SAFETY AND ENVIRONMENTAL ANNUAL REPORT 2005

DG JRC
Institute for Energy

June 2006

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Institute for Energy

Mission of the Institute for Energy
The Institute for Energy provides scientific and technical support for the conception, development, implementation and monitoring of community policies related to energy. Special emphasis is given to the security of energy supply and to sustainable and safe energy production.

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GLOSSARY

BHV	Bedrijfs Hulp Verlening (Company Emergency Organisation)
BNP	Bedrijfsnoodplan (Company Emergency Plan)
BNCT	Boron Neutron Capture Therapy
CPR	Commissie voor de Preventie van Rampen door gevaarlijke stoffen (Committee for the prevention of disasters by dangerous goods: old guideline for storage of dangerous goods)
DNV	Det Norske Veritas
ECN	Energieonderzoek Centrum Nederland (Energy Research Centre of the Netherlands)
EMS	Environmental Management System
HFR	High Flux Reactor
HSC	Health and Safety Committee
IE	Institute for Energy
INO	Interne Noodorganisatie (Internal Emergency Plan)
ISO	International Organisation for Standardisation
JRC	Joint Research Centre
NER	Nederlandse Emissie Richtlijn (Dutch Emission Guideline)
NRG	Nuclear Research and consultancy Group
H&S MS	Health and Safety Management System
OHSAS	Occupational Health and Safety management System
PGS	Publicatiereeks Gevaarlijke Stoffen (Publication Series for Dangerous Goods: new guideline for storage of dangerous goods)
RBP	Rampbestrijdingsplan (Disaster Fighting Plan)
RNPK	Revitalisatie Nationaal Plan Kerngevallen (Revitalisation National Nuclear Emergencies Plan)
SES	Safety, Environment, Security
Wm	Wet milieubeheer (Environmental Management Act)
Wvo	Wet verontreiniging oppervlaktewateren (Surface water pollution Act)

PURPOSE:
This document is the integrated safety and environmental annual report 2005 of the JRC-IE. The report describes safety and environmental activities, targets, impacts and the management system of the Institute. This report is published annually.

FOREWORD

The Institute for Energy (IE), situated in Petten, The Netherlands, is one of the seven research institutes of the Directorate General Joint Research Centre (DG JRC) of the European Commission. The total number of staff in Petten varies between 200 and 250.

The activities of the Institute for Energy encompass:

- Nuclear safety in the enlarged EU and support for nuclear safety in the Newly Independent States (NIS) of the former Union of Soviet Socialist Republics (TACIS Nuclear Safety Programme) and in the Central and Eastern European Countries (CEEC) (PHARE Nuclear programme);
- Safety of innovative nuclear energy systems;
- Clean and efficient waste incineration; waste to energy and biomass combustion; clean energy conversion and alternative fuels with a particular emphasis on hydrogen;
- Harmonisation and validation of safety and performance assessment of fuel cells and hydrogen storage technology.

All of these actions support the EU policy for a cleaner environment. These actions also involve networking activities, in line with the Commission's initiative for a European Research Area (ERA).

The Institute has research laboratories for the characterisation, testing and analysis of various materials, components, products and processes. As a reference laboratory, IE also validates different kinds of testing methods.

Training of EU Member State and Candidate country scientists is an important activity. The number of visiting staff is typically between 30 and 50.

The High Flux Reactor (HFR) is utilised in several ways. The material and fuel irradiation tests support the design of more effective and safer nuclear power plants. The operator and license holder NRG is using the reactor in the production of radioisotopes for medical purposes and in other commercial purposes. Furthermore, the neutrons produced in the reactor are used for treatment of tumour patients using Neutron Capture Therapy (NCT) methodology.

The Institute has certified ISO 9001 and ISO 14001 Quality and Environmental Management Systems.

This report highlights the actions and achievements of Institute for Energy in the area of safety and environmental management in 2005. The improvements noted under the different themes of health safety and environment show the willingness of the Institute management and staff to continuously improve this essential aspect of the work place.

The progress made is only possible with the cooperation of all. I would like to express my appreciation to the staff and I encourage them to continue their valuable contribution to this.

Petten, June 2006

Kari Törrönen
Director

1. SAFETY, HEALTH AND WELL-BEING RELATED ACTIVITIES

1.1. Background

The Safety, Health and Well-Being of all persons at the Institute have always been a focal point of the management. In 2004 the management decided to replace the existing general site safety regulations by an OHSAS 18001[1] based Safety and Health Management System (S&H MS). This integrated safety and environmental annual report is one step in the process of developing and implementing the S&H MS.

1.2. Near accidents, accidents and absence due to illness

In 2005 seventeen near accidents/accidents were reported. Two resulted in a consultation with a general practitioner. No accident requiring a report to the authorities has taken place. The overall absence due to illness was 2.2% of the total work time in 2005.

In 2004 there were 8 reported near accidents/accidents. The increase in reported near accidents/accidents is due to a better implementation of the reporting system and not due to an unsafe working environment. For the next couple of years more reporting of unsafe situations is expected.

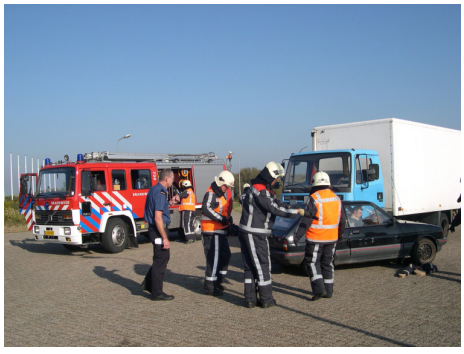
1.3. Emergency preparedness

Three emergency scenarios at the Petten research location are indicated in Table 1 together with relevant documents defining the actions to be taken.

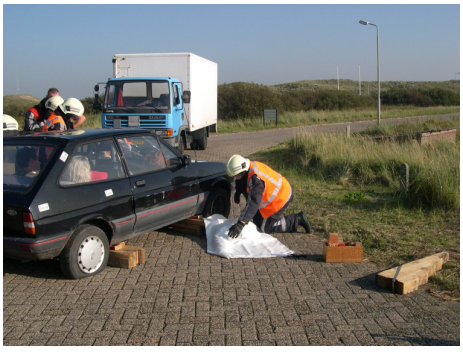
Table 1 Emergency scaling

Emergency scenario	Scale	Document
Company	JRC-IE	Company Emergency Plan [Bedrijfsnoodplan (BNP)]
Site	Petten research location	Internal Emergency Plan [Interne Noodorganisatie (INO)]
Off site	Municipality Zijpe	Disaster Repression Plan [Rampbestrijdingsplan (Rbp)]

To increase the emergency awareness of all staff, exercises at BNP and INO level have been carried out. Evacuation exercises were held in all buildings of the JRC-IE. A traffic accident scenario was used in an INO exercise.



INO exercise



In 2005 the process of reviewing the disaster repression plan was started by the municipality, representatives of the Institute were actively involved in this process.

1 An international occupational health and safety management system specification, embracing BS8800, AS/NZ 4801, NSAI SR 320 and a number of other publications, developed to be compatible with the ISO 9001 (Quality) and ISO 14001 (Environmental) management systems standards.

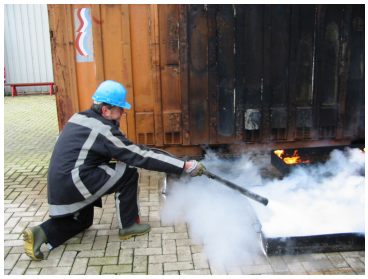
1.4. Safety related training and instructions

The JRC-IE organized internal and external training for its staff as shown in Table 2.

Table 2 Safety related training of JRC-IE staff

Emergency Training	Specific tools	Specific procedures
First Aid (Refreshment)	Fitting – prepare fittings	Radiation Protection different levels
Head of BHV	Inspection climbing equipment	Fuel Cell testing
BHV total	Operation of Building Management System	Effective Safety Management
BHV refreshment	Forklift truck licence	Ionising radiation refreshment
		Safety regulations for low voltage installations NEN 1010
		Transition CPR 15 → PGS 15

Furthermore, each newcomer receives general safety instructions specific to the Petten research location. Job-specific instructions are given by the Unit/Sector to which he/she belongs. Contractors and external companies working at the JRC-IE received the document W380-1 “Safety regulations for third parties working at the JRC-IE Petten site”.



BHV course

1.5. Inspections and Audits

At the Institute, various internal and external persons frequently carry out both planned and unplanned inspections and audits. The Director, the Heads of Unit, the SES Sector Head and internal auditors are examples of the internal personnel involved.

External personnel including the Medical Service of the European Commission (Luxembourg), representatives of the fire insurers, external auditors, the municipality and other inspection services of national authorities visited the Institute on several occasions. Inspection reports were always followed by action plans if applicable.

1.6. Medical supervision

The members of staff of the Institute are under the medical supervision of the Medical Service of the European Commission. The medical doctor and his staff visited the Petten site regularly for the annual medical check ups for personnel.

1.7. Radiological workers

About 25% of the JRC-IE staff is registered as a radiological worker. The measurement and registration of their exposure to ionising radiation is contracted with NRG. The figures in Table 3 present the highest individual doses of the exposed staff. All doses were well below the legal limits as defined in the Council Directive 80/836/Euratom and amending Directives.

Table 3 Dose of exposed people

Year	Number of staff	Dose (mSv) Highest individual dose
2002	52	0.33
2003	56	0.29
2004	55	0.92
2005	47	0.78

1.8. Health and Safety committee

The Health and Safety Committee (HSC) of the Institute is comprised of eight staff, nominated equally by the personnel representatives and the Director. The main task of the committee is to advise the management on safety matters. The frequency of meetings is once a month with the exception of the main vacation periods. In 2005 the Committee had ten meetings.

1.9. Status of goals for 2005

Activity	**Time schedule/ deadline**	**Status end 2005**
Annual Safety and Environmental Report 2004	Jun 2005	Completed
Risk assessment in the laboratories	Jul 2005	Completed
Establishment of a Risk Index and actualisation method	Sep 2005	Pending
Definition of H&S tasks, responsibilities and authorities	Oct 2005	To be approved
The development of OHSAS 18001 based H&S MS	Oct 2005	70%
Development of procedures and instructions for the H&S MS	Oct 2005 – Dec 2005	70%
Composition of H&S handbook	Jan 2006 – Dec 2006	To be approved
Legal Requirements Index	April 2006	Pending
Implementation of H&S MS	Jan 2006 – May 2006	Ongoing
Certification audit for the H&S MS	Jun 2006 – Jul 2006	Ongoing
Annual internal audits of the H&S MS	Ongoing activity	Ongoing
Evaluation of training needs for H&S	Ongoing activity	Ongoing

1.10 Goals for 2006

For the first time the Institute set up a safety programme. In the programme general safety goals are set for a period of 3 years. The first Health and Safety programme covers the period 2006-2008. The specific goals for 2006 are worked out in the Health and Safety Annual plan.

1. Awareness and training

1.1. Safety campaign
- The campaign will be connected to the European safety week organised by EU-OSHA (23-27 October 2006)
- The campaign material will include a poster exhibition, safety equipment exhibition and a dedicated safety site on IE Intranet

1.2. Safety presentations at Unit meetings
- Presentations will be given minimum twice in 2006 in each Unit.
- One focus point will be encouragement to report near-accident/accidents

2. Safety Management System

2.1. Maintaining the Safety Management System
- Complete the Safety Management Manual and other safety related documents
- Include the Safety Management System to the certification process

2.2. Prepare and publish the Annual Health and Safety Report
- Report should be sent to the municipality by end of June

3. Hazard identification, risk assessment and risk control

3.1. Prepare safety checklists
- Prepare safety checklists suitable for all types of workplaces
- Publish the list as a Quality document
- Begin the risk assessments using the checklist

3.2. Monitoring corrective actions
- Establish an effective computerised system for monitoring the corrective actions originating from the different inspections
- Upload all the current pending actions to the system

2. ENVIRONMENTAL RELATED ACTIVITIES

2.1. Background

In September 2005, Det Norske Veritas (DNV) acknowledged JRC-IE efforts to transfer the Environmental Management System ISO 14001:1996 standard to the upgraded ISO 14001:2004 standard. The certification of the EMS is a key requirement of the environmental site licence of the Institute. The licence for wastewater licence ("Wvo vergunning") and an environmental licence ("Wm vergunning") were granted early 2005.

In 2005 the Institute was audited by the Internal Audit Service of the DG JRC on the Environmental Management.

2.2. Environment related training and instructions

Similar to safety, each newcomer receives a general instruction on the EMS system and related work instructions. The Unit/Sector to which he/she belongs provides job specific instructions for the newcomer. A training was organized for lab managers and other interested parties on the changes from CPR 15 to PGS 15. One person has followed a course for environmental coordinator.

2.3. The main operational items in 2005

For two major new installations, the fuel-cell testing facility and the hydrogen storage testing facility, the local authorities have granted the construction licence and the environmental licence in 2004. The construction of the fuel-cell testing facility was finished during 2005. The finalisation of the hydrogen storage testing facility is still ongoing.

In 2005 the Institute kicked off the renovation plan of buildings 308, 309 and 313. The renovation of the façade of building 310 was completed. The JRC-IE expects energy savings resulting from the construction types and the materials used.

Artist impression 308 & 309

Temporary offices during construction

2.4. Status of goals of 2005

Activity	**Time schedule/ deadline**	**Status end 2005**
Maintaining the ISO 14001 certificate;	2005	Recertification in 2006
Drawing up and publishing the annual safety and environmental report;	June 2005	Completed
Comparing the storage of hazardous substances against the new PGS 15 directive;	2005	Ongoing activity
Monitoring the drainage system, including the filters;	2005	Ongoing activity
Launching a call for tender to select a company which evaluates the JRC-IE compliance with the environmental licence and legislation	2005	Pending
Preparing and implementing a Work Instruction on "Working with solvents"	2005	Pending
Communicating on (interim) safety and environmental results and enhancement of environmental awareness	2005	Ongoing activity
Drawing up a long-range plan to replace freon in the cooling systems	2005	Completed

2.5 Goals for 2006

Environmental goals are set for a period of 3 years in the Environmental programme 2006-2008. The specific goals for 2006 are worked out in the Environmental Annual plan.

1. Awareness and risk assessment

1.1 Information to all staff
- Environmental issues will be presented in 2 unit meetings per year.
- The environmental information to all staff through intranet will be increased. A dedicated intranet site will be developed and introduced.

1.2 Hazardous substances
- Analyze the current processes on ordering, storage and handling of hazardous substances.

2. Consumption of natural resources

2.1 Reduce consumption of natural resources
- Perform an energy scan which should show possibilities for reducing energy consumption.
- Defining actions coming from the energy scan.

3. Environmental performance indicators system

3.1 Define environmental performance indicators
- Set up IE goals and Unit goals related to the environment.
- Improve the data management and the availability of reliable data on resources (e.g. use of: water, paper, energy, etc).

3. ENVIRONMENTAL IMPACTS

3.1. Energy consumption

JRC-IE uses electricity and natural gas as energy sources. The gas heating systems are of energy saving (high efficiency) type. Maintenance of the heating system is done annually. The figures for the consumption of gas and electricity are shown in Table 4.

Table 4 Consumption of gas and electricity

Year	Number of staff	Gas (m3)	Electricity (kWh) (excl. HFR)	Number of days with temperature < 0 °C
2003	191	484 695	2 854 854	81
2004	213	435 324	2 932 122	68
2005	213	440 662	2 588 599	51

The number of staff members and the weather conditions influence the variation in the annual consumption.

3.2. Water consumption

The water consumption of the JRC-IE (excluding HFR) is shown in Table 5. The figures show that the efforts to reduce the water consumption have been successful over the last years. The data of 2003 is gathered from the measuring system of the main supply of the Institute. The significant difference in the figures of the water consumption of the Institute between the readings of earlier years is a result of a systematic error in the measuring system on the main supply for the Institute. The data on water consumption of 2004 and 2005 comes from the JRC-IE building management system.

Table 5 Consumption of water

Year	Water (m^3)
2003	(9 238)
2004	4 402
2005	3 334

3.3. Emissions to water

The laboratories are the main source of emissions to water. These emissions are analysed annually by an external company. The analysis method is based on sampling of the total drain water flow during one week. In 2004 the samples were taken in the period from 27 October to 3 November. The analysis covers organic wastes, chloride and heavy metals. The release of heavy metals to the drain system is presented in Table 6.

Table 6 Release of heavy metals to the drain system

Metal	Concentration (mg/m^3)			
	2002	2003	2004	2005
Cadmium (Cd)	< 2.0	< 2.0	< 1.0	< 0.4
Chromium (Cr)	< 5.0	6.8	< 5.0	< 5.0
Copper (Cu)	74.0	140.0	54.0	64.0
Nickel (Ni)	< 5.0	< 5.0	< 5.0	< 5.0
Lead (Pb)	< 5.0	12.0	< 5.0	< 5.4
Zinc (Zn)	63.0	96.0	70.0	100.0
Mercury (Hg)	0.16	0.11	< 0.1	< 0.1
Arsenic (As)	< 5.0	< 5.0	< 2.0	< 2.0

The licence limits are (mg/m^3):
Mercury: 10
Cadmium: 20
Other metals: 5000

The results show that emissions are within the limits of the permit. According to the company which conducted the analyses the relatively high concentration of copper and zinc originates from the water piping system.

The emissions of inorganic substances to the draining system are measured using the same method as for heavy metals. The figures are presented in Table 7.

Table 7 Inorganic emissions to the drain system

Substance	Year			
	2002	2003	2004	2005
Chloride (Cl^-) (g/m^3)	360	260	190	200

The values do not exceed the acceptable pollution limits. Typical limit value for chloride is 350 g/m^3.

3.4. Emissions to air

Emissions to the air consist primarily of small amounts of process gases and noble gases from the research laboratories.

JRC-IE has eight material testing research laboratories and the same number of support laboratories. These laboratories test components and test pieces of power plants and petrochemical plants under simulated conditions (elevated temperatures, high pressure, toxic and explosive environments) for creep, fracture and thermal fatigue. These laboratories use inert gases (Helium, Neon, Argon, and Nitrogen) and process gases (Hydrogen). In addition, gas mixtures of Argon, Nitrogen or air with gases presented in Table 8 are used (except SF_6). The SF_6 is used to produce an isolating atmosphere in some measurement equipment.

Some of the gases used in testing laboratories have environmental effects. The consumption of these bottled gases for the year 2005 is shown in Table 8.

Table 8 Amount of gases with environmental effect

Substance	Emission of JRC-IE			NeR-reference			
	kg/year	Emission hours/ year	g/hour	NeR category	Limit value (g/hour)	Max concentration (mg/m^3)	Remarks
HCl	0.13	1400	< 0.1	gA.3	150	10 30	Uncleaned concentration < 1 g/m^3 Uncleaned concentration > 1 g/m^3
CO_2	28	1400	20	-	-	-	No NeR requirements
H_2	2.7	1200	2.3	-	-	-	No NeR requirements

The use of these gases has not produced any health problems to the JRC-IE personnel or to the public in the surrounding area. No odor problems have been reported. The emission values are below the values defined in the Netherlands Emission Guidelines for Air (NeR).

3.5. Noise

No complaints related to noise were made by third parties.

The activities carried out at JRC-IE do not produce noise levels that would be harmful to the surrounding population or the environment.

3.6. Nuclear aspects

The environmental aspects concerning the HFR operating company NRG is reviewed quarterly. An independent expert does this by checking the NRG reports (Rapportage NRG Petten t.b.v. VROM Inspectie-KFD).

3.7. Waste

The type of waste produced, and the collected amounts are presented in Table 9.

Table 9 Type of waste by volume or weight

Type of waste	2003	2004	2005
	Amount	Amount	Amount
Household waste	1250 m^3	36.5 t*	1206 m^3
Paper and cardboard	350 m^3	28 t*	338 m^3
Wood	30 m^3	60 m^3	44 m^3
Glass	6 m^3	3 m^3	3 m^3
Metal	80 m^3	100 m^3	32 m^3
Electrical appliances (audiovisual and household)	30 m^3	30 m^3	30 m^3

The figures are based on the volumes of the containers.
*In 2004 the household waste and paper was measured in weight by the disposal company.

Some figures are difficult to interpret as the waste company is measuring waste consumption either by volume (number of bins collected) or weight. This will be addressed in the renewal of the waste collection contract.

Chemical waste

Chemicals including paints, batteries, solvents and acids are collected centrally at a chemical waste store. At regular intervals a certified waste treatment company collects the chemical waste from the store.

Small chemical waste (batteries and cartridges) is not only originating from the IE activities, as staff members are encouraged to use the collection bin for their old private batteries and cartridges as well. On the initiative of staff members a major part of the revenue originating from this waste is going to charitable purposes, a school in the region. The school is getting subvention for the collected batteries and cartridges to finance projects.

In 2004 the amount of chemical waste was lower than in the previous year due to a better management of the chemical resources. The amount of chemical waste depends on the activities in the laboratories. The types of waste and the amounts are specified in Table 10.

Table 10 Type of waste by weight

Type of waste	2003	2004	2005
	Amount (kg)	Amount (kg)	Amount (kg)
Small chemical: Batteries Cartridges	 200 250 pieces	 160 300 pieces	 400 300 pieces
Laboratory mixed waste	600	0	3.3
Oil filters; oil containing products	184	60	23
Solvents	211	86	5
Spray containers, paint	138	90	16.14
Developer	715	272	0
Oil	35	117	64.1
Acid	369	14	0
Sodium/potassium	6.5	0	0
Medical waste	n.a.	n.a.	1
Asbestos containing material	n.a.	n.a.	115
Heavy metals	n.a.	n.a.	18.66

Hydraulic oil is collected and disposed of as part of the maintenance contract of each machine and equipment.

The increase in batteries is due to the fact that more and more staff is bringing their private batteries to the collection box.

4. CONCLUSIONS

This Safety and Environmental annual report has described the activities related to the health, safety and well being of the Institute staff. Further the management of the environmental impact of our activities are presented.

Concerning the activities related to the health, safety and well being several aspects are monitored and is the subject of continual improvement. The data on the declaration of near accidents has shown that the awareness campaigns are beginning to bear fruit. This is indeed confirmation of the Institute staff awareness and the recognition that such declarations contribute to improved safety.

Emergency preparedness actions have progressed both on a local site level and in collaboration with the Municipality to ensure a more efficient and effective emergency response.
Audits conducted by both Institute and external organisations are key to monitoring implementation, progress and corrective actions in the area of health, safety and well being. The regular inspections and medical visits and specific safety related training of the staff have been an important aspect of this.

On an Institute level the joint staff committee on Health and Safety, which comprises members from the staff and the direction, has an important advisory role in the management and implementation of health and safety related issues.

The emissions to water and air are seen to respect the relevant limits. The figures available for the waste produced show improvement. The system for the monitoring of house hold and paper waste has shown some shortcomings – measurement by weight or volume. This aspect will be addressed in the discussions during the renewal of the waste collection contracts.

Finally the Commission has published a draft policy for Health and Safety at Work at the end of 2005 (Commission Decision (1623) establishing a Harmonised Policy for Health and Safety at Work for all Commission staff). This document will be used as a basis to further develop the existing policies on health, safety and well being of the staff of the Institute.

The ISO 14001 certification has been a key element for the environmental related activities reported. Training of staff in environmental aspects of their specific work and on a more global Institute level has continued. Significant renovation work has commenced on the existing buildings on site. Not only will the final installations further improve the working conditions of the staff but also particular emphasis has been given to ensure energy savings. Within the context of the Environmental Programme 2006-2008 the specific goals for 2006 include awareness and risk assessment, consumption of natural resources and the environmental performance indicator system.

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Abstract
The Safety & Environmental Annual Report 2005 describes the health, safety and environmental activities, targets, impacts and management system of the JRC Institute for Energy in Petten.

The mission of the Joint Research Centre is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

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