
| 9  | Butoxyacetylene, C <sub>4</sub> H <sub>9</sub> OC <sub>2</sub> H <sub>5</sub>                 |             | 190,3329-56-4   |
| 10 | Butyl peracetate, CH <sub>3</sub> COOOC <sub>4</sub> H <sub>9</sub>                           |             | 207, 107-71-1   |

|    |                                                                                                 |             |                           |
|----|-------------------------------------------------------------------------------------------------|-------------|---------------------------|
| 1  | Difluoramine, $\text{NHF}_2$                                                                    |             | 469,10405-26-3            |
| 2  | Silver amide, $\text{AgNH}_2$                                                                   | 2851.00.0 0 | 665, 121-82-4             |
| 3  | Ammonium chlorate, $\text{NH}_4\text{ClO}_3$                                                    | 2829.19.0 0 | 64, 10192-29-7            |
| 4  | Ammonium dichromate, $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$                                     | 2841.50.0 0 | 67, 7789-09-5             |
| 5  | Ammonium peroxodisulfate, $(\text{NH}_4)_2\text{S}_2\text{O}_7$                                 |             | 72,7727-54-0              |
| 6  | Ammonium picrate, $\text{C}_6\text{H}_2(\text{NO}_2)_3\text{ONH}_4$                             |             | 73, 131-74-8              |
| 7  | 1-Perchlorylpiperidine, $\text{C}_5\text{H}_{10}\text{NClO}_4$                                  |             | 981,768-34-3              |
| 8  | Diethylamine, $(\text{C}_2\text{H}_5)_2\text{NH}$                                               |             | 446,109-89-7              |
| 9  | Di-isopropylamine, $(i\text{-C}_3\text{H}_7)_2\text{NH}$                                        |             | 482, 108-20-3             |
| 10 | Methylamine, $\text{CH}_3\text{NH}_2$                                                           | 2921.14.0 0 | 825, 74-89-5              |
| 11 | Trimethylamine and solution, $(\text{CH}_3)_3\text{N}$                                          | 2921.11.0 0 | 1280,75-50-3              |
| 12 | Dimethylamine and solution, $(\text{CH}_3)_2\text{N}$                                           |             | 492, 124-40-3             |
| 13 | 3-Chloropropionitrile $\text{C}_2\text{H}_5\text{COCIN}$                                        |             | 320,2003-31-8             |
| 14 | Cyclohexylamine $\text{C}_6\text{H}_{13}\text{N}$                                               | 2921.30.0 0 | 361, 108-91-8             |
| 15 | Morpholine, $\text{C}_4\text{H}_9\text{NO}$                                                     | 2934.90.0 0 | 879, 110-91-8             |
| 16 | Nitroethane, $\text{C}_2\text{H}_5\text{NO}_2$                                                  | 2904.20.0 0 | 907, 79-24-3              |
| 17 | 1 and 2-nitropropane, $\text{C}_3\text{H}_7\text{NO}_2$                                         | 2904.20.0 0 | 921,922, 108-03-2,79-46-9 |
| 18 | N,N-Dimethylethylamine, $(\text{CH}_3)_2\text{C}_2\text{H}_5\text{N}$                           |             | 507, 598-56-1             |
| 19 | Ethylmorpholine, $\text{C}_6\text{H}_{11}\text{NO}$                                             |             | 611, 100-74-3             |
| 20 | 2,2,4-trimethyl-1,3-diaminobutane, $\text{NH}(\text{CH}_3)_2\text{C}(\text{CH}_3)_2\text{NH}_2$ |             | 711, 111-40-0             |

|    |                                                    |             |                |
|----|----------------------------------------------------|-------------|----------------|
| 21 | Eenzylamnie, CfiH5CH?NH?                           | ...         | 122, 100-46-9  |
| 22 | Dibenzylamine, (CRH4CH,)9NH                        |             | 388, 103-49-1  |
| 23 | Pentaethylenehexamine, (C2H2}5H13N6                |             | 968,4067-16-7  |
| 24 | 3-(Diethylamino) propylamine,<br>(C?HS)?N(CH?)3NH? |             | 448, 104-78-9  |
| 25 | N-Erhylpiperidine, C2H5C5H10N                      | 2933.39.0 0 | 616,766-09-6   |
| 26 | Hydroxylamine, NH2OH                               | 2825.10.0 0 | 700,           |
| 27 | N-Phenyl-2-naphthylamine, C6H4C10H7NH2             | 2921.45.0 0 | 1006,135-88-6  |
| 28 | m-phthalodinitrile, C8H4N2                         | 2917.39.0 0 | 1032,626-17-5  |
| 29 | 2,4,6-Trichloro-s-triazine, Cl3N3H3                | 2933.69.0 0 | 1252, 108-77-0 |
| 30 | Triethanolamine, (C2H5O)3N                         | 2922.13.0 0 | 1254, 102-71-6 |

|   |                                       |             |                  |
|---|---------------------------------------|-------------|------------------|
|   | <b>Skin irritant</b>                  |             |                  |
| 1 | 2-Dimethylaminoethanol (CH3)2NC2H4OH  | 2911.00.0 0 | 489, 108-01-0    |
| 2 | Trifluoromethanesulfonic acid FSCSO3H | 2904.90.0 0 | 1271, 1493-13-6  |
|   |                                       |             |                  |
|   | Aggregative exposure                  |             |                  |
| 1 | Cyanogen chloride, CNCl               |             | 352, 506-77-4    |
| 2 | Nitryl chloride, ClCN                 | 2812.10.0 0 | 935, 13444-90-1  |
| 3 | Potassium ferricyanide, K3Fe(CN)3     | 2837.20.0 0 | 1046, 13746-66-2 |
| 4 | Potassium ferricyanide, K4Fe(CN)3     | 2837.20.0 0 | 1047, 13943-58-3 |
| 5 | Potassium hexacyanoferrate, K2Fe(CN)6 | 2837.20.0 0 | 1049, 13746-66-2 |

|    |                                                                       |             |                             |
|----|-----------------------------------------------------------------------|-------------|-----------------------------|
| 1  | Difluoramine, $\text{NH}_2\text{F}_2$                                 |             | 469, 10405-26-1 3           |
| 2  | Silver amide, $\text{AgNH}_2$                                         | 2851.00.0 0 | 665, 121-82-4               |
| 3  | Ammonium chlorate, $\text{NH}_4\text{ClO}_3$                          | 2829.19.0 0 | 64, 10192-29-7              |
| 4  | Ammonium dichromate, $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$           | 2841.50.0 0 | 67, 7789-09-5               |
| 5  | Ammonium peroxodisulfate, $(\text{NH}_4)_2\text{S}_2\text{O}_8$       |             | 72, 7727-54-0               |
| 6  | Ammonium picrate, $\text{C}_6\text{H}_3(\text{NO}_2)_3\text{ONH}_4$   |             | 73, 131-74-8                |
| 7  | 1-Perchlorylpiperidine, $\text{C}_5\text{H}_{10}\text{NClO}_4$        |             | 981, 768-34-3               |
| 8  | Diethylamine, $(\text{C}_2\text{H}_5)_2\text{NH}$                     |             | 446, 109-89-7               |
| 9  | Di-isopropylamine, $(i\text{-C}_3\text{H}_7)_2\text{NH}$              |             | 482, 108-20-3               |
| 10 | Methylamine, $\text{CH}_3\text{NH}_2$                                 | 2921.14.0 0 | 825, 74-89-5                |
| 11 | Trimethylamine and solution, $(\text{CH}_3)_3\text{N}$                | 2921.11.0 0 | 1280, 75-50-3               |
| 12 | Dimethylamine and solution, $(\text{CH}_3)_2\text{N}$                 |             | 492, 124-40-3               |
| 13 | 3-Chloropropionitrile $\text{C}_2\text{H}_5\text{COCN}$               |             | 320, 2003-31-8              |
| 14 | Cyclohexylamine $\text{C}_6\text{H}_{13}\text{N}$                     | 2921.30.0 0 | 361, 108-91-8               |
| 15 | Morpholine, $\text{C}_4\text{H}_9\text{NO}$                           | 2934.90.0 0 | 879, 110-91-8               |
| 16 | Nitroethane, $\text{C}_2\text{H}_5\text{NO}_2$                        | 2904.20.0 0 | 907, 79-24-3                |
| 17 | 1 and 2-nitropropane, $\text{C}_3\text{H}_7\text{NO}_2$               | 2904.20.0 0 | 921, 922, 108-03-2, 79-46-9 |
| 18 | N,N-Dimethylethylamine, $(\text{CH}_3)_2\text{C}_2\text{H}_5\text{N}$ |             | 507, 598-56-1               |
| 19 | Ethylmorpholine, $\text{C}_4\text{H}_9\text{NO}$                      |             | 611, 100-74-3               |
| 20 | 2,2,4-trimethyl-1-piperidine, $\text{NHC}_4\text{H}_9\text{NH}_2$     |             | 711, 111-40-0               |

|    |                                                                                                        |             |                |
|----|--------------------------------------------------------------------------------------------------------|-------------|----------------|
| 21 | Benzy <sup>^</sup> -ninie, C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> NH <sub>2</sub>               |             | 122, 100-46-9  |
| 22 | Dibenzylamine, (C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> ) <sub>2</sub> NH                        |             | 388, 103-49-1  |
| 23 | Pentaethylenhexamine, (C <sub>2</sub> H <sub>2</sub> ) <sub>5</sub> H <sub>10</sub> N <sub>6</sub>     |             | 968,4067-16-7  |
| 24 | 3-(Diethylamino) propylamine. (C, <sub>h</sub> U,N(CH, <sub>h</sub> ),NH,                              |             | 448, 104-78-9  |
| 25 | N-Erhyllpiperidine, C <sub>2</sub> H <sub>5</sub> C <sub>5</sub> H <sub>10</sub> N                     | 2933.39.0 0 | 616,766-09-6   |
| 26 | Hydroxylamine, NH <sub>2</sub> OH                                                                      | 2825.10.0 0 | 700,           |
| 27 | N-Phenyl-2-naphthylamine, C <sub>6</sub> H <sub>4</sub> C <sub>10</sub> H <sub>7</sub> NH <sub>2</sub> | 2921.45.0 0 | 1006,135-88-6  |
| 28 | m-phthalodinitrile, C <sub>8</sub> H <sub>4</sub> N <sub>2</sub>                                       | 2917.39.0 0 | 1032,626-17-5  |
| 29 | 2,4,6-Trichloro-s-triazine, Cl <sub>3</sub> N <sub>3</sub> H <sub>3</sub>                              | 2933.69.0 0 | 1252, 108-77-0 |
| 30 | Triethanolamine, (C <sub>2</sub> H <sub>5</sub> O) <sub>3</sub> N                                      | 2922.13.0 0 | 1254, 102-71-6 |

|   |                                                                                        |             |                 |
|---|----------------------------------------------------------------------------------------|-------------|-----------------|
|   | <b>Skin irritant,</b>                                                                  |             |                 |
| 1 | Dimethylaminoethanol (CH <sub>3</sub> ) <sub>2</sub> NC <sub>2</sub> H <sub>4</sub> OH | 2911.00.0 0 | 489, 108-01-0   |
| 2 | Trifluoromethanesulfonic acid, F <sub>3</sub> CSO <sub>3</sub> H                       | 2904.90.0 0 | 1271, 1493-13-6 |

### Aggregative exposure

|   |                                                                |                  |                   |
|---|----------------------------------------------------------------|------------------|-------------------|
| 1 | Cyanogen chloride, CNCl                                        |                  | 352, 506-77-4     |
| 2 | Nitryl chloride, ClCN                                          | 2812.0 1 .0<br>0 | 935, 13444-90-1   |
| 3 | Potassium ferricyanide, K <sub>3</sub> Fe(CN) <sub>6</sub>     | 2837.0 2 .0<br>0 | 1046 , 13746-66-2 |
| 4 | Potassium ferricyanide, K <sub>4</sub> Fe(CN) <sub>6</sub>     | 2837.0 2 .0<br>0 | 1047 , 13943-58-3 |
| 5 | Potassium hexacyanoferrate, K <sub>2</sub> Fe(CN) <sub>6</sub> | 2837.0 2 .0<br>0 | 1049 , 13746-66-2 |