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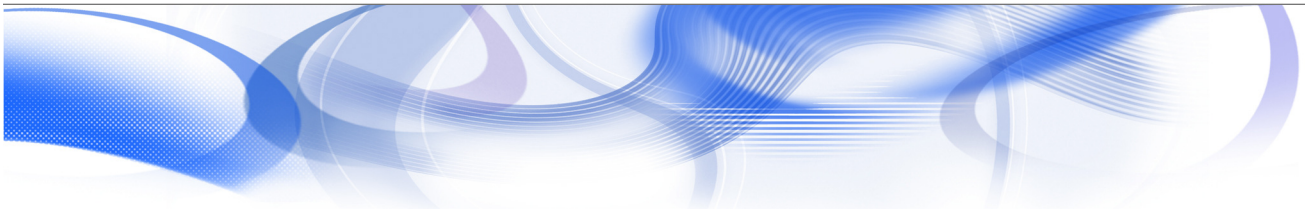

An Integrated OHSAS 18001, ISO 14001 and ISO 9001 Management System in the Institute for Reference Materials and Measurements

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The mission of the JRC-IRMM is to promote a common and reliable European measurement system in support of EU policies.

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FOREWORD

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Thanks also to Goedele de Bruyne for provision of the environmental data and to the IRMM Quality Team for making the assessment database as rich in detail as it was, facilitating such a report to be made.

ABBREVIATIONS

ADR = BELGIAN REGULATION ON TRANSPORT OF DANGEROUS GOODS
AMP = ANNUAL MANAGEMENT PLAN
ARAB = (HET) "ALGEMEEM REGLEMENT VOOR ARBEIDSBESCHERMING" OR THE BELGIAN FEDERAL REGULATION ON OCCUPATIONAL HEALTH AND SAFETY
ARBIS = BELGIAN FEDERAL REGULATION ON RADIATION PROTECTION AND NUCLEAR SAFETY
AREI = BELGIAN FEDERAL REGULATION ON ELECTRICAL SAFETY
BIPM = "BUREAU INTERNATIONAL DES POIDS ET MESURES"
CAR = CORRECTIVE ACTION REQUEST
CBMN = CENTRAL BUREAU FOR NUCLEAR MEASUREMENTS
CE = CAPILLARY ELECTROPHORESIS
CPPW = COMMITTEE FOR THE PREVENTION & PROTECTION AT WORK
CRL = COMMUNITY REFERENCE LABORATORY
CRM = CERTIFIED REFERENCE MATERIALS
DG = DIRECTORATE-GENERAL
DIR = DIRECTION
DNA = DEOXYRIBONUCLEIC ACID
EC = EUROPEAN COMMISSION
ELSD = EVAPORATIVE LIGHT SCATTERING DETECTOR
EMAS = ECO-MANAGEMENT & AUDIT SCHEME (EMAS)
EU = EUROPEAN UNION
FSQ = FOOD SAFETY & QUALITY
GC = GAS CHROMATOGRAPHY
GMO = GENETICALLY MODIFIED ORGANISMS
GPP = GLOBAL PREVENTION PLAN
HI & RA = HAZARD IDENTIFICATION AND RISK ASSESSMENT
HPLC = HIGH PERFORMANCE LIQUID CHROMATOGRAPHY
HVAC = HEATING, VENTILATION, AIR CONDITIONING
IAC = INTERNAL AUDIT CAPABILITY
IAEA = INTERNATIONAL ATOMIC ENERGY AGENCY
IATA = INTERNATIONAL REGULATION ON TRANSPORT OF DANGEROUS GOODS
IBM = INTERNATIONAL BUSINESS MACHINES
ICP = INDUCTIVELY COUPLED PLASMA
ICS = INTERNAL CONTROL STANDARDS
IDPM = INSTITUTE DEVELOPMENT & PROJECT MANAGEMENT
IHCP = INSTITUTE FOR HEALTH AND CONSUMER PROTECTION
IM = ISOTOPE MEASUREMENTS
IMS = INTEGRATED MANAGEMENT SYSTEM
INF = INFORMATICS
IQM = INSTITUTE QUALITY MANAGER
IRMM = INSTITUTE OF REFERENCE MATERIALS AND MEASUREMENTS
IR = INFRA RED
ISM = INFRASTRUCTURE & SITE MANAGEMENT
ISO = INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
JRC = JOINT RESEARCH CENTRE
KB = "KONINKLIJK BESLUIT" OR ROYAL DECREE
LINAC = LINEAR ACCELERATOR

LN = LOTUS NOTES
MS = MASS SPECTROMETRY
MSU = MANAGEMENT SUPPORT UNIT
NCMR = NON-CONFORMITIES
NIRAS = "NATIONALE INSTELLING VOOR RADIOACTIEF AFVAL OF VERRIJKTE SPLIJTSTOFFEN" (BELGIAN AGENCY FOR RADIOACTIVE WASTE OR ENRICHED FISSILE MATERIAL).
NP=NEUTRON PHYSICS
OHSAS = OCCUPATIONAL HEALTH & SAFETY ASSESSMENT SERIES
OIA = OPERATING INITIATING AGENT
PAR = PREVENTIVE ACTION REQUEST
PI = PERFORMANCE INDICATOR
QSHE = QUALITY, SAFETY, HEALTH, ENVIRONMENT
QSI = QUALITY SYSTEM INTERNATIONAL
RA = RISK ASSESSMENT
RITT = REQUEST INVITATION TO TENDER
RM = REFERENCE MATERIALS
RN = RADIONUCLIDES
RNA = RIBONUCLEIC ACID
RTO = REQUEST TO ORDER
SCK = STUDIECENTRUM VOOR KERNENERGIE
SHES = SAFETY, HEALTH, ENVIRONMENT AND SECURITY
TLC = THIN LAYER CHROMATOGRAPHY
UV = ULTRA VIOLET
VDG = VAN DE GRAAFF
VLAREM = FLEMISH REGIONAL REGULATION ON THE PROTECTION OF THE ENVIRONMENT
9/14/18 = ISO 9001, ISO 14001 AND OHSAS 18001

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1. INTRODUCTION

Today's buzz words include efficiency, integration, added value, synergy, win-win, to mention but a few. Though we try and avoid their over use, the idea of a management system which could be described in such terms is certainly appealing. However a certain organisation "maturity" is necessary before an attempt at an integrated management system is worthwhile (Kennedy & Kirwan[1] 1998; Neal[2] et al., 2000; Cooper[3], 2000; O'Toole[4], 2002; Alvesson[5], 2002; Richter & Koch[6], 2004). It helps if the organisation also has a "learning" culture, meaning, in its simplest form that it is ready to learn from past experience and is organised in such a way as to be able to provide continuous training. Therefore a brief description of IRMM will be provided along with a synopsis of its past, in an effort to show when and how opportunities for growth and change came about and how the organisational culture (including safety culture) evolved during this time.

1.1. INSTITUTE OF REFERENCE MATERIALS AND MEASUREMENTS (IRMM).

Being one of the seven institutes of the Joint Research Centre (DG JRC) makes, the Institute of Reference Materials and Measurements (IRMM) a core partner and service provider to many of the 26 Directorates-General (DGs) of the European Commission, of various European Agencies as well as International Organisations, such as the International Atomic Energy Agency (IAEA), “Bureau International des Poids et Mesures” (BIPM) etc. The fact that DG JRC is the only European Commission DG with research facilities as well as the fact that IRMM is one of the world's leading reference material producers, adviser in food safety and quality and bio-analysis as well as a provider of reference measurement data meant that attaining the appropriate accreditations became the first obvious hurdle some years ago.

At the same time as the specialised units within IRMM were aiming for accreditation, the need for an integrated management system covering the ISO 9001, the ISO 14001 and the OHSAS 18001 became obvious.

1.2. IRMM'S GROWTH PHASES

[1] Kennedy R. and Kirwan B., Development of a hazard and operability-based method for identifying safety management vulnerabilities in high risk systems, *Safety Science* **30** (1998), pp. 249–274
[2] Neal A., Griffin M.A. and Hart P.M., The impact of organizational climate on safety climate and individual behaviour, *Safety Science* **34** (2000), pp. 99–109
[3] Cooper M.D., Towards a model of safety culture, *Safety Science* **36** (2000), pp. 111–136
[4] O’Toole M., The relationship between employees’ perceptions of safety and organizational culture, *Journal of Safety Research* **33** (2002), pp. 231–243
[5] Alvesson M., Understanding Organizational Culture, Sage, London (2002)
[6] Richter A. and Koch C., Integration, differentiation and ambiguity in safety cultures, *Safety Science* **42** (2004), pp. 703–722

IRMM was founded in 1957 under the Treaty of Rome (The treaty establishing the European Atomic Energy Community, article 8) and started operation in 1960 under the name of the Central Bureau for Nuclear Measurements (CBNM). In 1993 it was renamed to reflect the new mission[7] of the institute, which covers a wide range of measurement problems from food safety to environmental pollution. It grew from being an institute of < 21 employees, all from the founder Member States to currently hosting ~ 320 staff of 20-25 nationalities and up to 23 languages, of which, English, Dutch and French are the languages used for written communications.

In this way, IRMM properly embraces one of the aims of the Lisbon Agenda, where the Heads of State of the EU 25 state that they want a *"removal of obstacles to physical, labour and academic mobility*" though it is meant to be realised in a much broader sense than simply within the Commission itself.

1.3. HISTORY OF IRMM IN ITS JRC CONTEXT.

1960 → 1969: The European Atomic Energy Community (Euratom) Treaty was signed by six European countries in 1957. In 1960, the Central Bureau for Nuclear Measurements (CBNM), was established in Geel, Belgium. The CBNM specialised in nuclear measurements for isotope analysis and absolute measurements of radiation and neutron absorption, essential in understanding how to safely produce nuclear energy. In 1962, the Van de Graaff (VdG) accelerator was installed and, in 1965, the linear electron accelerator was inaugurated. In addition, mass spectrometry laboratories were constructed between 1962 and 1963.

1970 → 1979: Public debate in the 1960s coined two new terms – 'technology gap' and 'brain drain'. The 1970s began with growing concern over the widening gap in R&D efforts and achievements between Europe and, most notably, the US. The overly-fragmented research efforts in Europe sparked the need to increase European research collaboration and coordination. A new era was finally initiated for the JRC early in this decade (circa 1973), fostered by the new European developments that began to appear at that time and JRC work areas began to be formalised by means of multi-annual research work programmes adopted by the Council, including resource allocation, which facilitated orderly long-term planning of research and finances.

1980 → 1989: During the 1980s, there was widespread debate across the European Economic Community on how research and technological development activities could strengthen industrial competitiveness in the Community. This led to the launch of industry related programmes and enhanced collaboration between industry and research.

1990 → 1999: In this decade, the JRC further developed its work in areas such as environmental impacts, and focused heavily on public health, safety and security. It also moved into entirely new fields, reflecting the developments of the time: for example, at the end of the nineties, food scares such as BSE ('mad cow disease') and dioxin contamination led to the creation of the Directorate- General for Health and Consumer Protection, separating the issue of food safety from that of industry and the environment.

[7] *The mission of IRMM is to promote a common and reliable European measurement system in support of EU policies.*

2000 → Today: In this decade, amidst new ways of producing food, energy and consumer goods, the safety and well-being of EU citizens had to remain a priority. In 2002, a significant part of the activities on food and feed safety and quality was moved from the Institute for Health and Consumer Protection (IHCP) to the IRMM. From 2004 onwards, the competence of the JRC is being recognised by DG SANCO through their granting of Community Reference Laboratory status (CRL) for various fields of food control i.e. there are now two CRLs in the IHCP and four in the IRMM).

The CRLs ensure that the testing for certain substances is performed to a reliable standard across the food chain, helping to guarantee the safety and quality of food for consumers. IRMM is well recognised for the support it has provided in emergencies, including the Belgian dioxin crisis in 1998, the BSE crisis and the 2002 acrylamide discovery in food products. IRMM has also developed a large variety of certified reference materials for industrial, environmental and food analysis, as well as for biotechnology and health applications. It was the first institute in the world to produce certified reference material for, among other things, the analysis of genetically modified organisms (GMOs), genetic testing, and pathogens. In 2006, 23000 reference materials were distributed worldwide.

1.4. VALUES, VISION, MISSION AND INTERNAL CONTROL STANDARDS

While IRMM has been maturing, so has the "mother ship", including both the DG JRC and the Commission as a whole. Certain organizational aspects, e.g. symbols such as the European Union flag  which is the symbol[8] not only of the European Commission but also of Europe's unity and identity in a wider sense, are commonly used by all EU bodies whilst other organizational aspects, such as it values, vision and mission are defined for each DG.

Due to the size of the organisation, speaking at Commission level, certain standards have already been set in place, known as the Internal Control Standards (see Table 1), which complement the requirements of ISO and OHSAS and to which each DG is expected to live up to.

VALUES

The JRC not only has to fulfill external requirements but also has expectations from itself and from its behaviour. These expectations are called values and concern Service, People, Competence and Responsibility.

[8] The circle of gold stars represents solidarity and harmony between the peoples of Europe and remains unchanged with successive enlargements.

- Service
  - To serve the EU citizen by enhancing the scientific and technological knowledge base of EU policies.
  - To provide a service independent of national or commercial interests.
  - To interact closely with our customers to understand their present and future needs, define JRC contribution and deliver on expectations.
- People
  - Genuine belief that JRC success is driven by its people.
  - To recognise the importance of recruiting, retaining and motivating highly-qualified staff, of providing them with state-of-the-art facilities and of continuously developing their skills.
- Competence
  - To constantly develop scientific and technical competencies and maintain strong links with leading research organisations in Europe and worldwide.
  - To actively pursue JRC role as integrator and consolidator of scientific and technical knowledge in support of European policies.
- Responsibility
  - To be committed to managing the resources entrusted to the JRC efficiently and responsibly.
  - To foster a culture of dialogue and respect guided by the principles laid down in the "JRC Statement on Ethics at the Workplace".

Some of these values could be seen, in some ways, as being a wish list as for e.g. the latter value of "responsibility" would in fact only be possible to strictly live by in an organization which has already fully matured, a state of unlikely "utopia". Nevertheless, the fact that these core values are written down in the first place, and communicated to all goes some way to ensuring their achievement.

VISION AND MISSION STATEMENTS

The elucidation of vision and mission statements are all indicators of a maturing organization and provide not only potential customers with an insight into the organization but also help (re-)inform staff about the essence of their duties and responsibilities.

- JRC Mission
  - The mission of the Joint Research Centre is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of European Union 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.
- IRMM Vision

- The vision for the JRC-IRMM is to be the European Commission reference, providing confidence in measurements in support of EU policies

- IRMM Mission
  - The mission of the IRMM is to promote a common and reliable European measurement system in support of EU policies.
- IRMM Motto
  - IRMM - Confidence in measurements®

INTERNAL CONTROL STANDARDS:

As mentioned earlier, due to the size of the organisation, speaking at Commission level, certain standards have already been set in place, known as the Internal Control Standards (ICS)[9], which complement the requirements of ISO and OHSAS and to which each DG is expected to live up to. Internal Control is broadly defined as a process intended to provide reasonable assurance to the management on the achievement of the DG's objectives. More concretely, internal control is all the measures management and staff take (for example the implementation of organisational structures, policies, procedures, controls, training, etc.) to ensure that:

- operational activities are effective and efficient;
- legal and regulatory requirements are met;
- financial and other management reporting is reliable;
- assets and information are safeguarded.

Since effective and efficient internal control is essential to any organisation, the 16 ICS (shown below in Table 1) aim to provide generic management principles and aim to set out the minimum requirements for the DG's internal control activities.

TABLE 1: EC'S INTERNAL CONTROL STANDARDS AND OVERLAP WITH ISO 9001[10], ISO 14001[11] & OHSAS 18001[12] (DENOTED AS 9/14/18).

[9] EC's Internal Control Standards, SEC(2007)1341, http://ec.europa.eu/budget/library/documents/implement_control/intg_int_control/sec_2007_1341_en.pdf

[10] The International Organization for Standardization (ISO) 9001:2000 gives the requirements for quality management systems, providing assurance about the ability to satisfy quality requirements and to enhance customer satisfaction in supplier-customer relationships.

[11] The ISO 14001:2004 gives the requirements for environmental management systems for companies wishing to operate in an environmentally sustainable manner.

[12] The Occupational Health & Safety Assessment Series (OHSAS 18001) specification gives requirements for an occupational health and safety (OH&S) management system, to enable an organisation to control its OH&S risks and improve its performance.

Building block	Internal Control Standard	Overlap with 9/14/18	Description
Mission & Values	IC01) Mission	9/14/18	The DG's *raison d'être* is clearly defined in up-to-date and concise mission statements developed from the perspective of the DG's customers.
	IC02) Values	9/14/18	Management and staff are aware of and share appropriate ethical and organisational values and uphold these through their own behaviour and decision-making.
Human Resources	IC03) Staff allocation & mobility	9001	The allocation and recruitment of staff is based on the DG's objectives and priorities. Management promote and plan staff mobility so as to strike the right balance between continuity and renewal
	IC04) Staff Evaluation & development	9001	Staff performance is evaluated against individual annual objectives, which fit with the DG's overall objectives. Adequate measures are taken to develop the skills necessary to achieve the objectives.
Planning & Risk Management Processes	IC05) Objectives & Indicators	9/14/18	The DG's objectives are clearly defined and updated when necessary. These are formulated in a way that makes it possible to monitor their achievement. Key performance indicators are established to help management evaluate and report on progress made in relation to their objectives.
	IC06) Risk Management Process	14/18	A risk management process that is in line with applicable provisions and guidelines is integrated into the annual activity planning.
Operations & Control Activities	IC07) Operational Structure	9/14/18	The DG's operational structure supports effective decision-making by suitable delegation of powers. Risks associated with the DG's sensitive functions are managed through mitigating controls and ultimately staff mobility. Adequate

Building block	Internal Control Standard	Overlap with 9/14/18	Description
	IC08) Processes & Procedures	9/14/18	IT governance structures are in place. The DG's processes and procedures used for the implementation and control of its activities are effective and efficient, adequately documented and compliant with applicable provisions. They include arrangements to ensure segregation of duties and to track and give prior approval to control overrides or deviations from policies and procedures.
	IC09) Management Supervision	9/14/18	Management supervision is performed to ensure that the implementation of activities is running efficiently and effectively while complying with applicable provisions.
	IC10) Business Continuity	Partial	Adequate measures are in place to ensure continuity of service in case of "business-as-usual" interruption. Business Continuity Plans are in place to ensure that the Commission is able to continue operating to the extent possible whatever the nature of a major disruption.
	IC11) Document Management	9/14/18	Appropriate processes and procedures are in place to ensure that the DG's document management is secure, efficient (in particular as regards retrieving appropriate information) and complies with applicable legislation.
Information & Financial Reporting	IC12) Info & Communication	9/14/18	Internal communication enables management and staff to fulfill their responsibilities effectively and efficiently, including in the domain of internal control. Where appropriate, the DG has an external communication strategy to ensure that its external communication is effective, coherent and in line with the Commission's key political messages. IT systems used and/or managed by the DG (where the

Building block	Internal Control Standard	Overlap with 9/14/18	Description
			DG is the system owner) are adequately protected against threats to their confidentiality and integrity.
	IC13) Accounting & Financial Reporting	9001	Adequate procedures and controls are in place to ensure that accounting data and related information used for preparing the organisation's annual accounts and financial reports are accurate, complete and timely.
Evaluation & Audit	IC14) Evaluation of Activities	9/14/18	Evaluations of expenditure programmes, legislation and other non-spending activities are performed to assess the results, impacts and needs that these activities aim to achieve and satisfy.
	IC15) Assessment of IC Systems	-	Management assess the effectiveness of the DG's key internal control systems, including the processes carried out by implementing bodies, at least once a year.
	IC16) Internal Audit Capability	9/14/18	The DG has an Internal Audit Capability (IAC), which provides independent, objective assurance and consulting services designed to add value and improve the operations of the DG.

Being able to describe the overlap in the requirements of the ICS and the triple certification, was essential in convincing senior management that not only would we have efficiency in aiming for compliance with the three "external" - 2 ISO, 1 OHSAS– standards at once but that we'd also be able to demonstrate a degree of compliance with about 14 of the 16 ICS, with the Risk Management (IC6) and Business Continuity (IC10) not really being covered (apart from the Hazard identification and Risk assessment for projects and processes but not in the broader sense, meant here, in identifying potential issues or events that could affect the execution of the organisation's activities and the achievement of its objectives).

2. **EXECUTION** (PLANNING, IMPLEMENTING, EVALUATING & REVIEWING)

At least six months before the general staff were made aware of the intention to go for triple certification, in the frame of achieving an integrated management system, the Institute

Quality Manager (IQM) and the Head of the Safety, Health, Environment and Security (SHES) Sector gained the support of most of the other top management members (including the director) by a series of explanations of what would be involved and what the main advantages and disadvantages might be. There remained some reluctance, however, as some senior managers felt that it would simply be an added burden without a real benefit and even when the final decision was made to go for compliance with all three standards at once, not everyone was fully convinced that this was the right thing to do.

2.1. WHY GO FOR CERTIFICATION?

Certification according to the appropriate management standard (ISO 9001, ISO 14001, OHSAS 18001) provides assurance about the ability of a company to satisfy quality or environmental or occupational health & safety requirements. See footnote numbers 10, 11 & 12.

The reasons for going for an integrated management system were:

- Enhanced safety, health, environmental and security performances
- Higher degree of QSHE sensitised staff
- Compliance with regulatory requirements
- Conformance with EC policies and EC Internal Control standards
- Customer satisfaction (quality); IRMM neighbourhood satisfaction (SHE)
- Enhanced image of the institute
- Improved cost and labour efficiency

Furthermore an integrated management system (IMS) provides coherence of the overall approach i.e.

- Safety risks and environmental aspects are “weighted” in a similar way; priorities are fixed in a balanced way;
- Simplification for management i.e. limitation of the number of action plans to follow-up, limitation of the number of reviews etc.
- Optimal use of synergies i.e. limitation of the number of audits, the number of procedures, the number of tools to be used
- One tool (management system based on a series of databases on a separate server e.g. Lotus Notes) used for the IMS, thereby minimising resources.
- Harmonisation of “work flows” from the two systems i.e. one for non-conformities (including incidents, near incidents, anomalies etc); one for assessments, one for document control, one for corrective/preventive actions etc.
- Better acceptance by the staff members i.e. less complexity as there is only one system.
- Increased collaboration/communication between units as IRMM key processes are managed by different process owners in different units.

2.2. WHERE DID WE BEGIN?

IRMM’s status, during the latter half of 2006, in terms of existing management system implementation was as follows:

- Commitment to Health and Safety and Protection of the Environment at IRMM existed (see Annex 1-I)
- Many tools existed and were documented, but not widely communicated and implemented;
    - exception: nuclear activities, where SHE assurance was already well implemented for decennia
- 3 Units almost accredited (ISO17025) due to pressure from customers and/or partners;
- General view: "Only SHES Unit is responsible for Safety, Health and Environmental and Security matters!"
- Not all managers convinced of the need of a QSHE management system;

2.3. THE ROAD MAP TO TRIPLE CERTIFICATION

Once the decision was made to achieve the triple certification, it became the task of the Institute's Quality Office and the Institute's Safety, Health, Environment and Security Sector to work together and plan the campaign and involve as many staff as possible, from the earliest stages.

Needless to say the Plan, Do, Check, Act stages of the ISO and OHSAS standards were used as a basis for a road map with the final "destination" of triple certification. However the **road map** involved more stages, going beyond the intended certification and already foreseeing how certification could more easily be maintained and including the difficult area of setting up measurable Performance Indicators in each of the three areas concerned, quality, safety and environment. Each stage will be described in the following chapters but first summarized (Table 2) in terms of the "tools" developed and used.

TABLE 2: THE TOOLS EMPLOYED ON IRMM'S ROAD TO TRIPLE CERTIFICATION.

Plan	Do (Implementation & Operation)	Check (Evaluation)	Act (Review)
Tool 1A: Plan how Legal Requirements will be managed.	**Tool 1B:** Mapping the Legal Requirements (register creation).	**Tool 1C:** Evaluation of compliance with legal requirements	**Tool 12:** Management review using inputs (e.g. suggested improvement actions) from the evaluation phase. Reflect on the lessons learned.
Tool 2A: Plan how Document Control will be managed	**Tool 2B**: Documents Controlled	**Tool 2C**: Evaluate how Document Control is been managed	
Tool 3A: Plan how Integrated Assessments will be managed	**Tool 3B:** Mapping the Generic Processes	**Tool 3C:** Evaluation of the Internal Process Assessments	
Tool 4A: Plan how Risk assessments will be managed	**Tool 4B:** Map the Generic Risk Assessments	**Tool 4C:** Evaluate the Risk Assessments	

Plan	Do (Implementation & Operation)	Check (Evaluation)	Act (Review)
Tool 5A: Plan how Environmental aspect assessments will be managed	**Tool 5B:** Map the Environmental Aspect Assessments	**Tool 5C:** Evaluate the Environmental Aspect Assessments	
Tool 6A: Plan how non-conformities, incidents and accidents will be managed	**Tool 6B:** Record non-conformities, incidents and accidents.	**Tool 6C:** Evaluate the non-conformities, incidents and accidents.	
Tool 7A: Plan how corrective & preventive actions will be managed	**Tool 7B:** Record integrated corrective & preventive actions.	**Tool 7C:** Evaluate the execution of CARs, and PARs.	
Tool 8A: Plan how purchases will be managed from a SHE compliance angle.	**Tool 8B:** Implement SHES Coding system for Purchases.	**Tool 8C:** Evaluate the SHES Coding system for Purchases	
Tool 9A: Plan Emergency Preparedness	**Tool 9B:** Practice Emergency preparedness.	**Tool 9C:** Evaluate Emergency Preparednes	
Tool 10A: Plan how Q and SHE Peformance Indicators will be managed.	**Tool 10B:** Implement the monitoring of the Q and SHE Peformance Indicators.	**Tool 10C:** Evaluate the chosen Q and SHE Performance Indicators.	
Tool 11: Train & Communicate at every stage.			

In the interest of improved readability, each tool will be described in its entirety i.e. including what was necessary at the planning (P), doing (D), checking (C) and acting (A) stage and the "¼, ½, ¾ and complete" symbols will be used to denote the stage. However a general introduction about each of the PDCA stages will first be provided.

Planning

The basic requirements, at the planning stage, are that Objectives and a Work Programme have been set in place. In concrete terms, what this meant for IRMM, was that the Annual Management Plan (AMP), the Global Prevention Plan (GPP), the "Committee for the Prevention & Protection at Work" (CPPW) plan would all reflect the objectives and actual

work required to achieve our goal of compliance with the three standards. Certain preliminary practical steps had also to be taken such as the procurement of a contract with a certification body and the activation of a QSHE group (comprising of unit quality managers and members of the SHE sector). Another preliminary step was taking the precaution of having a pre-certification audit where existing gaps and areas of improvement were already identified in advance of the main "campaign".

See **Annex 1-II** for the associated Gantt chart displaying the triple certification achievement plan, most of which (50/70 tasks) describe the improvements which had to be made.

Table 2, column one, lists many planning tools which have one common thread throughout, being how these various planned activities would be managed? The answer - by use of a commercial system of interrelated databases. Quite simply, a vital part of the whole certification process was a set of databases, initially designed by and purchased from the Quality System International (QSi) company, who prepared these databases for use on the International Business Machines (IBM) Lotus Notes platform. Two screenshots (Figure 1) of the Lotus Notes (LN) workspaces are shown here:

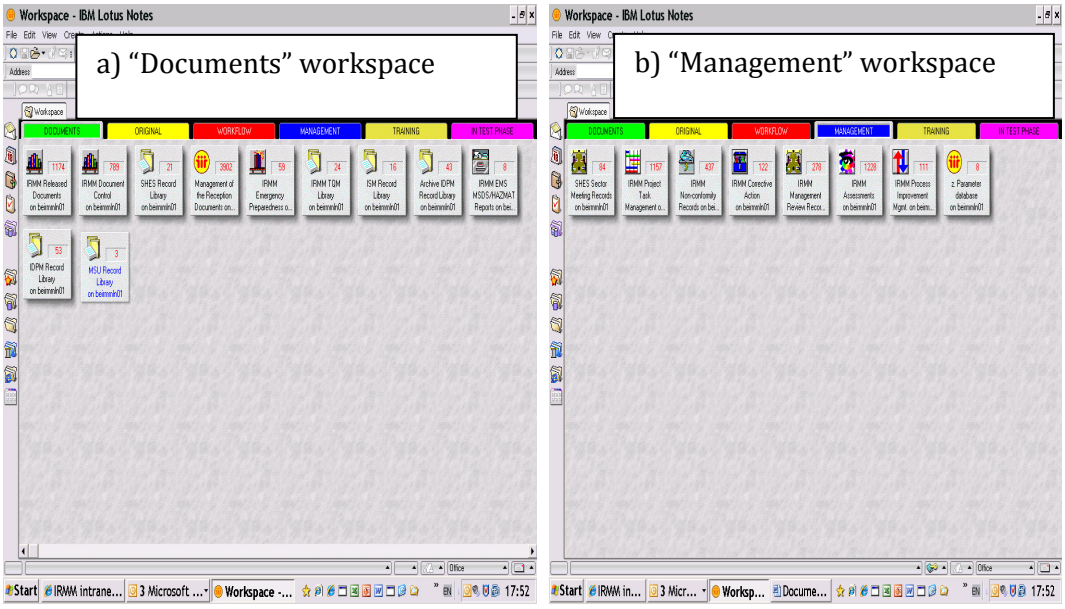


FIGURE 1: SCREENSHOTS OF THE A) "DOCUMENTS" AND B) "MANAGEMENT" WORKSPACES, AS CUSTOMIZED FOR USE IN IRMM.

These databases were then heavily customized by the previous Institute Quality Manager and are being further customized by the current IQM and Informatics unit) as the need arises. In fact an important change in terms of assuring constant improvement of the LN set of databases was the securing of informatic technology support, as this had previously not been a support domain of the Informatics Unit.

Since a large part of the planning stage of each tool involves a procedure or methodology, the decision was made to only keep the methodology description in the main text if it was custom made for the Integrated Management System. The descriptions of the other methods employed are shown in the Annex. It was felt that the readers would rather appreciate more information on the Evaluation stage, the generation of score cards for each performance indicator and on the (novel) lessons learned in IRMM's case.

Doing

Keeping in mind the wish to avoid near-duplicate procedures, near-duplicate audits etc, a simple approach, using simple tools, needed to be taken so as to gain wide acceptance during the execution stage. The extremely important aspects of communication and training will also be described as a separate tool even though they were utilised at every stage throughout the process. Certain tasks in the Do stage such as the “Definition of Roles and Responsibilities” and the “Allocation of Resources” are not described to the same extent as the other tasks due to the complexity of the systems. However, to summarise, systems for all exist, either at Commission or at JRC level e.g. the Career Development Review (CDR) system (a part of a broader Sysper system) outlines roles and responsibilities for every staff member and the systems for managing Financial Resources (ABAC, Jipsy) allow exactly that. Current human resources are also tracked both in the Sysper system (for permanent and temporary agent staff) whilst recruitment competitions are managed through the European Personnel Selection Office (EPSO).

Therefore to keep this manuscript to a manageable size, only the “tools” listed in Table 2, “Do” column will be described here.

Checking

According to the three standards, the "Check" stage is all about evaluation of the management system. So as to keep a red thread through the manuscript the same tools are used as section headers (see Table 2, Check column) as for the planning and doing stages but this time the use of the tools has been evaluated (as far as that is possible).

The main adjustments made along the way mostly concerned fulfillment of “urgent” Integrated Assessment or Risk Assessment recommendations (in the form of Assessment recommendations, Corrective/Preventive actions etc) and addressing obvious training needs which if left untended would have either had a negative impact on IRMM and eventually also a negative impact on our chances of triple certification.

The evaluation "results" are presented quantitatively as opposed to qualitatively (except for the incident reporting issue) as one would hope that if the system is being more and more heavily used, that this is also a sign that we are on the path of continuous improvement. The evaluation of the performance indicators (Tool 10C) helps as with the "strong" indicators, most leave little room for subjectivity and so may result in an era where true benchmarking will be possible.

Acting

The acting stage of this project basically involved trying to gather all the results of the planning, doing and adjusting stage for the annual management reviews so that actions for post certification could be planned and in so doing complete the continuous improvement cycle.

2.3.1.TOOL 1 – LEGAL REQUIREMENTS

TOOL 1A: PLAN HOW LEGAL REQUIREMENTS WILL BE MANAGED

According to the ISO 14001 and OHSAS 18001 specifications, an organization seeking certification must identify and track all applicable Federal, State and Local legal requirements. Acquiring the methodology i.e. the Legal Register database allows registration of the most current versions of all regulations. New regulations are entered under the heading "Current", while out-of-date regulations are stored under the heading "Obsolete". A modification and renewal process is available to keep existing documents up to date on the most current regulations (e.g. screening of the two-weekly bulletin of "Prevent Actua", a monthly periodical assures OH&S regulation updates).

Legal compliance, for IRMM, means that both European Directives and Belgian Regulations have to be followed and Table 3 summarises this framework. Deciding to create a Legal Register (see Figure 2), hosted in a LN database, was the planned outcome from this stage.

TABLE 3: REGULATORY FRAMEWORK BY WHICH IRMM ABIDES.

Category	**Regulation**	**Regional, National, European or International**
Occupational Health and Safety	CODEX, ARAB	National
Environmental	VLAREM I, II, VLAREA, VLAREBO…	Regional
Nuclear	ARBIS, NIRAS related Royal Decrees	National
Electrical	AREI	National

Transport	ADR, IATA	International
Export/Import	EC 1334/2000[13]	European
Financial	Internal Commission Rules	"European"

TOOL 1B: MAP THE LEGAL REQUIREMENTS

As mentioned earlier, one of the tools required for triple certification compliance was a Legal Register, which needed to have a procedure attached clearly identifying IRMM's legal requirements for safety, health and protection of the environment. Due to the nature of the institute, the legal scope included

- Occupational Safety and Health, including:
  - Radiation Protection and Nuclear Safety;
  - Nuclear Safeguards;
  - Biosafety
  - Chemical Safety;
  - Electrical Safety;
  - Fire Protection.
- Environmental Protection and Waste Management;
- Security
- Transport of Dangerous Goods and Dual Use Goods.

The evolution of the regulatory requirements regarding Safety & Health and regarding the protection of the environment has to be monitored and the applicable legal requirements have to be identified. This is achieved by the appointed "legal" function holder (see Table 4), by means of the appropriate information sources (internet, specific paper or electronic publications) needed to be able to identify the requirements in the field he/she is in charge of. See Table 5 for the environmental, transport and biosafety legislation sources and Table 6 for the safety, electrical and nuclear legislation sources.

TABLE 4: EMPLOYEE POSITION TITLE AND THEIR RESPECTIVE "SHE" LEGAL FUNCTIONS

Position Title	Legal Function
SHES Sector Head (as Head of the Internal Service for Prevention and Protection at Work and the Health Physics Service):	Belgian Federal regulation on Occupational Health and Safety ("Codex" and "ARAB") Belgian Federal regulation on Radiation Protection and Nuclear Safety ("ARBIS") Belgian Federal regulation on Radioactive Waste Belgian Federal regulation on Electrical Safety ("AREI") Belgian Federal regulation on the Radiological and Nuclear Emergency Plan

[13] Council Regulation (EC) No 1334/2000 of 22 June 2000 setting up a Community regime for the control of exports of dual-use items and technology ; Official Journal L 159 , 30/06/2000.

Position Title	Legal Function
	Belgian Federal regulation on Fire Safety.
Coordinator for Transport of Dangerous Goods:	Belgian and International regulation on transport of Dangerous Goods ("ADR", "IATA", ...) Belgian and Flemish regulations on Import and Export of Goods
Environmental Co-ordinator	Flemish Regional regulation on the protection of the Environment ("Vlarem", "Vlarebo", ..)
Biosafety Co-ordinator	Flemish Regional regulation on biosafety issues ("Vlarem").

TABLE 5: THE REQUIRED SPECIFIC LEGISLATION VERSUS THE ASSOCIATED ENVIRONMENTAL ASPECT, KEPT UP TO DATE BY THE ENVIRONMENTAL OFFICER.

Legal requirement	Environmental aspect									
	Pollution by waste	Primary Energy Consumption	Noise to the environment	Air emissions	Risk of loss of hazardous material	Environmental radiation exposure	Risk of soil contamination	Water emissions	Use of natural resources	Changes to the landscape and biotope (incl the neighbourhood)
VLAREA	✓				✓					
VLAREBO							✓			
VLAREM I, II	✓	✓	✓	✓	✓		✓	✓	✓	
ROYAL DECREES (e.g. Legionella, waste, surface waters, soil sanitation, environmental management).	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DIRECTIVES (Besluiten) (e.g. environmental effect report, integrated environmental management)	✓	✓	✓	✓	✓	✓		✓	✓	✓
EC REGULATIONS (e.g. animal by-products)	✓				✓					
ENVIRONMENTAL LICENSE – Special conditions e.g. Noise			✓							
ARBIS	✓			✓	✓	✓	✓	✓		
ROYAL DECREES	✓									
NUCLEAR LICENSE – Special requirements			✓	✓		✓	✓			

TABLE 6: THE REQUIRED SPECIFIC LEGISLATION VERSUS THE ASSOCIATED SAFETY AND HEALTH RISKS, KEPT UP TO DATE BY THE SHES SECTOR HEAD.

Legal requirement	Safety & Health Risks				
	Fire & Explosion Risk	Radiation exposure risk	Biological risk	Chemical risk	Conventional safety related risks
CODEX, ARAB	✓		✓	✓	✓
AREI	✓				✓
ARBIS		✓			✓
NUCLEAR LICENSE – Special requirements	✓	✓			
VLAREM	✓		✓		

Again use is made of Lotus Notes as a host for the SHES Legal Register (see Figure 2). It contains new regulations along with their respective implementation and enforcement dates and applicable permits (nuclear, environmental, biosafety, chemical, transport, etc) with their appropriate renewal dates.

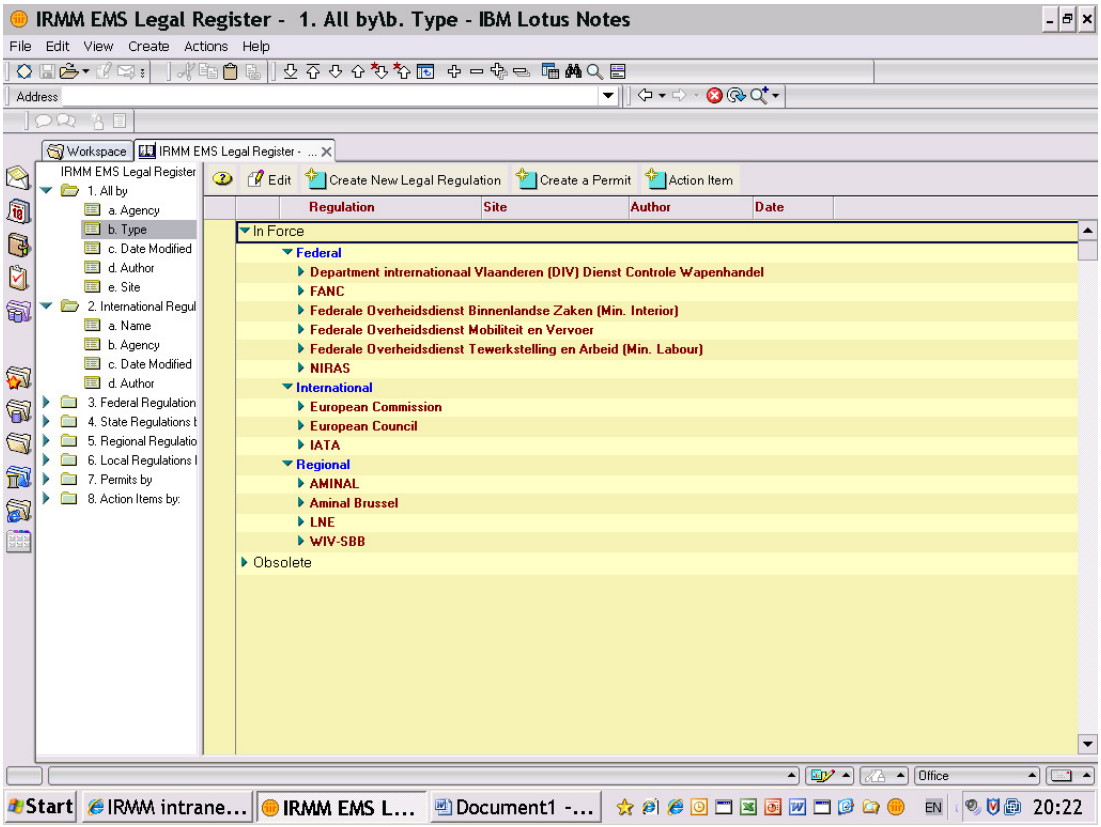
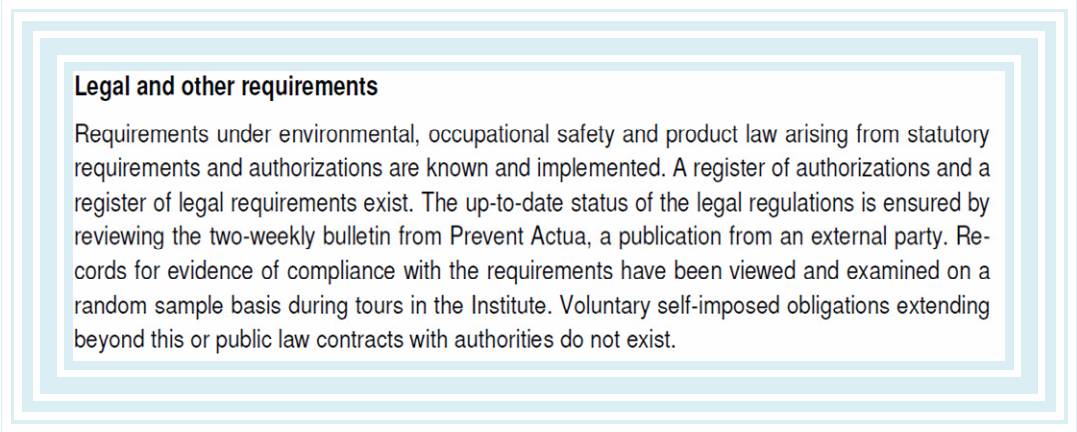


FIGURE 2: SCREENSHOT OF THE IRMM LEGAL REGISTER.

TOOL 1C: EVALUATION OF COMPLIANCE WITH LEGAL REQUIREMENTS

Perhaps the easiest way to show the result of our internal efforts to ensure legal compliance is to shown an excerpt (Figure 3) from the external audit, which explains how it's done and the fact that, upon scrutiny by others, appears to be done correctly.



Legal and other requirements

Requirements under environmental, occupational safety and product law arising from statutory requirements and authorizations are known and implemented. A register of authorizations and a register of legal requirements exist. The up-to-date status of the legal regulations is ensured by reviewing the two-weekly bulletin from Prevent Actua, a publication from an external party. Records for evidence of compliance with the requirements have been viewed and examined on a random sample basis during tours in the Institute. Voluntary self-imposed obligations extending beyond this or public law contracts with authorities do not exist.

FIGURE 3: EXCERPT FROM THE TUV NORD AUDIT REPORT AWARDING THE TRIPLE CERTIFICATION – COMPLIANCE WITH LEGAL REQUIREMENTS (21.12.2007)

TOOL 1D: ACTING - REGARDING COMPLIANCE WITH LEGAL REQUIREMENTS

The last sentence of the TUV Nord report excerpt above regarding "voluntary self-imposed obligations" or "public law contracts" is currently being tackled in the preparations for the Eco-Management & Audit Scheme (EMAS) and this intention is further rubber-stamped by the consideration of a public law contract with the Flemish authorities regarding achievement of Environmental Performance Indicator targets (see 2.3.10 for full detail).

IMPROVEMENT ACTION 1: COMMUNICATE ENVIRONMENTAL TARGETS FOR APPROPRIATE PERFORMANCE INDICATOR TO LOCAL AUTHORITIES.

2.3.2. TOOL 2 – DOCUMENT CONTROL

TOOL 2A: PLAN HOW DOCUMENT CONTROL WILL BE MANAGED

To this end the IQM examined the institute's LN document control system to see how many manuals, procedures, working instructions, forms etc there were, how many could be merged or made obsolete. The other databases in LN were also examined to see if some databases were excessive to requirements and to see if others could be merged.

At unit level an elucidation of which documents were essential; which could be merged with others and which were obsolete and where (on LN or on shared drives) these documents were, was a significant amount of work in planning how best this would be managed in the future. This operation was further complicated by the tendency of some units to treat certain documents in one way e.g. placement of procedures, working instructions and forms in Lotus Notes and placement of internal audit reports, non-conformities etc in separate word files, unlinked to Lotus Notes and therefore not "controlled" i.e. official version often hard to trace etc.

TOOL 2B: MAP CONTROLLED DOCUMENTS

Due to the large repository of controlled documents (nearly 2000 documents between the released and control sets) it would be pointless to show these. Suffice to say that they are mapped and constantly being reviewed for redundancy or overlap.

TOOL 2C: EVALUATION OF DOCUMENT CONTROL

After considerable time and effort by the institute Quality Manager, many improvements were made to create a uniform and coherent documentation set, e.g. by standardizing the Manual, Procedure, Working Instruction templates for all to freely use. Whilst doing this many documents were made obsolete (due to either lack of fit for purpose or due to duplication in one way or another). Certain databases were either made redundant, hidden or re-shaped to fit current needs. Figure 4 shows the evolution of such improvements (only process improvements shown as an example) over the last few years.

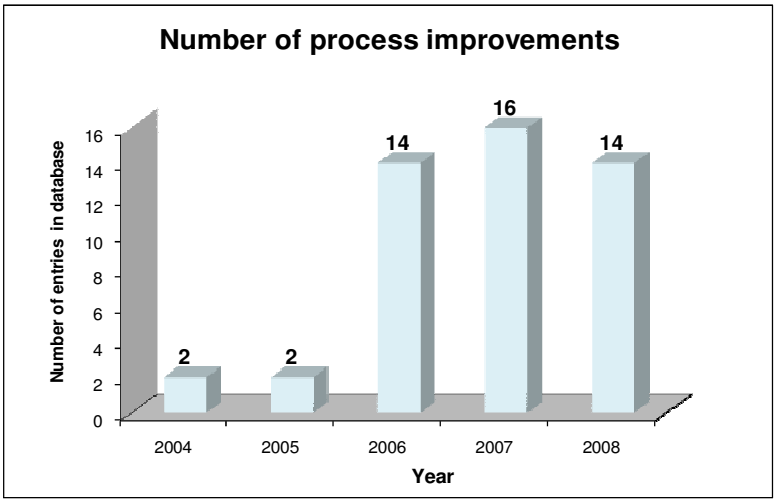


FIGURE 4: EVOLUTION OF PROCESS IMPROVEMENTS FROM 2004-2008

TOOL 2D: ACTING - REGARDING DOCUMENT CONTROL

Having standardized layouts for manuals, procedures, working instructions etc and having a harmonized way of storing these documents had a very positive effect on e.g. the traceability of document version including the changes and reasons for changing.

LESSONS LEARNED 1: COHERENT CONTROL OF HARMONIZED DOCUMENTS AIDS ALL ASPECTS OF AN IMS.

2.3.3. TOOL 3 – INTEGRATED ASSESSMENTS

TOOL 3A: PLAN HOW INTEGRATED PROCESS ASSESSMENTS WILL BE MANAGED

After an in-depth investigation of the institute's existing management system, it was decided to prepare for this triple certification by carrying out integrated audits on processes. The result of this planning stage led to a "Generic Process Map" which will be explained in the next section (Table 7).

Creating the Integrated Assessment Plan and perhaps, more importantly, having this accepted by all concerned, demanded considerable communication skills as the promised eventual lighter load of audits would first have to be preceded by a year dominated by audits i.e. a total of 70 integrated audits were planned over a 12 month period. Auditees became convinced however, of having an integrated approach, when it was explained that if we were to try to assess compliance with all three standards separately we would have to conduct 480 audits (3 standards, 20 clauses, 8 units).

An examination of the overlapping areas of the requirements of the ISO 9001, the ISO 14001 and the OHSAS 18001 (see Figure 5) provided the starting point in terms of preparing the internal assessments according to all elements.

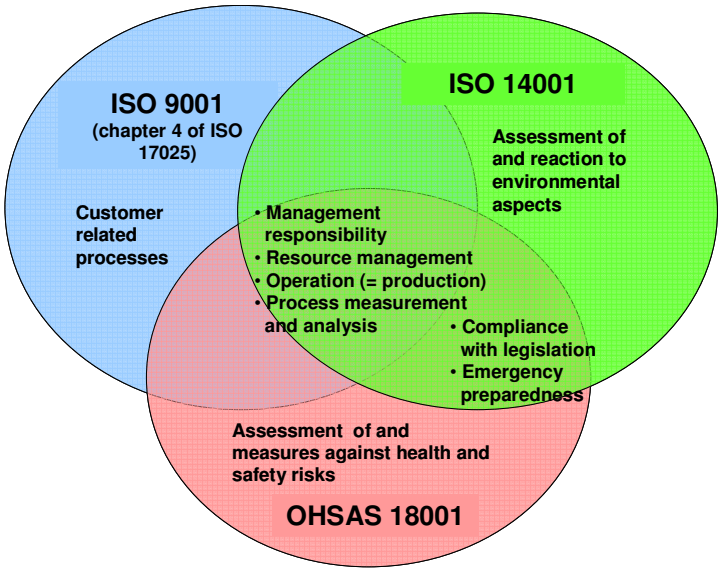


FIGURE 5: OVERLAP AND UNIQUE REQUIREMENTS OF EACH OF THE ISO 9001, 14001 AND OHSAS 18001 STANDARDS.

As mentioned earlier, another important overlap is that with the Internal Control Standards of the European Commission, as shown in Table 1.

Armed with the known overlaps, the internal integrated assessments were planned to be carried out as process audits. The process structure provided by the units was, as can be seen in Table 7 in certain cases, quite detailed, thus leading to "heavy audits" and/or difficulties in "scoping". At this early stage it had already become clear that further reductions in processes would be necessary to make the IMS and IRMM as a whole easier to manage.

METHODOLOGY FOR INTEGRATED ASSESSMENTS

Creation of the integrated assessment sheets was another mammoth task, carried out by the institute Quality Manager, with input from SHES regarding ISO 14001 and OHSAS 18001 element “questions”. The Lotus Notes assessment sheets were set up so as to cover all chapters of each of the ISO 9001, the ISO 14001 and the OHSAS 18001 and though an essential part of this project, they have been re-compiled into one “MS Word” table and placed in Annex 1-IV, due to their length. It should also be pointed out that the Lotus Notes assessment database (where each of the clauses of each standard appears separately) greatly facilitates checking which clauses had already been covered (kind of pivot table effect in the sense that as many views as one could imagine -uncovered clauses, 18001 clauses only, 14001 clauses only, 9001 clauses only, SHE related audit recommendations, etc) could be displayed. An example of a typical assessment sheet is provided in Annex 1-V.

TOOL 3B: MAP THE GENERIC PROCESSES

After an external gap audit (9/14/18) it became clear that not only would the processes have to be mapped and streamlined, if possible, before being audited, but also that the processes needing a Risk Assessment would have to be identified so as to fill that void in a reasonable way. Sub-processes were also mapped as these were often the level at which the RA was associated. See Table 7 for the Process and/or sub-process map.

TABLE 7: PROCESSES AND/OR SUB-PROCESSES MAP (GENERIC RISK ASSESSMENTS ARE INDICATED).

Unit	Process	Sub-Process	RA
All units	Management Review		
	Control of Documents		
	Improvement management		
	Internal Audit		
	Control of Corrective Actions		
	Control of Preventive Actions		
	Control of non-conformities		
	Hazard identification & Risk Assessment		
	Environmental aspect		
	Administrative work		✓
	Internal Transport (via trolleys, forklifts, hoists etc).		✓
DIR	Steering Processes		
	Policy and Strategy		
	Management Review		
MSU	Human Resources Management	Recruitment	
		Promotions & Bonuses	
	Financial Resources Management	Budgeting	
		Procurements	
		Purchasing	
		Payments	
		Competitive Income Management	
		Fixed Assets Management	
		Staff declaration	
	Administrative support	Flexible hour management	
		Post, printing & CAD service	✓
		Travel service	
		Social Support	

Unit	Process	Sub-Process	RA
MSU-Q	Internal Audit		
	Improvement management		
IDPM	Training		
	Work programme Management, evaluations and		
	IRMM External Customer Management, complaints & satisfaction.		
	Communication	Communication General	
		Events Management	
		Management of the IRMM library/information centre.	
IM	Work programme management (incl Project		
	Quality management (Accreditation maintenance)		
	Reference Measurements	Clean Labs activities	✓
		ICP Labs activities	✓
		Analytical activities in nuclear	✓
		Gas Labs activities	✓
		Primary Standardisation (radioactive source preparation)	✓
		Primary standardisation	✓
		Gamma Ray spectroscopy	✓
		Liquid scintillation counting	✓
		Irradiation	✓
		Chemical Labs (RN) activities	✓
		Weighing activities	✓
		Underground Lab (SCK)	✓
	Running inter-laboratory comparisons		
	Producing Certified Reference Materials		
	Providing Metrology in Chemistry (TrainMiC) Courses		
RM	Accredited management system		
	Reference Material Project Management		
	Processing of Reference Materials	CRM processing	✓
		CRM storage & dispatching	✓
	Testing of Reference materials	Chemical Labs activities	✓

Unit	Process	Sub-Process	RA
		Biotechnology Labs activities	✓
		Engineering Materials Lab activities	✓
NP	Neutron Data measurements	Experiments LINAC	✓
		Experiments Van de Graaf	✓
	Operation Van de Graaf	Planning of the beam time schedule and machine operation modes	
		Accelerator operation & operator responsibilities	✓
		Running of the accelerator facility under normal conditions	
		Organisation of maintenance, repair and improvement actions.	
		Testing and repairing/maintaining critical machine equipment.	
		Testing response (safety actions) in emergencies (incl malfunction) of VdG and associated components.	
	Operation LINAC	Planning of the beam time schedule, machine operation modes and neutron flight path schedule.	
		Accelerator operation & operator responsibilities (incl shift work planning).	✓
		Running of the accelerator facility under normal conditions	
		Organisation of maintenance, repair and improvement actions.	
		Testing and repairing/maintaining critical machine equipment.	
		Testing response (safety actions) in emergencies (incl malfunction) of LINAC and associated components.	
	Workshop LINAC		✓
FSQ	Unit management	People management	
		Budget management	
		Project management	
		Purchases	
		Quality management (Accreditation maintenance)	
	Communication	Internal	
		External	
	Method development & in-house validation		

Unit	Process	Sub-Process	RA
	Method development & inter-lab validation		
	Scientific/Analytical support/advice to customers		
	Organisation of events		
	Laboratory organisation	Sample Preparation	✓
		Chromatography (HPLC, GC, TLC)	✓
		Spectroscopy (IR, UV, microscope)	✓
		Hyphenated techniques (LC-MS, GC-MS, CE-MS, LC-ELSD)	✓
		Electrophoresis	✓
		DNA/RNA Amplification	✓
INF	Management of requests		✓
ISM	Preventive Maintenance	HVAC	✓
		Electrical	✓
		Buildings	✓
	Managing of Work Requests	HVAC	✓
		Electrical	✓
		Buildings	✓
		Workshop	✓
	Management of Central Store		✓
	Control of Records		
	Management of complaints & non-conformities		
	Improvement		
SHES	General Sector Management		
	Identification & implementation of legal requirements		
	General IRMM SHE management	Policy, planning, objectives	
		CPPW reports	
		Medical (general)	
		Medical (radioactive dose follow-up)	
		SHE training	
		SHE communication, publications	
		Purchases	
		Hazard/environmental aspect identification & Risk Assessment	
		Internal audit	

Unit	Process	Sub-Process	RA
		Management of non-conformities (incl incidents and accidents).	
	Radiation protection (RP)	Operational RP	✓
		RP instrumentation (use &	
		RP Lab activities	
		Management of controlled area access	
	Safeguards		
	Transport of dangerous goods	Radioactive material	
		Other material	
	Fire Protection		✓
	Environment protection (incl Hazardous waste management).	Releases, effluents	✓
		Environmental dosimetry	
		Radioactive waste	
		Conventional hazardous waste	
		Conventional environment	
	Bio & Chemical safety	Biological safety	
		Chemical safety	
	Conventional safety		
	Emergency Planning		
	Decommissioning		
	Surveillance & Security		✓

Abbreviations in Table 9 provided below [14]

TOOL 3C: EVALUATION OF INTEGRATED ASSESSMENTS

One of the best results of the IMS introduction was the achievement of a genuine collaboration between not only the institute QM and the SHES auditors but between all of the institute's auditors. There was a tangible feeling (and later clear confirmation) that everyone was pulling together to achieve this. The fact that the ground had been well prepared in terms of preparing the unit heads and staff that the effort to achieve our goal

[14] Abbreviations: Dir = Direction; MSU = Management Support Unit; MSU-Q = Management Support Unit-Quality; IDPM = Institute Development & Project Management; IM = Isotope Measurements; RM = Reference Materials; NP=Neutron Physics; FSQ = Food Safety & Quality; INF = Informatics; ISM = Infrastructure & Site Management; SHES = Safety, Health, Environment and Security; ICP = Inductively Coupled Plasma; RN = Radionuclides; SCK = Studiecentrum voor Kernenergie; CRM = Certified Reference Materials; LINAC = Linear Accelerator; VdG = Van de Graaf Accelerator; HPLC = High Performance Liquid Chromatography; GC = Gas Chromatography; TLC = Thin Layer Chromatography; IR = Infra Red; UV = Ultra Violet; CE = Capillary Electrophoresis; ELSD = Evaporative Light Scattering Detector; MS = Mass spectrometry.

would be three times the normal workload in 2007 (see Figure 6) but thereafter would reduce again to 33% of this effort; allowed us to plough on successfully to the end without a "revolution".

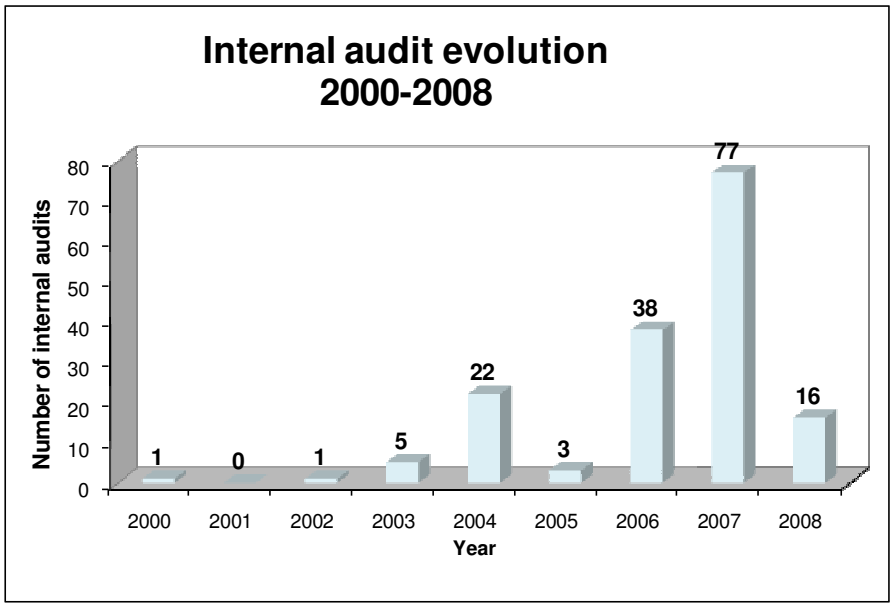


FIGURE 6: INTERNAL AUDIT EVOLUTION

TOOL 3D: ACTING - REGARDING INTEGRATED ASSESSMENTS

The major lesson learned from integrating all assessments was that it increases overall assessment efficiency and it leads to a mutual understanding of the institute's common goal, initially amongst auditors and thereafter rippling out to all staff. Other audits e.g. those for maintaining accreditations do not have the same positive effect due to the unit tendency to use their own unit internal auditors and not use the IRMM auditor pool.

LESSONS LEARNED 2: INTEGRATED ASSESSMENTS LEAD TO INCREASED ASSESSMENT EFFICIENCY.

LESSONS LEARNED 3: INTEGRATED ASSESSMENTS LEAD TO IMPROVED STAFF UNDERSTANDING OF THE INSTITUTE'S COMMON GOALS.

IMPROVEMENT ACTION 2: INCREASE ACCREDITATION AUDIT HARMONIZATION BY USING IRMM AUDITOR POOL INSTEAD OF UNIT POOL ONLY.

2.3.4. TOOL 4 – HAZARD I.D. & RISK ASSESSMENTS

TOOL 4A: PLAN HOW RISK ASSESSMENTS WILL BE MANAGED

Hazard Identification and Risk assessment refers to the process of evaluating risks to workers' safety and health from hazards at the workplace. Apart from being legally required in all EU countries, it is good practice to carry out Hazard Identification and Risk assessments

as they allow effective measures to be taken to protect workers' health. It follows therefore that Hazard Identification and Risk Assessments (HI&RA) have to be planned and require a methodology to be created for their implementation (see below).

Following on from the efforts made to streamline/map the generic processes, this information was then used to plan which of these processes needed a corresponding Generic Risk Assessment (see Table 7: Processes and/or sub-processes Map (Generic Risk Assessments are indicated).). It should perhaps be mentioned that before the certification campaign began, > 90 % of processes did not have a corresponding Hazard ID and Risk Assessment. At the time of RA planning we did not yet have a database for managing the Risk Assessments (see section 4 for the future perspectives in this area).

METHODOLOGY FOR RISK ASSESSMENTS

The accident prevention process starts with the reduction and, where feasible, total elimination of potential risks, followed by the implementation of collective prevention measures and, in the final instance, personal protection solutions. By identifying the hazards and evaluating the risks, the employer, or person in control of the work should be able to:

- Make a decision as to the protective measures required, taking into account relevant legal requirements;
- Check whether the measures in place are adequate;
- Prioritise any further measures found to be required;
- Show that an informed judgement has been made on workers' safety and health (e. g. to the workers or to the regulatory authorities);
- See whether an improvement in the level of protection of the workers has been achieved.

Since the methodology was already presented in a previous UAMS paper entitled “A Hazard identification and Risk Assessment system – tailored for a broad topic research centre”[15], and to keep the main body of the manuscript as concise as possible, the full description will only appear in Annex 1-VI.

HI&RAs were systematically carried out just before the Integrated Assessment, scheduled for the same process, on the same day. This was to optimize the fact that the relevant people were available in any case and thus to try and minimize audit fatigue. The methodology, during the certification campaign, involved saving signed pdf RAs in a SHES Record Library along with other SHE record categories, and this being available to all staff.
The results of the application of this tool are summarized in the Evaluation section (Table 8: Hazard or environmental aspect identification and Risk Assessment per Generic Process.).

TOOL 4B: MAP THE REQUIRED GENERIC RISK ASSESSMENTS

[15] “A Hazard identification and Risk Assessment system – tailored for a broad topic research centre”, J. McCourt, PA Niv. I, 24 ° promotie, UAMS, 2007.

The gap audit carried out by external auditors before the certification process began, revealed that apart from one unit, very few other units had been aware of their legal obligation to carry out Hazard Identification and Risk Assessments of their Processes (and Projects). Upon consultation with Unit Quality Managers, Action Leaders and Building Responsibles, the Generic Risk Assessments, as ticked next to appropriate Generic Process in Table 7 , were then mapped.

TOOL 4C: EVALUATION OF GENERIC RISK ASSESSMENTS

During the meetings with unit representatives to decide which processes needed a Risk Assessment, the opportunity was also used to communicate the particular role of the hierarchy in the area of Hazard Identification and Risk Assessment (methodology described in Annex 1-VI). Due to numerous staff nationalities (~ 27), people with leadership functions such as Project Leaders, Action Leaders etc, were not often aware that the Project Owner or Process Owner is the person who should make the Hazard Identification and Risk Assessment. This message was repeated again and again during the assessment stage also as it was felt that SHES would have to take the lead role in initiating all Hazard Identification and Risk Assessments before certification but that thereafter SHES would only advise as is meant to be the case.

The first outcome of these generic process RAs was the elucidation of risk descriptions and scoring, as shown in Table 8.

TABLE 8: HAZARD OR ENVIRONMENTAL ASPECT IDENTIFICATION AND RISK ASSESSMENT PER GENERIC PROCESS.

Unit	**Processes or sub-processes -requiring risk assessment**	**Hazard (or Aspect) identification & Risk Assessment**							
		Building Nr.	Fire or Explosion Hazard	Radiation Exposure hazard	Chemical hazard	Biological hazard	Conventional safety related hazards	Inadvertent loss of hazardous material	Waste & other environmental aspects
IM	Clean Labs activities	040	1	0	2	0	1	0	2
	ICP Labs activities	040	1	0	2	0	1	0	2
	Analytical activities in nuclear controlled area	040	1	2	1	0	2	2	2
	Gas Labs activities	040	1	0	2	0	1	0	2
	Primary Standardisation (radioactive source preparation)	010	2	1	1	0	2	1	1
	Primary standardisation (measurements)	010	2	1	1	0	2	2	1
	Gamma Ray spectroscopy	010	1	1	0	0	1	1	0

Unit	Processes or sub-processes -requiring risk assessment	Hazard (or Aspect) identification & Risk Assessment							
		Building Nr.	Fire or Explosion Hazard	Radiation Exposure hazard	Chemical hazard	Biological hazard	Conventional safety related hazards	Inadvertent loss of hazardous material	Waste & other environmental aspects
	Liquid scintillation counting	010	1	1	2	0	1	1	2
	Irradiation	010	0	2	0	0	1	1	1
	Chemical Labs (RN) activities	010	1	1	2	0	1	1	2
	Weighing activities	010	1	0	1	0	1	0	1
	Underground Lab (SCK)	002	1	1	1	0	2	1	1
RM	Clean cells activities	130							
	BSL2* Lab activities (BSE, TSE)	130	1	0	2	2	1	1	2
	BSL2 Labs activities (GMOs & Microbiology)	130	1	0	1	2	1	0	2
	DNA determination processes	130	1	0	2	2	0	0	2
	Chemical Labs activities	130	1	0	2	0	1	0	2
	CRM processing	130	1	0	1	1	2	0	1
	CRM storage & dispatching	190	1	0	1	1	1	0	1
	Engineering Materials Lab activities	130	1	0	1	1	2	0	1
NP	Operation Van de Graaff	020	2	2	2	0	2	2	1
	Experiments Van de Graaff	020	1	2	1	0	2	2	1
	Operation LINAC	050	2	2	1	0	2	2	1
	Experiments LINAC	050	1	2	1	0	2	2	1
	Workshop LINAC	050	1	2	0	0	1	1	2
FSQ	Sample Preparation	010, 110	1	0	2	1	2	0	2
	Chromatography (HPLC, GC, TLC)	010, 110	1	0	2	0	1	0	2
	Spectroscopy (IR, UV, microscope)	010,110	1	0	2	1	1	0	2
	Hyphenated techniques (LC-MS, GC-MS, CE-MS, LC-ELSD)	010, 110	1	0	2	0	1	0	2
	Electrophoresis	110	1	0	2	0	1	0	2
	DNA/RNA Amplification	110	1	0	2	0	1	0	2
INF	Management of requests	050	1	0	1	0	1	0	2
ISM	HVAC Air Handling	All	1	0	0	0	2	0	2
	HVAC Heating	170	1	0	1	0	2	0	2
	HVAC Process Chilled water	All	1	0	1	2	2	0	1
	HVAC Sanitary water	All	1	0	0	0	2	0	1
	HVAC Waste water	All	1	1	2	2	1	2	2
	ELEC - Low voltage	All	2	0	0	0	2	0	1
	ELEC - Medium voltage	090	1	0	1	0	2	0	1

Unit	Processes or sub-processes -requiring risk assessment	Hazard (or Aspect) identification & Risk Assessment							
		Building Nr.	Fire or Explosion Hazard	Radiation Exposure hazard	Chemical hazard	Biological hazard	Conventional safety related hazards	Inadvertent loss of hazardous material	Waste & other environmental aspects
	ELEC - Vital Supply	091	2	0	1	0	1	0	2
	Telecommunications	060, 010	1	0	0	0	1	0	1
	Portable electrical equipment use.	All	1	0	0	0	2	0	0
	Central workshop activities	060	1	0	1	1	2	0	1
	Central Storage	060	1	0	0	0	2	0	2
	Infrastructure Works & Waste management	All	E	X	T	E	R	N	AL
	Cleaning of Workplaces	All	E	X	T	E	R	N	AL
SHES	Radiation protection	All	1	2	2	0	1	2	1
	Surveillance & Security	All	1	1	1	1	1	2	1
	Fire Brigade	All	0	2	2	2	2	1	1
	Hazardous Waste Management	All	2	0	2	2	1	1	2
IRMM	Administrative work	All	1	0	1	0	1	0	1
	Transport (via trolleys, fork lifts, hoists etc).	All	1	0	0	0	1	0	0

The second outcome of these generic process RAs was the elucidation of a clear list of the seven most significant areas of concern, weighted as shown, in Table 9.

TABLE 9: MOST SIGNIFICANT AREAS OF CONCERN ARISING FROM THE GENERIC PROCESS RAS.

Area of concern	Frequency of occurrence	Weighting	Weighted score
Lack of Personal Protective Equipment	11	4	44
Waste issues (incorrect storage or absent labelling)	11	3	33
Extraction issues (inadequate Fume Cupboard extraction or need for mobile hood)	5	5	25
Lack of preventive maintenance programmes	5	4	20
Inspection required (magnetic field measurements, gas meter functioning checks)	5	2	10
Missing Spill Kits	2	2	4
Missing Emergency Response Information	3	1	3

The third outcome of this tool use was that the hierarchical line became aware of their responsibility in this area and so there was a direct impact on the generation of RAs. In the latter half of 2006, when this certification campaign began, it was mainly one unit (Neutron Physics) who generated Risk Assessments. During the course of 2007 all units carried out both Project and Process Risk Assessments, but on the SHE sector instigation. At the time of writing this project in 2008, all units instigate their own RAs (both Project and Process) –see Figure 7, Figure 8- but one unit (IM) seems under-represented in the number of Project RAs being carried out (in comparison with the projects listed in the IRMM Project Task Management database).

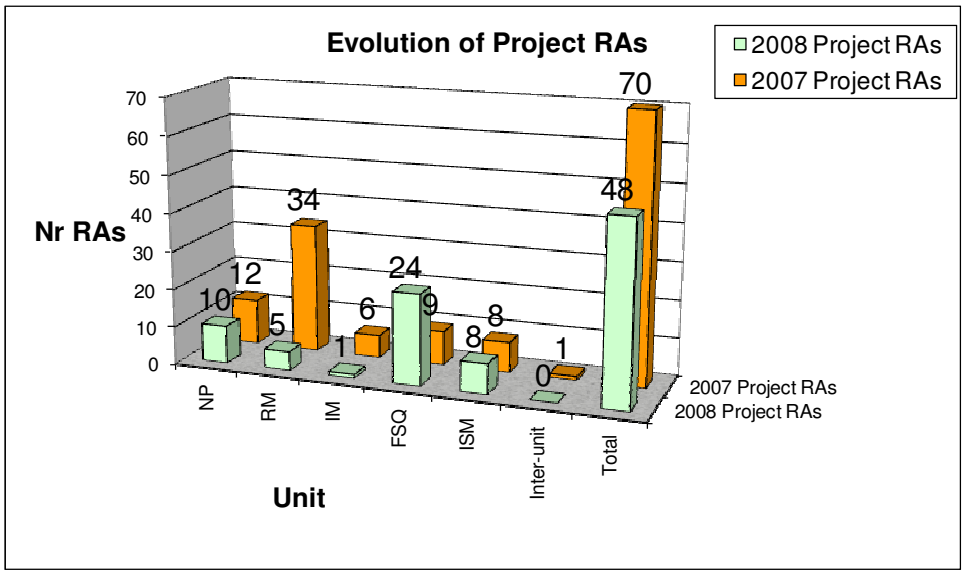


FIGURE 7: EVOLUTION OF HAZARD IDENTIFICATION AND RISK ASSESSMENTS IN PROJECTS FROM 2007 TO 2008.

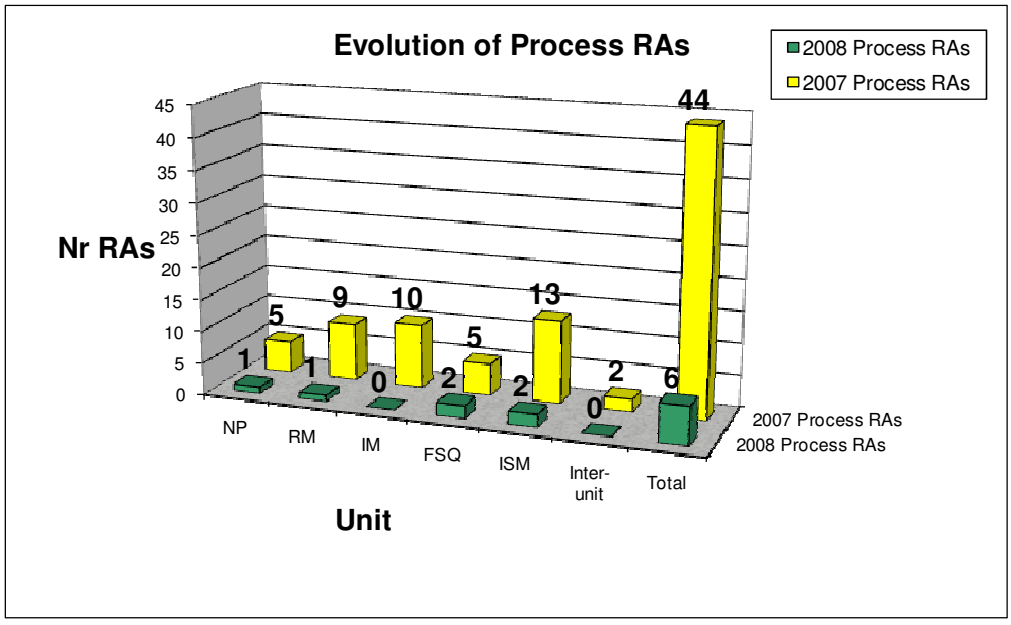


FIGURE 8: EVOLUTION OF HAZARD IDENTIFICATION AND RISK ASSESSMENTS PROCESSES FROM 2007 TO 2008.

As can be seen in Figure 9, the use of the Generic Risk Assessment tool received a special mention from the external auditors as a "Strength" of the IMS.

Strengths are:

- open atmosphere during the audit
- the competence of the employees, e.g. in accordance to their "own" processes and the overall process of the Institute
- numerous hints from the pre-audit were already realised December 2007 or put in concrete terms in the action list of 2008.
- by employing the generic risk assessment tool a good documentation of the demands in environmental and health & safety protection is secured.

FIGURE 9: EXCERPT FROM THE TUV NORD AUDIT REPORT AWARDING THE TRIPLE CERTIFICATION – STRENGTHS OF THE IMS (21.12.2007)

An area for improvement (as noted by the TUV auditors) in terms of Risk Assessments is shown below (Figure 10).

7	8.2.3	4.5.1	4.5.1	all scientific units, ISM, SHE	**I:** Machineries, e.g. movable electrical equipment of the workshop should be inspected regularly. The inspection interval should be determined by means of a risk assessment. SHE unit should support those units concerned with risk assessment.

FIGURE 10: EXCERPT FROM THE TUV NORD AUDIT REPORT AWARDING THE TRIPLE CERTIFICATION – AREA FOR IMPROVEMENT (21.12.2007)

Tool 4C proved essential in paving the way to triple certification as if generic process RAs had not been well planned and implemented then we simply wouldn't have been ready in the set time frame.

TOOL 4D: ACTING - REGARDING HAZARD I.D. & RISK ASSESSMENTS

The major lessons learned regarding the implementation of Hazard Identification and Risk Assessment (HI&RAs) for Generic Processes were the following:

LESSONS LEARNED 4: THE GENERIC PROCESS HI&RAS ALLOWED THE ELUCIDATION OF RISK DESCRIPTIONS AND SCORING FOR ALL RELEVANT IRMM PROCESSES.

LESSONS LEARNED 5: THE GENERIC PROCESS HI&RAS ALLOWED THE ELUCIDATION OF A CLEAR LIST OF THE SEVEN MOST SIGNIFICANT AREAS OF CONCERN.

LESSONS LEARNED 6: THE PROCESS OF CARRYING OUT THESE HI&RAS ACROSS THE INSTITUTE RESULTED IN THE HIERARCHICAL LINE BECOMING MORE AWARE OF THEIR RESPONSIBILITY IN THIS AREA.

IMPROVEMENT ACTION 3: PORTABLE ELECTRICAL EQUIPMENT SHOULD BE INSPECTED REGULARLY.

2.3.5. TOOL 5 – ENVIRONMENTAL ASPECT ASSESSMENTS

TOOL 5A: PLAN HOW ENVIRONMENTAL ASPECT ASSESSMENTS WILL BE MANAGED.

Another important planning task in terms of assuring legal compliance and in terms of certification was, of course, the environmental aspect identification and evaluation. Needless to say this had already been elucidated (due to the need for legal compliance in this area to continue to hold an environmental license in Belgium) even before we began to prepare for the triple certification. However there were gaps that needed to be filled and further refining, which was in itself a considerable task, performed by our internal environmental manager and aided by an external environmental coordinator, for continuous auditing and for the preparation of the file for the renewal of the environmental license which also occurred during the IMS introduction period.

METHODOLOGY FOR ENVIRONMENTAL ASPECT ASSESSMENTS

The aim of the procedure “Protection of the Environment at IRMM – aspect identification and significance analysis” (as provided in Annex 1-IX) is to describe the methodology that leads to the identification of the aspects and impacts relevant to the environment and aims to allow a quantitative significance analysis of these aspects.

The results of the application of this tool are summarized in the Evaluation section (Figure 11: IRMM’s Environmental aspects and their weighted scores, Table 11: Summary Environmental aspects and their weighted score).

TOOL 5B: MAP THE REQUIRED ENVIRONMENTAL ASPECT ASSESSMENTS

The table mapping the activities associated with a possible environmental aspect is shown here (Table 10) and how the scoring is done is further explained via Tool 5C: Evaluation of Environmental Aspect Assessments – and in the Annex, referenced above.

TABLE 10: IRMM ACTIVITIES WITH POSSIBLE ENVIRONMENTAL SIGNIFICANCE

Unit	Activity
ISM	Buildings and site
	Central store
	Central workshop
	Cleaning
	Mechanical services
IM	Non nuclear laboratory research
	Nuclear laboratory research
	Radionuclides research
NP	LINAC - neutron physics general
	LINAC operation
	Van de Graaff accelerator - neutron physics general
	Van de Graaff accelerator operation
RM	Production and certification of reference materials
	Storage of reference materials
FSQ	Laboratory research
SHES	Fire brigade
	Surveillance and assistance
	Decommissioning
INF	Informatics and electronic maintenance
All units	Administrative services

TOOL 5C: EVALUATION OF ENVIRONMENTAL ASPECT ASSESSMENTS

Once again, in the frame of continuous improvement, the method for the assessment of the environmental aspects was streamlined and the related procedure issued.
After a detailed analysis the following scores were elucidated. See Figure 11 which illustrates the fact that certain sub-aspects need to be tackled immediately whereas others have their scores in the significance warning zone, which gives some leeway for action but still enough warning about the importance of the aspect. The tables in Annex 1-XII: IRMM activities and their respective environmental aspect scores (1/3 tables), provide the individual scores per criterium and Table 11 summarizes the outcome of the evaluation, with 6 of the 10 categories of aspects needing remedial action (involving 24/64 or 37.5% of the mapped activities).
Needless to say tackling these 24 issues along with the major findings of the final certification audit, which were:

- the necessity to establish and maintain an up-to-date waste register *(legal requirement)*;
- the necessity to formally register complaints related to environmental issues.

will require a lot of institute resources.

What has been done to begin to solve these issues will be described in the section

Evaluation of Performance – Environmental PIs (2.3.10)

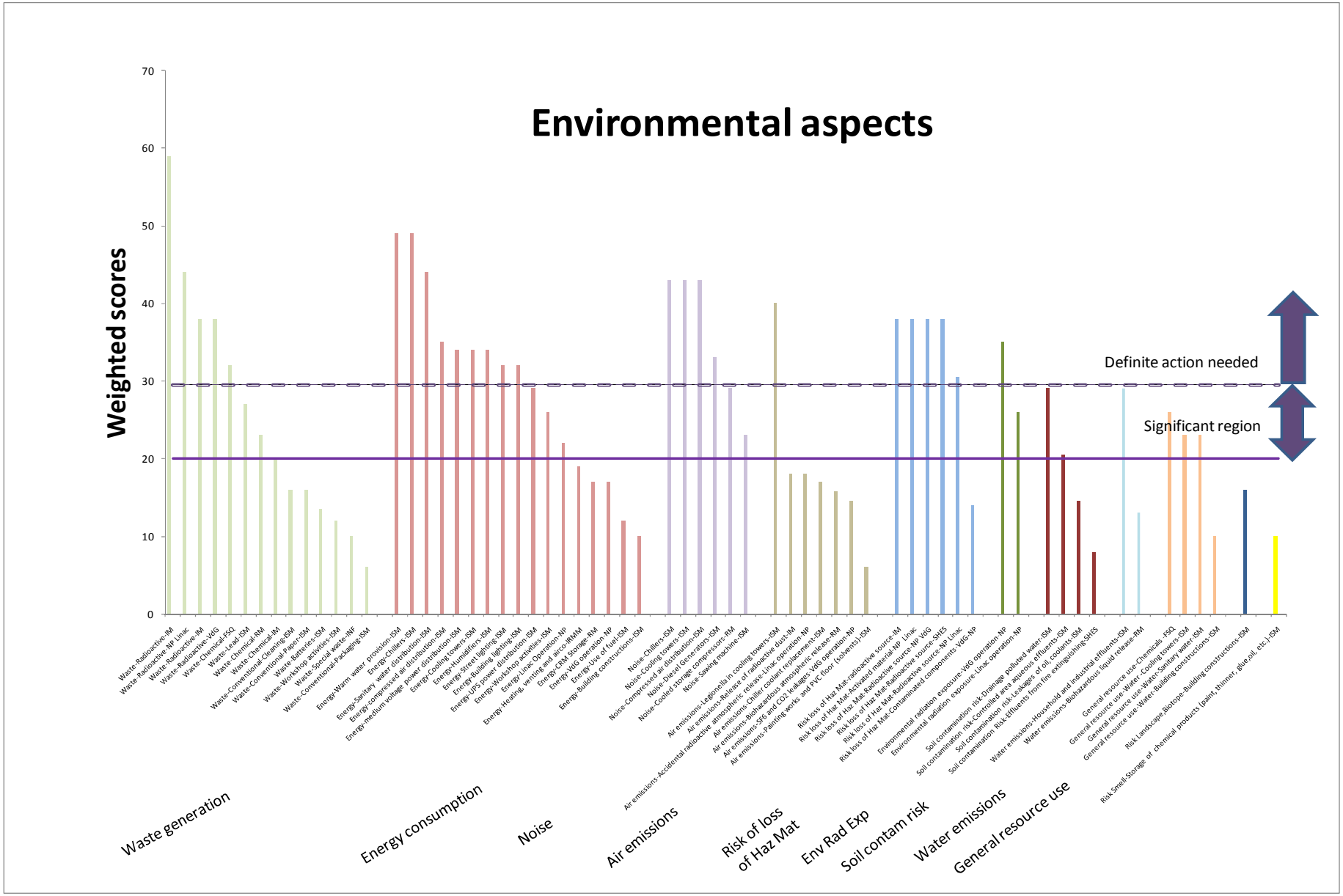


FIGURE 11: IRMM'S ENVIRONMENTAL ASPECTS AND THEIR WEIGHTED SCORES

TABLE 11: SUMMARY ENVIRONMENTAL ASPECTS AND THEIR WEIGHTED SCORES

Environmental aspect	Maximum weighted score
Waste generation	59
(Primary) Energy consumption	49
Noise (to the environment	43
Air emissions	40
Risk of loss of Hazardous Materials	38
Environmental Radiation exposure	35
Risk soil contamination	29
Water emissions	29
Use of general resources	26
Changes to the landscape and biotope (including the neighbourhood)	16

TOOL 5D: ACTING - REGARDING ENVIRONMENTAL ASPECT ASSESSMENTS

The major lessons learned from the assessment of the Environmental Aspects were the following:

LESSONS LEARNED 7: PERFORMING THE ENVIRONMENTAL ASPECT ASSESSMENTS ALLOWED THE ELUCIDATION OF A CLEAR LIST OF THE MOST SIGNIFICANT AREAS OF CONCERN.

IMPROVEMENT ACTION 4: CERTAIN ENVIRONMENTAL SUB-ASPECTS NEED TO BE TACKLED IMMEDIATELY (~38% OF THE MAPPED ACTIVITIES)

IMPROVEMENT ACTION 5: ESTABLISH AND MAINTAIN AN UP-TO-DATE WASTE REGISTER *(LEGAL REQUIREMENT)*;

IMPROVEMENT ACTION 6: FORMALLY REGISTER COMPLAINTS RELATED TO ENVIRONMENTAL ISSUES.

2.3.6. TOOL 6 – NON-CONFORMITIES, INCIDENTS AND ACCIDENTS

TOOL 6A: PLAN HOW NON-CONFORMITIES, INCIDENTS AND ACCIDENTS WILL BE MANAGED.

Planning for how non-conformities (NCMR), incidents or accidents would be managed again resulted in a decision to merge two separate databases and have one integrated “non-

conformity, incident or accident" database. The advised (and for the most part used) way of using this database (in IRMM) is to first discuss with the people involved and only then enter the NCMR or incident/accident details in the system. This leads to greater acceptance of one's accountability for the implementation of any actions recommended and also leads to a better Root Cause Analysis.

TOOL 6B: RECORD THE NON-CONFORMITIES, INCIDENTS AND ACCIDENTS

During the Do phase, one relies on the readiness of all concerned to play their part in recording the necessary facts, in this case, the NCMRs, incidents and accidents. A screen shot of the database showing just how these records are kept is shown in Figure 12.

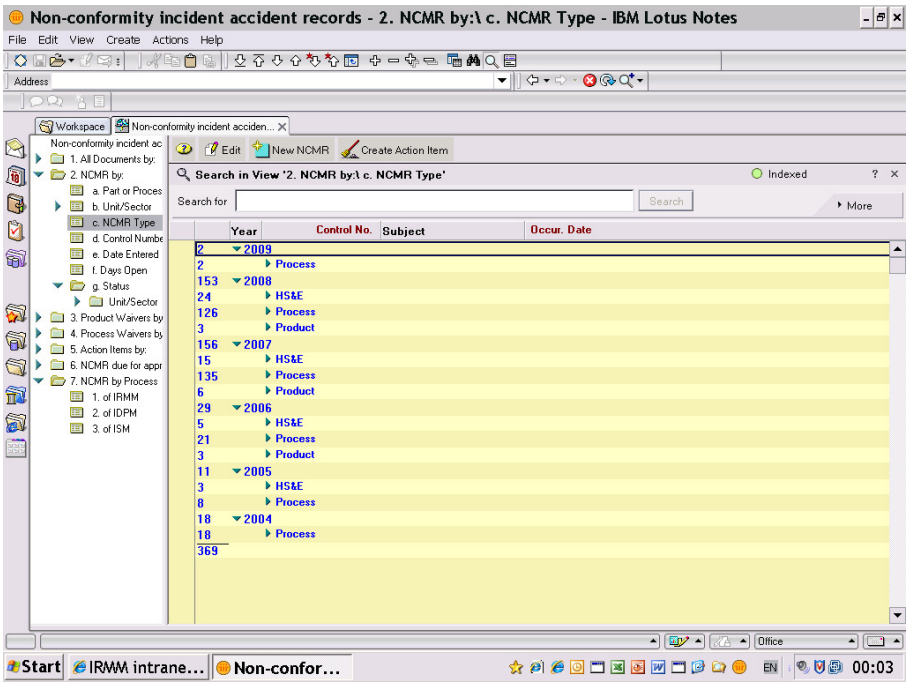


FIGURE 12: SCREEN SHOT OF THE NON-CONFORMITIES, INCIDENTS AND ACCIDENTS DATABASE.

TOOL 6C: EVALUATION OF THE INTEGRATION OF NCMR$_S$

The decision to integrate the reporting of non-conformities, near-incidents and incidents was initially not taken lightly as there was concern that people would confuse their importance. However the decision was made and a merged data base was launched (see excerpt below, Figure 13), where the indication of the type of non-conformance i.e. either a) SHE, b) Process or c) Product was the first distinction to be made.

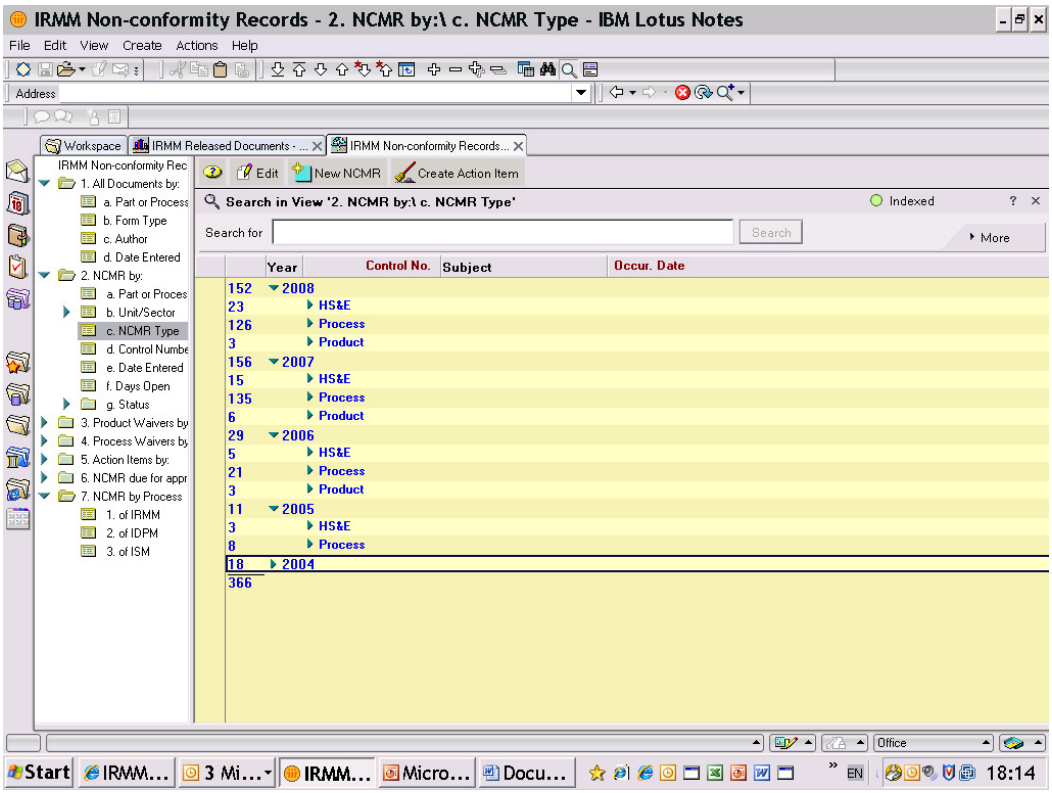


FIGURE 13: SCREEN SHOT OF NON-CONFORMITY DATABASE, SHOWING HS&E, PROCESS AND PRODUCT RELATED NCMRS.

One of the “seeming” improvements was the merge of the Product, Process and SHE related non-conformities in one database, with the result as shown in Figure 14. This figure doesn't show the situation before the use of the database, i.e. when SHE related "NCMRs" were recorded separately and on paper. Having a look in the archives revealed that the total numbers of SHE related "NCMRs" were 20 paper records (2005) and 15 paper records (2006), bringing the true "SHE" totals up to 23 and 20 for 2005 and 2006 respectively.

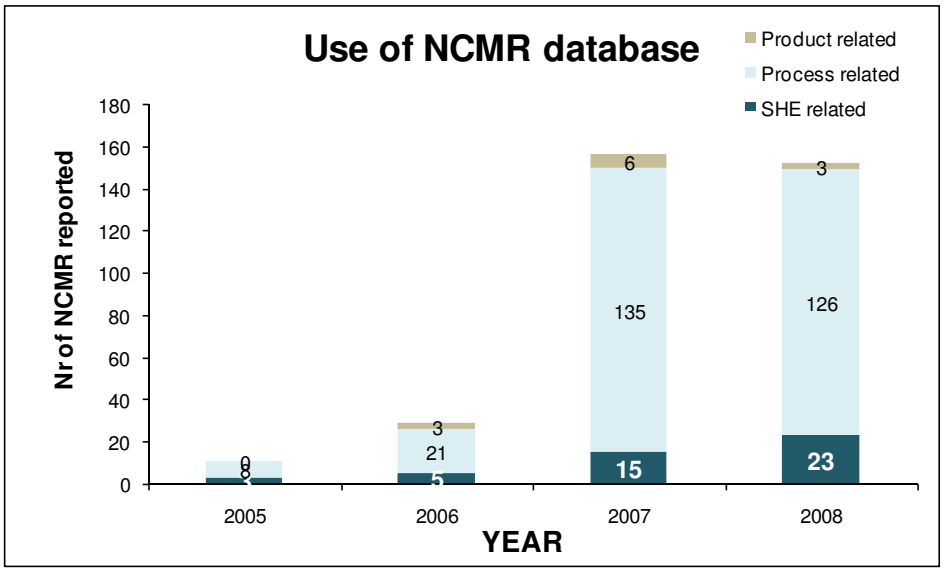


FIGURE 14: USE OF NON-CONFORMANCE DATABASE

However a small part of another “Veiligheidskunde” study entitled “Werken met derden en de rol van vorming en opleiding op een gezamenlijke veiligheidscultuur”[16], highlighted a possible improvement area in the realm of incident reporting. A limited survey of nine people, of seven different nationalities, (five contract agents (all on the point of departure), two project leaders and two action leaders) was carried out by means of standard questions (Annex 1-XIV**,** 1-XV**,** 1-XVI) to elucidate a little more what the current level of safety culture in IRMM was amongst these groups, paying particular attention to the contract agents, as these usually constitute the actual laboratory personnel. All of the interviewees had already spent at least 2.5 years in IRMM and all had a university qualification in Science (2 physicists, 1 bio-engineer and 6 analytical chemists).

The questions were posed and the answers were interpreted by counting the positive scores (as one) and not counting the negatives (therefore total less than nine per question if some person(s) had a negative remark. See Figure 15 below for a visualisation of the "results".

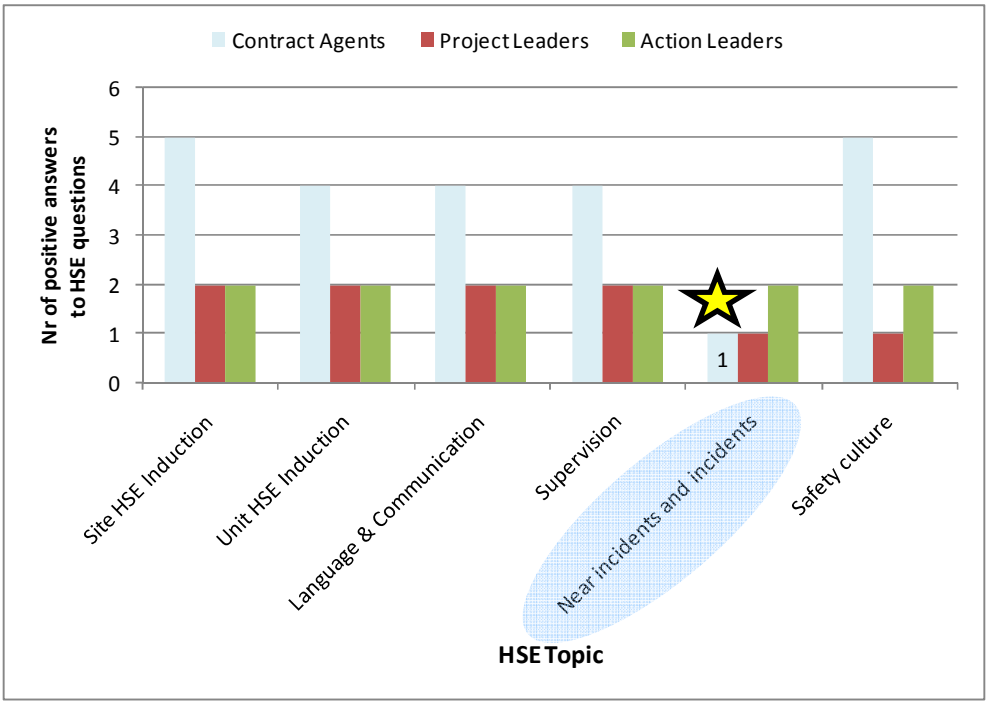


FIGURE 15: IMPRESSION OF DEGREE OF SHE CONFORMITY ACCORDING TO THE DIFFERENT CATEGORIES OF STAFF [16].

Even considering the fact that the population interviewed was not large (inhibiting too many conclusions), nevertheless the fact that only 1 of the 5 Contract Agents said that near incidents and incidents were reported gives some reason for concern and for further attention. The other topics such as HSE induction, supervision etc are shown because they were part of the original survey but the highlighted point of "Near incidents and incidents" reporting is the focal point here.

[16] “Werken met derden en de rol van vorming en opleiding op een gezamenlijke veiligheidscultuur”, Hans Bastiaans, Marc Broeders, Lauris van Hove, Josephine McCourt, Enrico Schorno, PA Veiligheidskunde Niv. I, 24° promotie, Dec.2008.

Unfortunately, a culture where (short term) employees don't seem to report incidents or near incidents actually has a slowing down effect on the evolution of an OH&S management system, as well as obviously contributing to the continuance of potentially dangerous practices or situations. It is, of course, then important that the hierarchical line as well as the SHES sector, strive to encourage the reporting of such incidents. By analysing incidents and near incidents, appropriate corrective and preventive measures can be formulated. By taking these measures, the impact of an incident can be lessened or even avoided altogether. Open communication about such incidents can prevent similar incidents, in another unit, from occurring and thus contribute to the cycle of continuous improvement.

A genuine safety culture is a crucial key or conversely, stumbling block in the further evolution of an institute on its way towards real integration of safety, environmental and quality management.

TOOL 6D: ACTING - REGARDING NON-CONFORMITIES, INCIDENTS & ACCIDENTS

The main lesson learned from the evaluation of the use of the non-conformance database is that what appears to be a steady reporting (taking all records into account) of non-conformities, incidents and accidents actually may hide a tendency, of a certain category of staff, to not report incidents or near-incidents.

LESSONS LEARNED 8: APPARENTLY CONSISTENT REPORTING OF NON-CONFORMITIES, INCIDENTS AND ACCIDENTS MAY NOT SHOW THE FULL PICTURE.

IMPROVEMENT ACTION 7: FURTHER COMMUNICATE ABOUT THE BENEFITS OF OPENLY REPORTING INCIDENTS OR NEAR-INCIDENTS.

2.3.7. TOOL 7 – CORRECTIVE & PREVENTIVE ACTIONS

TOOL 7A: PLAN HOW CORRECTIVE AND PREVENTIVE ACTIONS WILL BE MANAGED.

Planning for how corrective and preventive actions would be managed gave rise to the creation of another database. This database allows the generation and tracking of Corrective Action Requests (CARs) and Preventive Action Requests (PARs).
A Corrective Action Request (CAR) is created to record action taken to eliminate the causes of an existing nonconformity in order to prevent recurrence. A Preventive Action Request (PAR) is created to record action taken to eliminate the causes of a potential nonconformity. An Action Item is created by the assignee of a CAR/PAR in order that others may aid in the resolution of the CAR/PAR.

TOOL 7B: RECORD THE INTEGRATED CORRECTIVE AND PREVENTIVE ACTIONS

Achieving good record keeping of corrective and preventive actions also relies on the readiness of all concerned to play their part. A screen shot of the database showing just how these records were kept is shown in Figure 16:

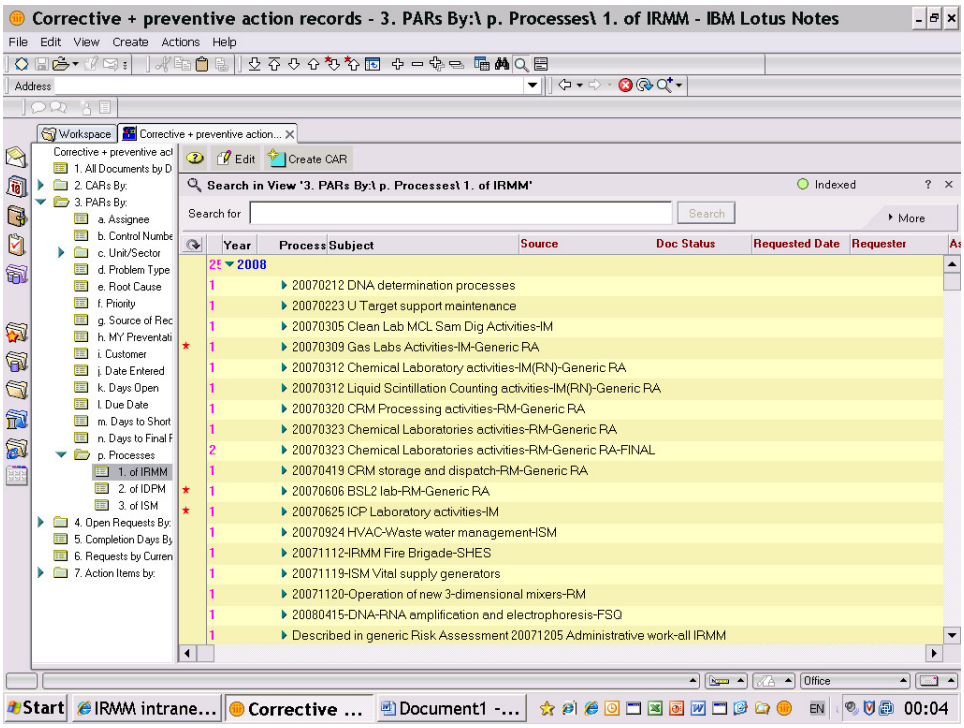


FIGURE 16: SCREEN SHOT OF THE CORRECTIVE AND PREVENTIVE ACTIONS DATABASE.

TOOL 7C: EVALUATION OF THE INTEGRATION & EXECUTION OF CORRECTIVE & PREVENTIVE ACTIONS

It is clear from Figure 17 and Figure 18 that the introduction of the IMS in IRMM resulted in (much) greater use of these databases with, as a result, much greater accountability.

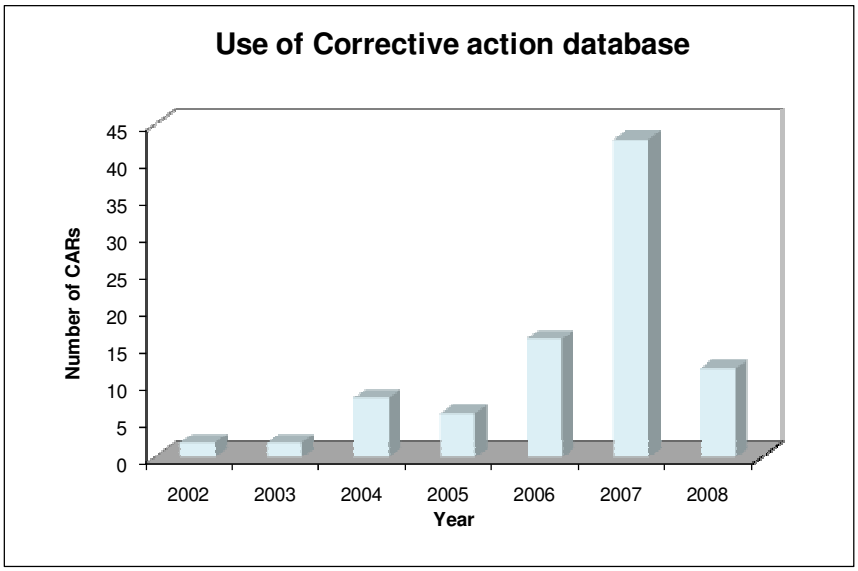


FIGURE 17: EVOLUTION OF CORRECTIVE DATABASE USE FROM 2002-2008

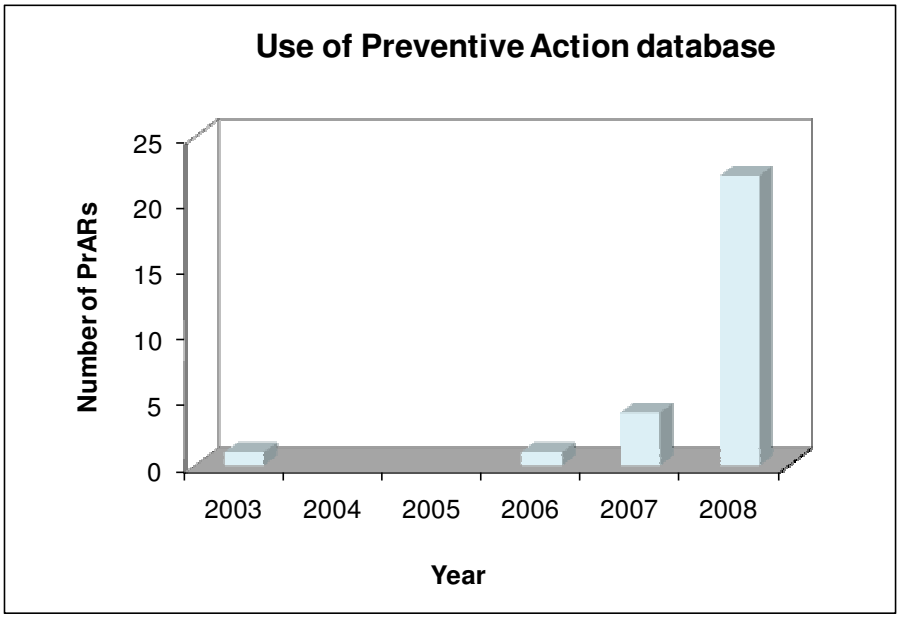


FIGURE 18: EVOLUTION OF PREVENTIVE ACTION DATABASE FROM 2003-2008

The advised (and, for the most part, used) way of using these databases (in IRMM) is to first discuss with the people involved and only then enter the possible CAR or PAR in the system. This leads to greater acceptance of one's accountability for the implementation of any actions recommended.

TOOL 7D: ACTING - REGARDING CORRECTIVE & PREVENTIVE ACTIONS

The main lesson learned from the association of recording corrective and preventive actions with an improved Integrated Management System, was:

LESSONS LEARNED 9: THIS ASSOCIATION CAUSED AN INCREASE IN THE USE OF THESE DATABASES WITH AN IMPROVED UNDERSTANDING THAT PRIOR DISCUSSION BETWEEN THE CONCERNED PARTIES WAS CRUCIAL TO ENSURING OWNERSHIP AND ACCOUNTABILITY.

2.3.8. TOOL 8 – PURCHASES

TOOL 8A: PLAN HOW PURCHASES WILL BE MANAGED FROM A SHE COMPLIANCE ANGLE

So as to assure legal compliance, plans on how to manage procurements of equipment, products and services from this angle need to be made and the methodology set in place. The involvement of the SHES sector in purchases and at the commissioning is also a requirement of the ISO 14001 and OHSAS 18001 standards. In Belgium there is also a legal obligation in place in this sense (Table 12)

METHODOLOGY FOR SHES CODING SYSTEM

The system relies on a "code" that has to be attributed to each procurement, using a letter for each of the three main types of procurement (P for Product, E for Equipment and S for Services), with further sub-divisions as shown in the table below. The different codes are described in Table 13). To summarize very briefly the purchase Operating Initiating Agent (OIA) initiates the Request Invitation to Tender (RITT) and already selects a code (or a few codes) that are appropriate for that tender request. The RITT is then processed further and depending on its code(s), is redirected to SHES where, advice is provided depending on the need but which, in any case, is recorded. A functional mail box is used to send advice to the OIA stating the need for e.g. addition to inspection list (once order complete) or requesting a hold until the appropriate license has been adjusted or simply a reminder that the item e.g. instrument may have to be commissioned before use (with help from SHES).

TABLE 12: CATEGORIES OF PROCUREMENT AND THE CORRESPONDING LEGAL REQUIREMENT REFERENCE

Purchase type	Legal requirement ref.
Equipment, machines or mechanised tools	Codex T. VI., H.I. art. 8, Vlarem I & II.
Personal protective equipment or collective protective equipment	Codex T. VII., H.II. art. 9 (personal) and ARAB, art.54 quater 3 (collective), AREI art.57, Vlarem I & II.
Chemical substances, bio-hazardous organisms or pharmaceutical substances with hormonal, anti-hormonal, anabolic, beta-adrenergic, anti-infectious, anti-parasitic and anti-inflammatory functioning.	Codex T. II., H.I. art. 7, 3°; Vlarem I & II; KB 1/04/2004 (bio-hazardous products) and KB 12/04/1974 (hormonal, anti-hormonal……)
Service work to be carried out by external companies on site	Codex T. VI., H.I. art. 8, Vlarem I & II.

TABLE 13: CODING SYSTEM FOR IRMM'S PROCUREMENTS

Code		Description	Step 1		Step 2
			SHES signature on **RITT** needed?	**On-line** ordering (advance email notification needed?)	SHES inspection on delivery/commissioning /start of works.
Products	**P0**	Stationary, Books, Periodicals, Software, Office furniture, Cleaning products, Food products. *General* chemicals (i.e. flammables, oxidising, corrosive, irritating, harmful, explosive, …) providing MSDS also delivered.	No	No	No
	P1	*Large amounts* of haz. chemicals (i.e. flammables, oxidising, corrosive, irritating, harmful and explosive) if > 50 Kg weight (or > 50 L volume) and/or in > 25 Kg packaging.	Yes	Yes	No
	P2	New type of *very poisonous*, *mutagenic* (incl. *carcinogenic*), *teratogenic* products (as defined in respective MSDS sheet)	Yes	Cc of ordering e-mail	Yes
	P3	*Bio-hazardous* organisms (pathogens, non-authorised GMOs).	Yes	Yes (if available on-line)	Yes
	P4	*Pharmaceutical* substances with hormonal/anti-hormonal anabolic, beta-adrenergic, anti-infectious, anti-	Yes	Yes (if available on-line)	Yes

Code		Description	Step 1		Step 2
			SHES signature on **RITT** needed?	**On-line** ordering (advance email notification needed?)	SHES inspection on delivery/commissioning /start of works.
		parasitic and anti-inflammatory functioning.			
	P5	*Radioactive* substances.	Yes	N/A	Yes
Equipment	**E0**	*Basic* equipment, providing *CE* certificate is also delivered (including basic office equipment).	No	N/A	No
	E1	Equipment with CE certificate but with *specific safety concerns* (e.g. gas generators, centrifuges, homogenisers, microwave digestors, etc.) and equipment which need ventilation, gas supply and non-standard electrical supply.	Yes	N/A	Only if specified by SHES on original RITT
	E2	*Tailor made* equipment: equipment designed and/or assembled by IRMM	Yes	N/A	Only if specified by SHES on original RITT
	E3	Equipment legally requiring a *license* i.e. transformers, compressors and air-conditioning units, diesel engines, large batteries, steam generators, steam based equipment as well as leased equipment such as bulk gas tanks.	Yes	N/A	Only if specified by SHES on original RITT

Code		Description	Step 1		Step 2
			SHES signature on **RITT** needed?	**On-line** ordering (advance email notification needed?)	SHES inspection on delivery/commissioning /start of works.
	E4	Equipment legally requiring periodic *inspection* e.g. Lifting equipment (e.g. Hydraulic equipment, cables); Welding (e.g. acetylene torches), Equipment for working at height (ladders, scaffolding); Transport equipment (e.g. forklifts).	Yes	N/A	Only if specified by SHES on original RITT
	E5	*Protective* equipment: - personal e.g masks, - monitoring e.g. gas leak detectors, - collective e.g. fume cupboards, safety cabinets.	Yes	Yes (if available on-line)	Only if specified by SHES on original RITT
Services	**S0**	Without work on site, Without manual labour on site (e.g. inspection).	No	N/A	N/A
	S1	*With manual labour* on the site.	Yes	N/A	Only if specified by SHES on original RITT

TOOL 8B: IMPLEMENT THE SHES CODING SYSTEM FOR PURCHASES

Whether the SHES Coding system is correctly implemented heavily relies on the "good will" and training of the OIA, the purchasing office personnel and of course the SHES personnel. It appears to be well accepted (see 8C) but there are known gaps in the system, which will have to be addressed in the near future, such as in the on-line ordering system and with respect to large procurements (which follow a different mechanism to "normal" purchases).

TOOL 8C: EVALUATION OF SHES CODING SYSTEM FOR PURCHASES

Following the introduction of the legally required system for tracking purchases (with SHE relevance), here is an overview of the use of the coding system (see Table 13: Coding system for IRMM's procurements) with some remarks on its first 5 months in deployment.

- All codes appear to be applied correctly (see Figure 19) – see further explanation below
  - Service codes: use appears to be correctly applied with S1 most prevalent case
  - Equipment codes: use appears to be correctly applied (often triggered by MSU).
  - Product code use: results masked a little by on-line ordering; not all unit OIAs copying SHES with email order and appropriate code.
    - May need further sensitisation by SHES.
- Changes to allow for the code selection on the RITT/RTO forms (within JIPSY) will follow.
- The positive outcomes for IRMM, in terms of increased compliance with Belgian Law and the enhanced opportunity for SHES to carry out their advisory duties along with little or no impact on the total purchase time, supports the implementation of this system.

On examination of all purchases (a total of 800) during the same 5 month period, only 11 of the 800 missed the new SHES coding "net". Based on the fact that we only miss ~1.4% of the standard purchases, it is relatively safe to say that the Purchase Coding system is working well for this type of purchase. We also have an on-line system for ordering chemicals from 2 suppliers, with a catalogue already known to SHES. However there are some P1- P4 category products (see Table 13) which can be procured and which SHES might need to be aware of, that are currently not being directed to us for advice. Apart from the on-line purchases, there are the procurements by contract, which are also, not as yet covered by the SHES Coding System. These are areas for improvement and have already been addressed in the 2008 Management Review and also in the SHES action section of the Annual Management Plan. The idea is that we will first examine all on-line and contract purchases for a fixed period and see just how many we needed to be made aware of and weren't. Preventive actions will then be described.

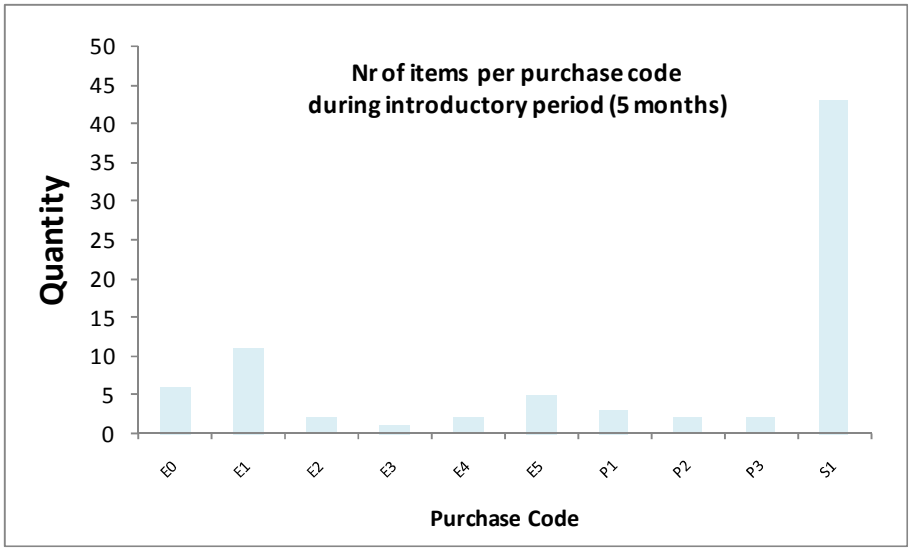


FIGURE 19: QUANTITY PER PURCHASE CODE

TOOL 8D: ACTING - REGARDING PURCHASES

The lessons learned from the application of the SHES Purchase Coding tool are:

LESSONS LEARNED 10: THE SHES PURCHASE CODING SYSTEM IS BEING SUCCESSFULLY APPLIED FOR CERTAIN CATEGORIES OF PURCHASE.

The known gaps need to be addressed as follows:

IMPROVEMENT ACTION 8: OIAS NEED FURTHER SENSITISATION BY SHES ON THE USE OF THE PURCHASE CODING SYSTEM FOR ON-LINE ORDERS.

IMPROVEMENT ACTION 9: THE USE OF THE SHES PURCHASE CODING SYSTEM HAS TO BE EXTENDED TO COVER CONTRACT PROCUREMENTS.

2.3.9. TOOL 9 – EMERGENCY PREPAREDNESS

TOOL 9A: PLAN EMERGENCY PREPAREDNESS

Basically emergency preparedness is planned and organized with the help of the Emergency

Preparedness database (see embedded icon). The database is used for planned emergency response operations and for the creation and maintenance of related documents such as training and personnel records. Actual responses to emergencies are tracked, and Emergency Procedures are created and monitored in this database. Records entered into this database are periodically reviewed and revised as necessary. Emergency response procedures detailed in this database are tested through drills, and the results of those actions are reflected in the documentation.

TOOL 9B: PRACTICE EMERGENCY PREPAREDNESS

Due to the nature of the IRMM site (Class 1[17], therefore highest level of nuclear safety and security required) and due to the extensive documentation describing the system, making it difficult to incorporate here, a schematic diagram (see Figure 20) is simply provided showing all the necessary cells and communication lines. Emergency preparedness is tested by an annual Emergency Exercise and the readiness of the Fire Brigade is tested 11 times a year (10 on site) by means of ± monthly practice sessions.

[17] IRMM is a Class 1 site according to the ARBIS regulation.

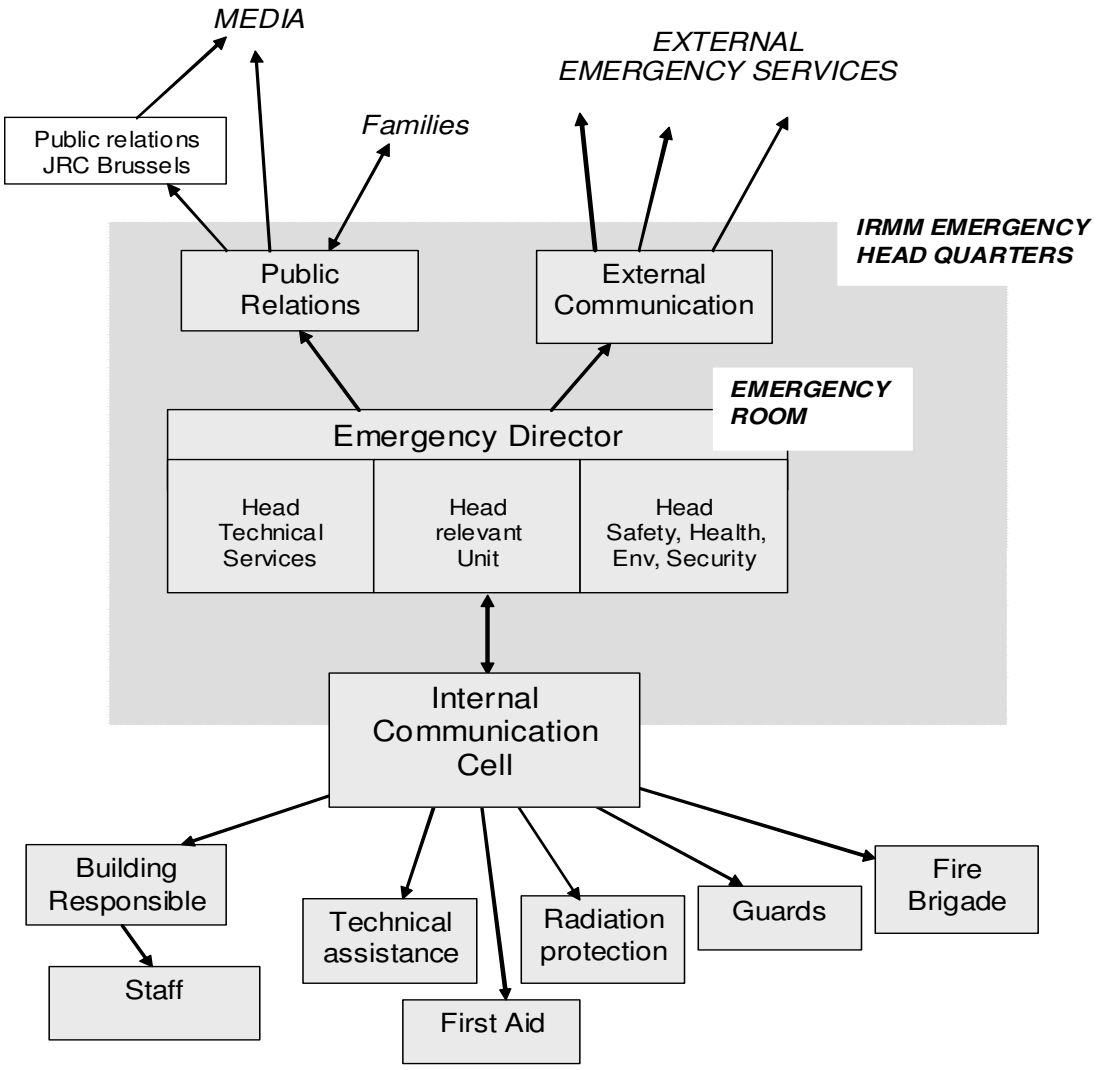


FIGURE 20: EMERGENCY PREPAREDNESS AT IRMM

TOOL 9C: EVALUATION OF EMERGENCY PREPAREDNESS

Perhaps the simplest way to show the value of the Emergency Preparedness (Tool 9A, B) is by showing the excerpt from the external audit, as shown in Figure 21

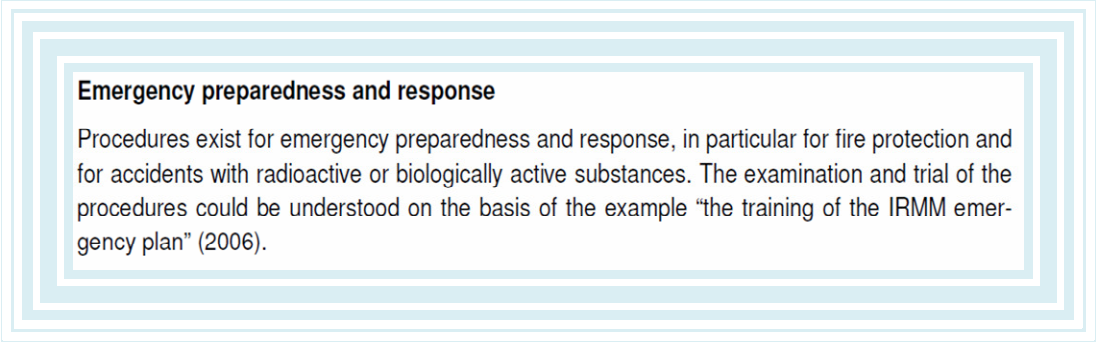


FIGURE 21: EXCERPT FROM THE TUV NORD AUDIT REPORT AWARDING THE TRIPLE CERTIFICATION – EVALUATION OF EMERGENCY PREPAREDNESS AND RESPONSE (21.12.2007)

TOOL 9D: ACTING - REGARDING EMERGENCY PREPAREDNESS

LESSONS LEARNED 11: BY STRINGENTLY ADHERING TO THE ESSENCE OF EMERGENCY PREPAREDNESS, AS PRESCRIBED BY BELGIAN REGULATIONS, WE COMPLY WITH EMERGENCY PREPAREDNESS, AS DESCRIBED IN THE STANDARDS CONSIDERED HERE (ISO 18001 AND ISO 14001).

2.3.10. TOOL 10 – PERFORMANCE INDICATORS

TOOL 10A: PLAN HOW Q AND SHE PERFORMANCE INDICATORS WILL BE MANAGED.

A JRC wide Science Knowledge Management (SKM) System is used to make monthly reports, periodic annual reviews (evaluations of performance) etc available to JRC staff. This is also the platform where the JRC Core Performance Indicators (PIs) are listed and tracked. However, apart from the Core PIs, other Q and SHE related PIs are planned and managed at institute level and appear in the Annual Management Plan (AMP), the Global Prevention Plan (GPP) and in the "Committee for Prevention and Protection"-CPPW- plan. How all indicators are monitored and evaluated will be discussed and displayed in the next two sections (10B and 10C).

TOOL 10B: IMPLEMENT THE MONITORING OF THE Q AND SHE PERFORMANCE INDICATORS.

To avoid un-necessary explanation and yet in the interest of keeping the flow the same as in Table 2, suffice it to say here that the system for monitoring all PIs is not really fully in place (as some of the PIs kept changing, due to improved specifications) and yet, due to good

record keeping in general, enough information has been recorded to allow an evaluation of most PIs (all categories i.e. QSHE).

TOOL 10C: MONITORING OF QSHE PERFORMANCE INDICATORS

One of the ways of monitoring whether, or not, we are maintaining continual improvement is to check if we achieve the targets set out in the JRC performance indicators. Currently, at JRC level, these are limited to a set of Core Performance Indicators in the areas of quality, safety / health and environment. Core Performance Indicators (PIs) should be trendable, observable, reliable, measurable, and specific as indeed should OH & S Performance Indicators (OH&S PIs) and Environmental Performance Indicators (EPIs). See Table 14 for a list of the Joint Research Centre's core PIs, all of which have been chosen due to their being "*trendable, observable, reliable, measurable and specific* (TORMS)" and how the JRC performed in this area is shown in Figure 22: JRC Performance – as measured using its Core PIs against % of Target reached (2004-2008).

TABLE 14: ACTUAL JRC'S CORE PERFORMANCE INDICATORS

Indicator	**Description**	**Indicator & *TORMS*[18] fit**
Support EU Policy makers	01) Total number of high-impact products & services to European policy makers in 2008	☺
	02) Level of customer satisfaction	☺
Scientific excellence in key areas competence	03) Number of peer reviewed journal articles	☺
	04) Number of JRC reference reports	☺
	05) Value of competitive income generated	☺
	06) Success rate in indirect actions	☺
JRC as an effective and efficient organisation	07) Level of utilization of institutional funds	☺
	08) Ratio of scientific to administrative staff (percentage of scientific staff)	☺
Make the JRC a better work place	09) Percentage of female staff in AD (as opposed to AST) posts	☺
	10) Percentage of female staff in Management posts	☺

The JRC, especially IRMM, has certain OH&S and environmental performance indicators, being measured over the last few years. These are summarized in Table 15 and Table 16

[18] TORMS: "*trendable, observable, reliable, measurable and specific*"

below. Possible complementary indicators in both of these areas have been added and labeled according to their TORMS fit.

TABLE 15: ACTUAL AND POSSIBLE COMPLEMENTARY **OH&S** PERFORMANCE INDICATORS (ALSO RELEVANT FOR WHOLE JRC)

Possible complementary OH&S indicators	**Indicator & *TORMS* fit.**	**Strength or Weakness (Strong, Medium, Weak)**
Actual:		
01) Work accidents -Frequency and Gravity index vs rest JRC	☺	Strong: No room for ambiguity.
02) Radiation doses - Total collective dose (mSv/yr) at IRMM and the maximum individual dose (mSv/yr), compared with the regulatory dose limit (20 mSv/yr)	☺	Strong: No room for ambiguity.
Possible complementary:		
03) Number of Corrective or preventive actions completed (or outstanding) arising from significant near incidents and incidents (versus 100%)	😐	Medium: Could be a useful indicator if enough near-incidents and incidents were recorded.

TABLE 16: ACTUAL AND POSSIBLE COMPLEMENTARY ENVIRONMENTAL PERFORMANCE INDICATORS (AT IRMM LEVEL)

Possible complementary Environmental indicators	**Indicator & *TORMS* fit.**	**Strength or Weakness (Strong, Medium, Weak)**
Actual:		
01) Radioactive waste - Volume and cost of radioactive waste.	☺	Strong: However a sliding Target may have to be used if the nuclear activities increased (then even with continued good waste segregation, the volume of this waste would naturally increase)
02) Non-radioactive waste - Volume and cost of Hazardous waste, Industrial waste, Paper waste (excl. Shred-it), Wood product waste, Brick and stone waste, Glass waste.	☺	Strong: However a sliding Target may have to be used if the nr of activities increased with eg increasing staff nrs (then even with continued good waste segregation, the volume of this waste would naturally increase)
03) Energy use (kWh) per capita and cost.	😐	Medium: Energy use per capita data as well as energy use per

		(scientific) activity would be a better indicator.
Possible complementary:		
04) Reduction in the Water usage per capita (L/yr)	😐	Medium: Not sure if sensible as the most obvious measures for reducing water usage e.g. recycling of cooling waters have already been taken.
05) Achievement of planned Environmental aspect remedial measures in forecast time (namely acoustic measures, energy conservation strategy steps, electrical distribution board replacements, re-design of hot water supply systems for the eradication of legionella, printer number reductions, electronic procurement process (to reduce paper use) and reductions in the number of container cooling units).	☺	Strong: If the plan is realistically made then staged achievements could be a good indicator of IMS continual improvement.

TORMS: "*trendable, observable, reliable, measurable and specific*"

TABLE 17: POSSIBLE COMBINED QSHE OR SHE PERFORMANCE INDICATORS

Possible Combined QSHE or SHE Performance Indicators	**Indicator & *TORMS* fit.**	**Strength or Weakness (Strong, Medium, Weak)**
01) Staff satisfaction - Level (%) of satisfaction with the attention paid, at IRMM, to SHE (vs other JRC sites)	😐	Medium: Might be a bit weak in terms of reliability from year to year (positive answer could depend on the general climate a bit too much).
02) Emergency Preparedness - Frequency of Emergency Exercises (EE) and number of fire brigade exercises (FBE) per year (vs target value of 1 EE/yr and 10 FBE/yr.	☺	Strong: No room for ambiguity.
03) Legal compliance - Number of QSHE non-compliances with regulations and procedures	😐	Medium: To be fully comparable on an annual basis a stricter categorization of assessment recommendation/deficiency etc would be needed. The target would be zero.
04) Legal compliance – Number of SHE and Security files completed and sent to relevant authorities per year.	☺	Strong: No room for ambiguity if the number of files that the authorities expect is known.
05) Training - Number of Q and SHE related training and information sessions per year	☺	Strong: No room for ambiguity.

06) Assessments - Number of performed risk/environmental aspect assessments and IMS assessments per year	☺	Strong: No room for ambiguity in terms of IMS assessments. A possible target for the nr of HI&RAs could be 100% of new projects, 100 % of new or amended processes.
07) Number of Performance awards per year	😐	Medium: Might be many years with zero.

EVALUATION OF CORE PERFORMANCE – CORE PIS

A lot of work has been done and is on-going in the selection of suitable Core PIs which satisfy the TORMS criteria. In fact it is for this reason that there are gaps in the data (Figure 22) as it was only in 2007 that these most recent PIs were set. The likelihood is that they may change slightly again as more and more effort is made in making them sensible and easy to maintain.

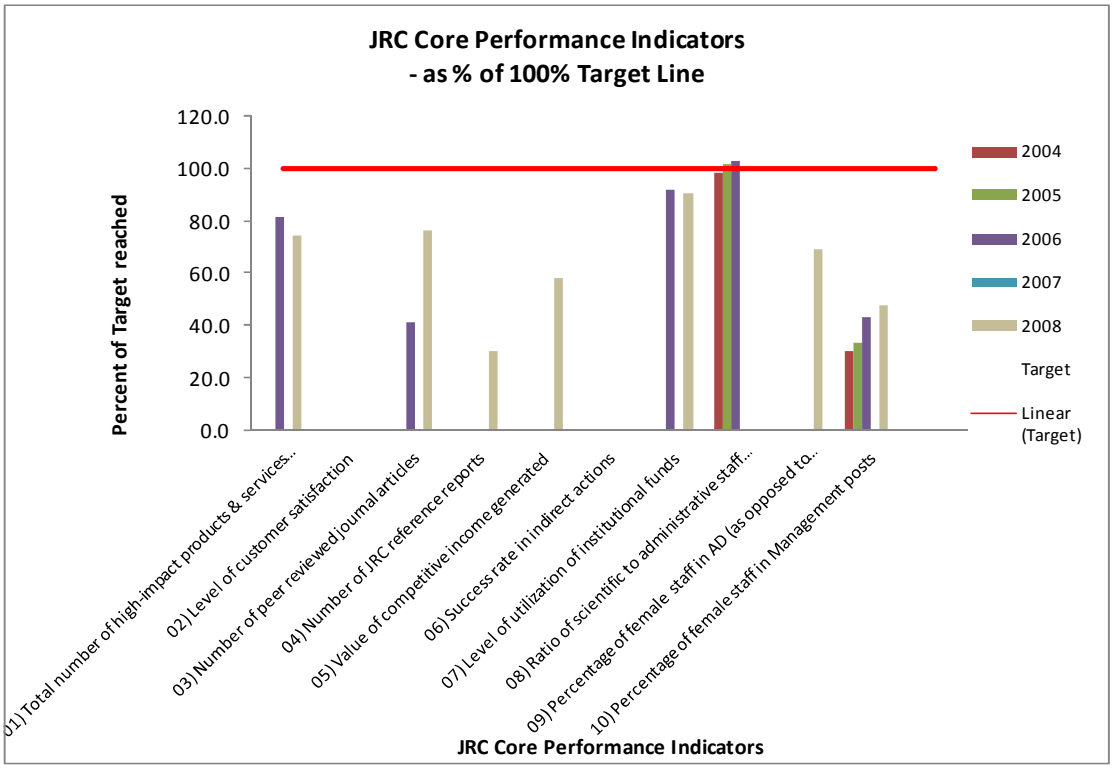


FIGURE 22: JRC PERFORMANCE – AS MEASURED USING ITS CORE PIS AGAINST % OF TARGET REACHED (2004-2008)

What can be seen from Figure 22 is that considerable improvements have been made in indicator 3 and that 1, 7 and 8 are well on their way to achieving the set targets (sliding scale used of course but could not easily represent that graphically so used 100% achievement as the Target line instead). Indicator 10, even though a known improvement area for many years, seems to be improving at a very slow pace. The reasons for this are numerous and would comprise a separate thesis by themselves but if asked to stagger an informed guess,

I'd suggest simply the result of our scientific inheritance. The lack of women in certain Scientific areas and the happily now redundant prejudice against women reaching senior positions more than 15 years ago, has left a gap which, with the best will in the world (current JRC climate), takes time to fill.

Seeing as the purpose of this thesis is partial fulfillment of the UAMS Prevention Advisor – Level I – in "Veiligheidskunde", (as well as to act as an aid for other JRC institutes in their strides towards triple certification) the discussion on the Strengths and Weaknesses of the Performance Indicators will be limited to the OH&S and Environmental PIs.

EVALUATION OF PERFORMANCE – OH&S PIS

Table 15 lists the actual and possible complementary OH&S PIs that are and could be tracked either at IRMM level or JRC level or both. An attempt at evaluating them, by labeling as Strong, Medium or Weak fit with the TORMS criteria has already been made and also displayed in the same table.

However perhaps a graphical display of the indicators and their measurands is the best way to see if a) its possible and b) if a sensible target can be set (if not already). Needless to say in the field of OH&S, sometimes one strives for a set target (as with accidents) or for "as low as reasonably possible" – ALARA - as with radioactive doses, which is quite different to the Core PI targets.

OH&S PERFORMANCE INDICATOR 01

The first OH&S performance indicator on the frequency and gravity of work accidents is a strong indicator, leaving no room for ambiguity.

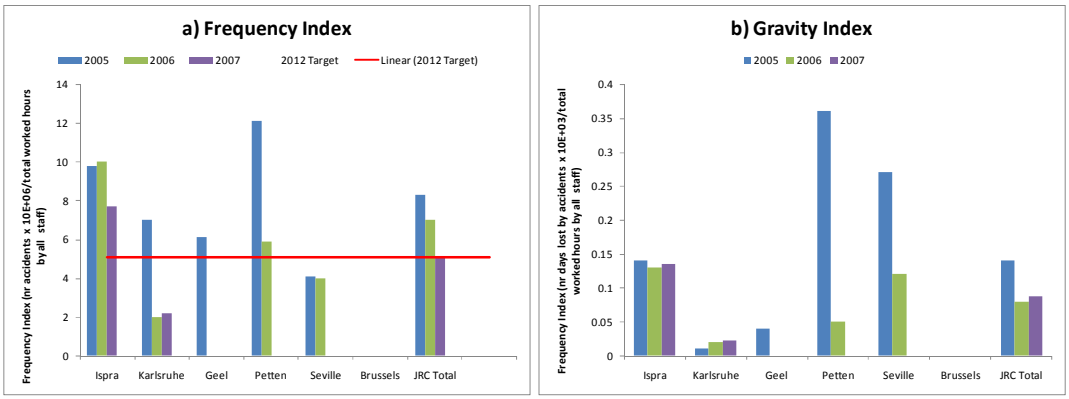


FIGURE 23: FREQUENCY INDEX AND GRAVITY INDEX FOR WORK ACCIDENTS ACROSS JRC (2005 - 2007).

Figure 23 (a and b) shows the frequency index[19] and the gravity index[20] between the JRC sites over three years. As can be seen, the graphs show a relatively favourable situation for IRMM-Geel, although the statistics with accidents can be very variable from year to year.

The red line denotes the target which was set by the European Commission, in its strategy document for promoting health and safety at work 2007-2012[21]. The actions proposed, both

[19] Frequency Index = # accidents x 10^6 /total worked hours by all staff
[20] Gravity Index = # days lost by accidents x 10^3 /total worked hours by all staff

at European and national levels, aim to achieve an overall 25% reduction of occupational accidents and diseases in the EU.

OH&S PERFORMANCE INDICATOR 02

The second OH&S PI concerning annual comparisons of staff radiation doses is another strong indicator, leaving no room for ambiguity. Keeping both individual and collective radioactive exposures as low as reasonably achievable (ALARA) and in any case below the legal limit set for occupational workers in the nuclear field (20 mSv/year) is something which has to be continuously monitored and thereby ensured. The system in IRMM is that any individual can check his/her exposure for e.g. that day or that month visually (displayed over time) and so can then decide to reschedule experiments/maintenance etc so as to ensure that they stay below the safe limit. Figure 24 illustrates the evolution of the total collective dose at IRMM and the maximum individual dose, compared with the regulatory dose limit.

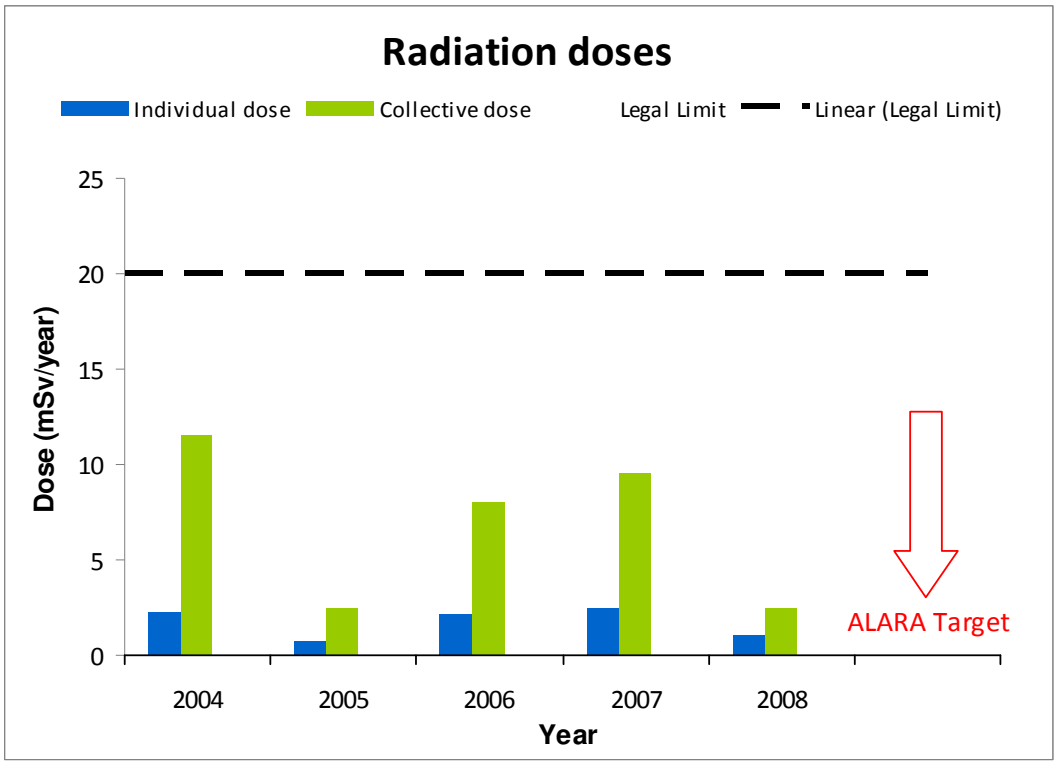


FIGURE 24: INDIVIDUAL AND COLLECTIVE RADIATION DOSES OF STAFF.

The total collective dose has stabilised in recent years to either at or below 10 mSv per year. The maximum individual dose values are well below the regulatory limit of 20 mSv.

OH&S PERFORMANCE INDICATOR 03

This OH&S PI concerning the number of Corrective or Preventive actions completed (or outstanding) arising from significant near incidents and incidents (versus 100%) per year,

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[21] Improving quality and productivity at work: Community strategy 2007-2012 on health and safety at work, Communication from the Commission to the Council and the European Parliament, 21-02-2007.

though not previously tracked as a PI, could be a medium indicator for a well functioning OH&S part of the IMS.

EVALUATION OF PERFORMANCE – ENVIRONMENTAL PIS

Table 16 lists the actual and possible complementary Environmental PIs that are and could be tracked either at IRMM level or JRC level or both. An attempt at evaluating them, by labeling as Strong, Medium or Weak fit with the TORMS criteria has already been made and also displayed in the same table.

However, perhaps a graphical display of the indicators and their measurands is the best way to see if a) its possible and b) if a sensible target can be set (if not already).

ENVIRONMENTAL PERFORMANCE INDICATOR 01

The first Environmental PI concerning radioactive waste reductions per year is a strong indicator but would probably need a sliding target that would be proportional to the number of activities causing the waste generation, to be fully compliant with the TORMS criteria. Figure 25 shows the evolution of the volumes of radioactive waste and its cost. Decreasing volumes were achieved by a) better waste collection and separation; b) more decontamination; c) more compact packaging and d) increased awareness of costs amongst Unit "Radioactive Waste" Officers. Therefore despite increasing costs per volume (NIRAS fees), an overall decrease in costs can be seen. It should be noted that the peak in 2002 was due to a large scale nuclear decommissioning of an entire building.

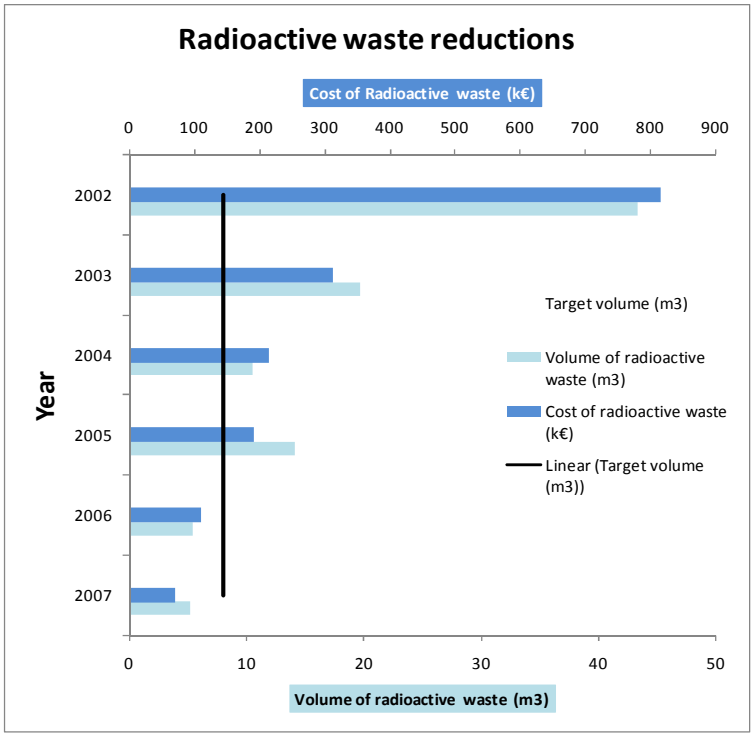

FIGURE 25: RADIOACTIVE WASTE REDUCTION PER YEAR

ENVIRONMENTAL PERFORMANCE INDICATOR 02

The second Environmental PI concerning non-radioactive waste generation per year is a strong indicator but would probably need a sliding target that would be proportional to the number of activities causing the waste generation, to be fully compliant with the TORMS criteria. Figure 26 shows the evolution of the waste volumes over three years. Certain measures have been taken to reduce the volume of, for e.g. paper waste, such as more awareness raising about the lack of need for printing documents (including emails), increased use of electronic means for distributing documents (all HI&RAs now sent in electronic form only) but the dramatic reduction in paper waste from 2006 to 2007 is probably also attributable to the introduction of shredders (the weight of shredded paper is however not included in this figure). This will be rectified in future comparisons as the data is not available at this time.

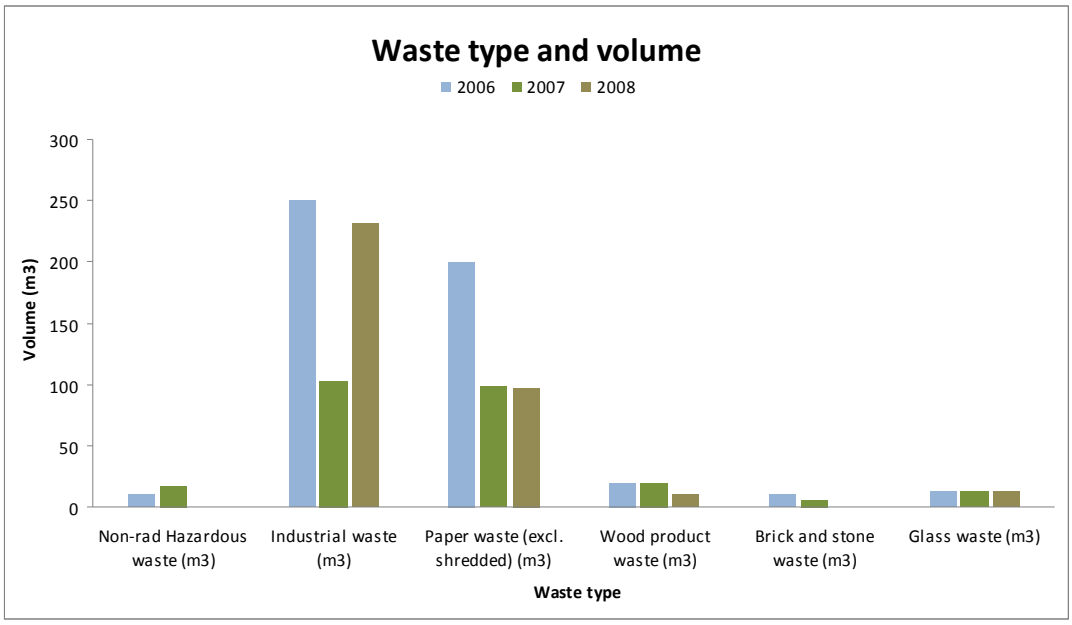

FIGURE 26: NON-RADIOACTIVE WASTE GENERATION PER YEAR

The volume of industrial waste removed from the site if often higher on years when a site clean-up has taken place, as was the case in 2006 and 2008.

As interesting as this indicator might be, it is still hard to see where improvements can be made. The fact that the segregation into the various categories of non-radioactive waste is properly done at IRMM has an indirect environmentally friendly impact by resulting in increased potential for recycling (by the external waste handling company).

ENVIRONMENTAL PERFORMANCE INDICATOR 03

The third Environmental PI concerning energy use per capita per year (Figure 27) is a medium strength indicator due to the fact that the really interesting data (energy use per heavy scientific installation/large scale equipment has not yet been possible to decipher (due to the lack of devices in place for doing this). As one of the continuous improvements IRMM is making, an action plan has been set up to tackle energy consumption and thus conservation. A necessary part of this will be to place energy consumption measurement devices in all the right "locations". This plan is summarized in 1-XVII: Action Plan for the 2009 Energy Conservation Measures – established by the ISM Unit.

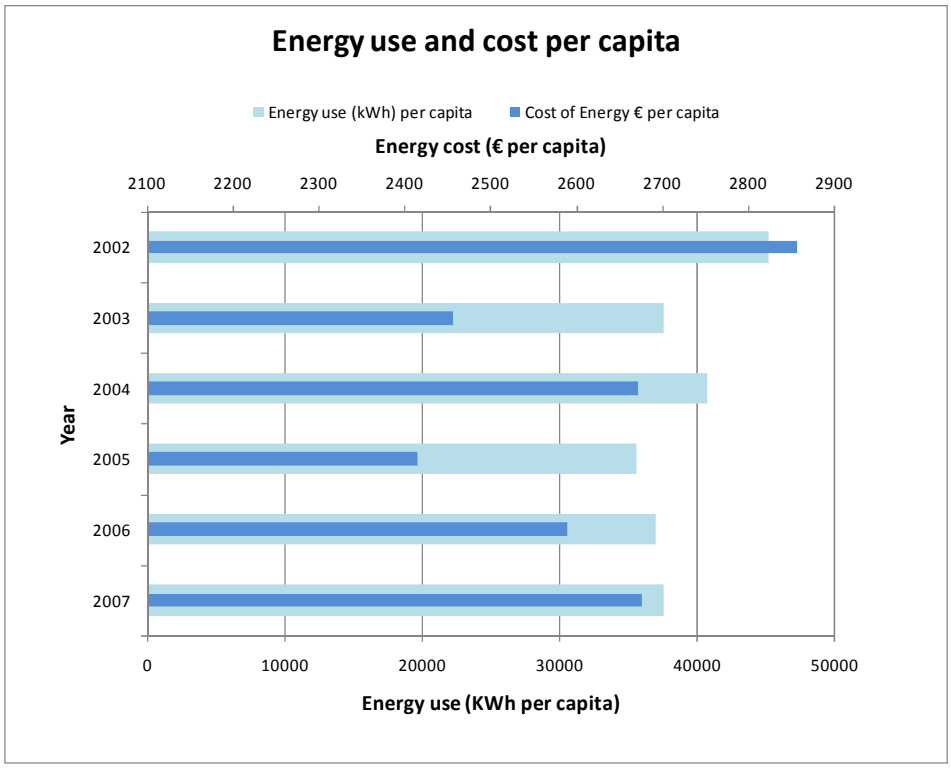

FIGURE 27: ENERGY USE AND ENERGY COST PER CAPITA PER YEAR

What can be seen from the figure above is that energy usage (per capita) appears to have stabilized in the last 3 years but the cost per capita has been increasing significantly since 2005.

The Infrastructure and Site Management unit received some data from the provider (Electrabel) on the number of MWh and GJ energy consumed per building and when this is converted into tons of CO_2 emitted and plotted against a roughly calculated Kyoto[22] target (Figure 28), one can see where one could go with this information, especially later when we have the significant installation/large scale equipment energy usage data.

[22] Kyoto target: A target of -8% of 1990 CO_2 emission values has been set for the European Union. Since the 1990 values are unavailable in this case, I used the average across all buildings and calculated -8% of that to act as the target value.

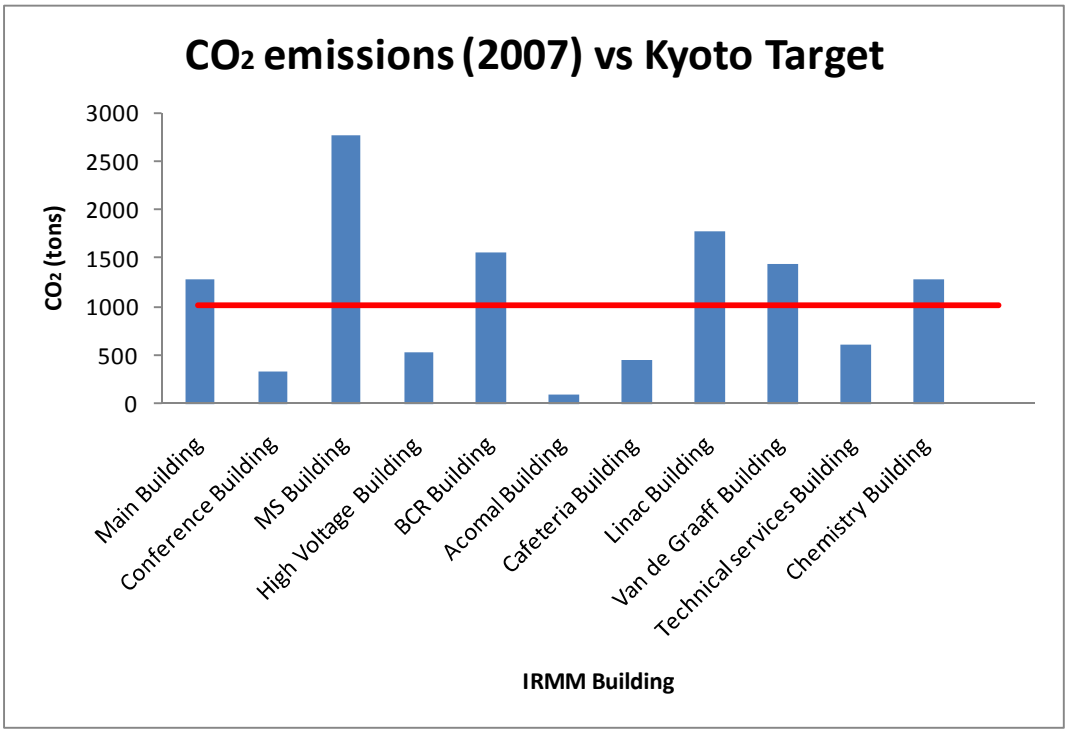

FIGURE 28: CO_2 EMISSIONS (2007) PER BUILDING IN IRMM

ENVIRONMENTAL PERFORMANCE INDICATOR 04

The fourth Environmental PI concerning water usage per year is a medium strength indicator due to the fact that once all water conservation measures, such as e.g. recycling of cooling waters, use of rain water for certain applications, sanitary measures (automatic flow-stop taps) etc have been taken, there wouldn't be much left to plot trends of, apart from seeing if we stay below the set target (see Figure 29) and to highlight any events (either environmental or otherwise which may trigger increased water usage).

One of the largest water supply companies in Flanders is Pidpa and they quote an average of 45 m^3 per person per year in a domestic situation. Setting a target of 90 m^3 per person, (arrived at using IRMM water usage from 1998 – 2008), would mean that IRMM would have to try and stay at approximately the current usage. Needless to say this would highly depend on whether, or not, there was any large scale building going on (as is currently the case). The construction of an entire building started in September 2008 which will have a large impact on the water usage figures for 2009 and beyond.

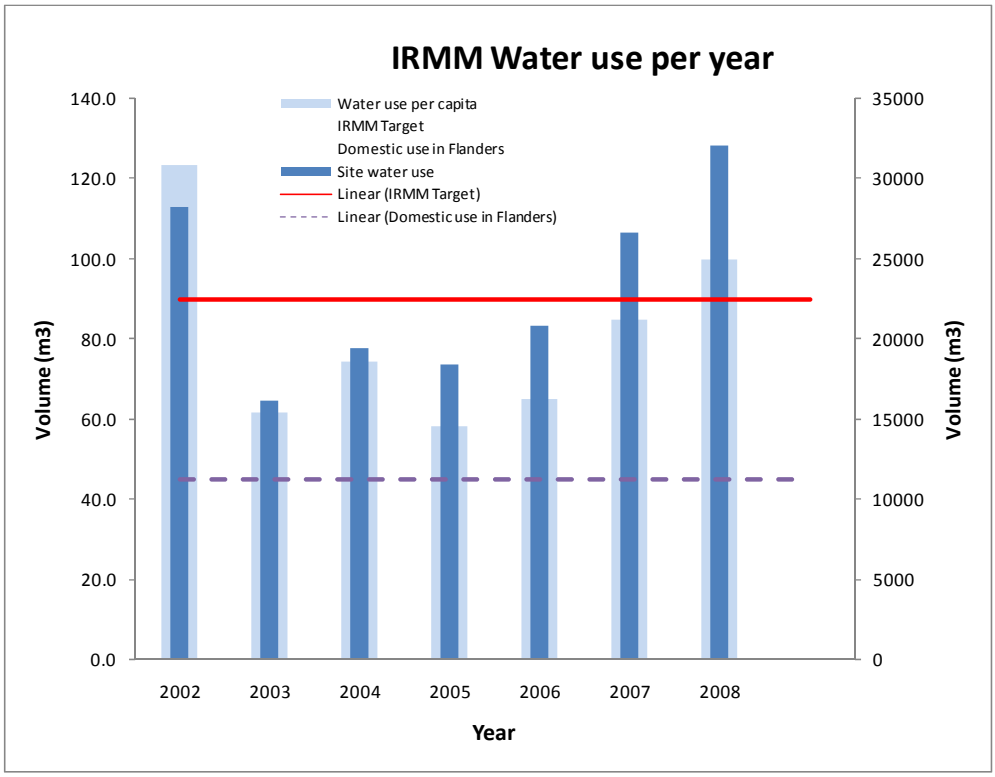

FIGURE 29: IRMM WATER USE PER YEAR (2002-2008)

ENVIRONMENTAL PERFORMANCE INDICATOR 05

The fifth Environmental PI concerning the achievement of the planned environmental aspect remedial measures, as listed in Annex 1-XII, is a strong indicator but is, perhaps, more an indicator of the proper functioning of IRMM as a whole, as opposed to providing a better idea of what the noise levels are like, what the energy use is like, what the legionella figures are like after the remedial measures have been taken.

In an effort to expand on this some data that is already available has been plotted (Figure 30) e.g. what the noise to the environment was like, at 6 different locations around a building with many motors on its roof. The results show the noise at full operation of all motors both before (2005) and after (2008) acoustic remedial measures had been taken (including the construction of a special sound barrier on the roof).

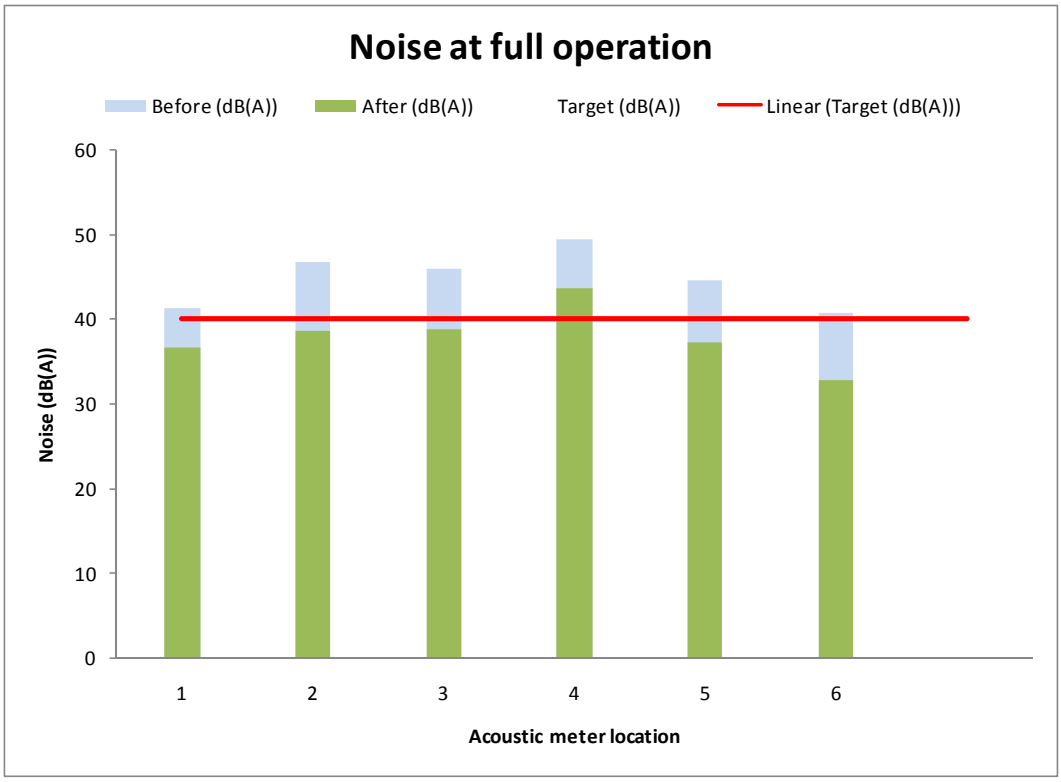

FIGURE 30: NOISE TO THE ENVIRONMENT (AT FULL OPERATION) BEFORE AND AFTER REMEDIAL MEASURES.

The noise to the environment, under "normal" conditions is, in fact much lower as not every motor runs 24 hours a day.

EVALUATION OF COMBINED PERFORMANCE INDICATORS

Certain performance indicators can provide information on either a combination of "OH&S and Environmental" (denoted as SHE) performance or can even provide information on Quality and SHE (denoted as QSHE) performance. These will now be discussed and illustrated if possible.

COMBINED PERFORMANCE INDICATOR 01

The use of the % of staff satisfied with the level of attention paid to SHE issues (as shown in Figure 31) is a medium strength PI, useful in a stable climate but one would wonder if the responses might not be too dependent on the general climate in the institute at the time of each survey to be really trendable and reliable.

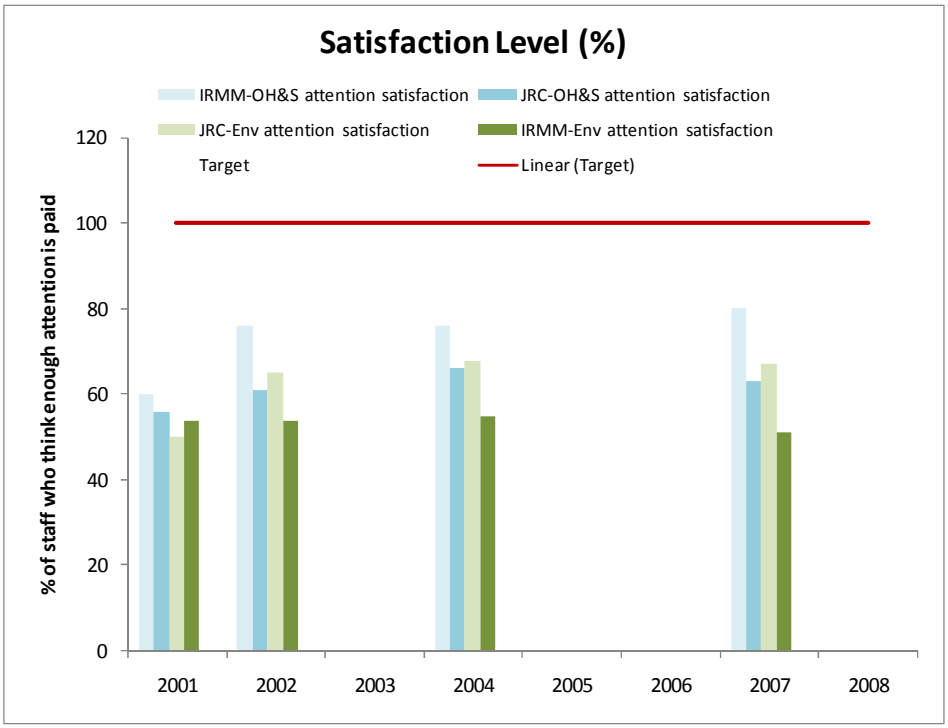

FIGURE 31: STAFF SATISFACTION – AS % OF STAFF SATISFIED WITH THE LEVEL OF ATTENTION PAID TO OH&S AND ENVIRONMENTAL ISSUES.

COMBINED PERFORMANCE INDICATOR 02

The combined PI concerning Emergency Preparedness - specifically the annual frequency of Emergency Exercises and Fire Brigade Exercises (FBE), with an FBE target of 10 per year, is another strong indicator, leaving no room for ambiguity (see Figure 32). IRMM's emergency exercises are coordinated by the head of the SHES sector and the IRMM Fire Brigade comprises of one professional Fire Fighter and a current total of 13 other members, representing all units, with 2 members trained in providing First Aid.

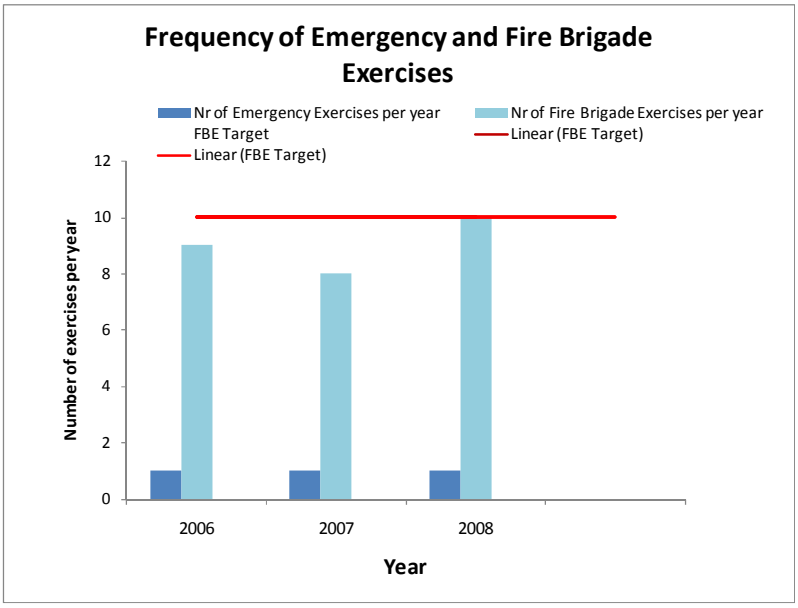

FIGURE 32: FREQUENCY OF IRMM'S EMERGENCY AND FIRE BRIGADE EXERCISES PER YEAR

COMBINED PERFORMANCE INDICATOR 03

This Combined PI concerning Legal Compliance and specifically the number of QSHE non-compliances with regulations and procedures, though not previously tracked, could be a medium strength indicator if properly recorded. To be fully comparable on an annual basis a stricter categorization of assessment recommendation / deficiency etc would be needed. The target would be zero.

COMBINED PERFORMANCE INDICATOR 04

This Combined PI concerning Legal Compliance and specifically the number of OH&S and Security files being completed and sent to the relevant authorities per year, though not previously tracked as a PI, could be a strong indicator for a well functioning OH&S/Security part of the IMS.

COMBINED PERFORMANCE INDICATOR 05

This Combined PI concerning the number of Q and SHE related training and information sessions is quite strong but not yet monitored as such. However the data is retrievable (as all training courses including in-house training are recorded in the JRC's "syslog" database. However it is currently up to the individual trainer to record an information or coaching session so these may not all be fully recorded. There is a JRC target of an average of 10 days training per staff member but this target does not apply specifically to any one type of training, therefore a specific target for SHE topics would perhaps have to be set to make this an even better indicator. Displaying the number of training courses of this type over the course of a few years would in any case be helpful in allowing a target to be elucidated.

COMBINED PERFORMANCE INDICATOR 06

This Combined PI concerning the number of performed Hazard I.D. & Risk Assessments and IMS assessments is quite strong and could be a good intra JRC PI once all institutes are fully certified. Both Process and Project RAs are included in the HI&RA data presented in Figure 33. The earlier data (i.e. for 2002-2005) is not shown as there were only paper records at that time. The target of 33 IMS assessments per year was chosen due to its being 1/3 of the assessments needed over a three year period (latter being the period allowed to cover all clauses).

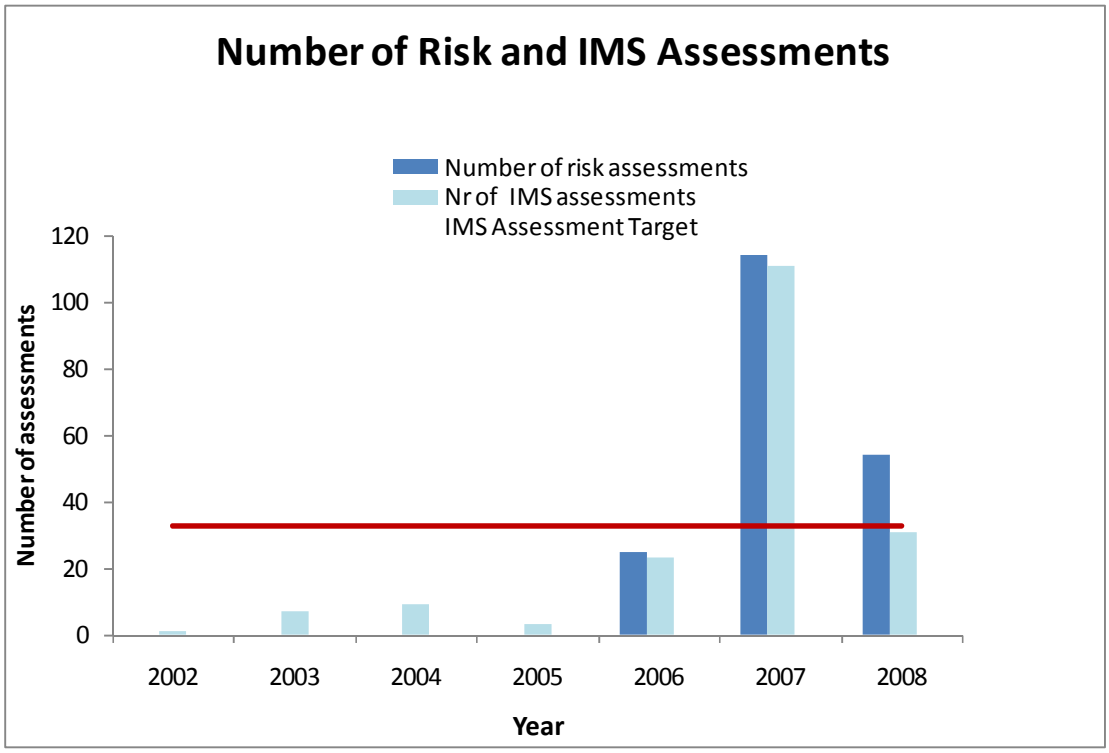

FIGURE 33: NUMBER OF RISK AND IMS ASSESSMENTS PER YEAR

COMBINED PERFORMANCE INDICATOR 07

This combined QSHE PI concerning the number of Performance Awards is a medium strength indicator which fulfills most of the TORMS criteria but which may not always have many numbers attached. As providence would have it, the JRC decided to introduce a new category of award in 2008 for "JRC Excellence in Administration and Support Activities", for which IRMM's IMS being described in this work received a prize (see Annex **Error! Reference source not found.**).It would however, have to be said that it would be quite hard to set a target for this PI.

TOOL 10D: ACTING – PERFORMANCE INDICATORS

There were many lessons learned during the examination of all and the elucidation of many of these PIs. Since they mostly involve improvements actions, they will be recorded as such:

IMPROVEMENT ACTION 10: CORE PERFORMANCE INDICATORS NEED TO BE KEPT STABLE FOR A FEW YEARS SO THAT ANNUAL COMPARISONS ON PERCENT TARGET ACHIEVEMENT CAN BE MADE.

IMPROVEMENT ACTION 11: OCCUPATIONAL HEALTH AND SAFETY INDICATORS AND TARGETS NEED TO BE SET ACROSS ALL OF THE JRC SO THAT ANNUAL COMPARISONS ON PERCENT TARGET ACHIEVEMENT CAN BE MADE.

IMPROVEMENT ACTION 12: ENVIRONMENTAL INDICATORS AND TARGETS NEED TO BE SET ACROSS ALL OF THE JRC SO THAT ANNUAL COMPARISONS ON PERCENT TARGET ACHIEVEMENT CAN BE MADE.

IMPROVEMENT ACTION 13: COMBINED QUALITY AND "OCCUPATIONAL HEALTH AND SAFETY / ENVIRONMENTAL" INDICATORS AND TARGETS NEED TO BE SET ACROSS ALL OF THE JRC SO THAT ANNUAL COMPARISONS ON PERCENT TARGET ACHIEVEMENT CAN BE MADE

IMPROVEMENT ACTION 14: AN EFFECTIVE MEANS OF DISPLAYING AN INSTITUTE'S ANNUAL PERFORMANCE AGAINST THE JRC BACKDROP INFORMATION SHOULD BE FOUND (E.G. USE OF SCORE CARDS TO SUMMARIZE, AT A GLANCE, WHERE AN INSTITUTE IS AT, IN TERMS OF ITS GENERAL PI TARGET ACHIEVEMENT, ON AN ANNUAL BASIS.

2.3.11. TOOL 11 – COMMUNICATION & TRAINING

PLAN, DO, CHECK AND ACT

Certain steps in the triple certification campaign had to be taken early, such as initially ensuring top management support, thereafter by communicating the message to all staff that we were striving for this goal, as an institute, explaining why we were aiming for this and saying what it would mean for them personally. The message was conveyed on many occasions, initially via a general IRMM presentation (also used as a training event), thereafter by means of specific unit presentations on topics such as Waste Management and Risk Assessment and during every internal integrated audit, which were taken as communication and training opportunities, rather than solely fact finding missions. The idea was to sensitize staff to QSHE issues and in turn gain their commitment for improvements in these areas. The intranet (see Figure 34) was also effectively used as an internal means of communication to inform about upcoming training events and upcoming "gap audits" by external auditors. External communications were also made for e.g. people living in the vicinity of the IRMM were also invited to a few evening information sessions covering topics such as our Noise Remediation plan and our intention to apply for planning permission for a new Reference Materials Production facility.

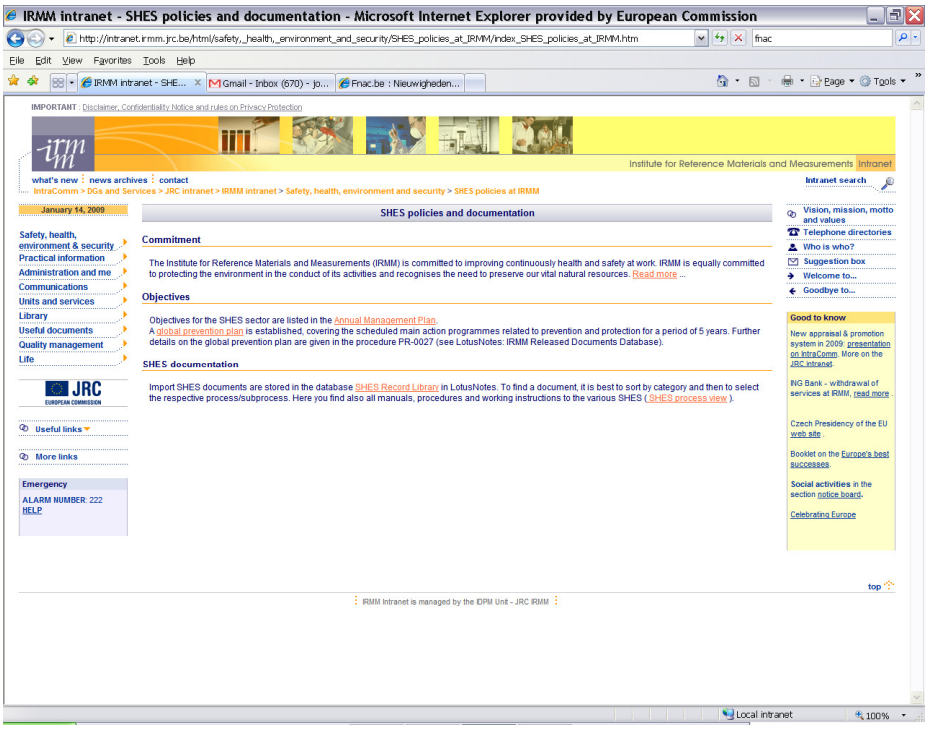

FIGURE 34: SCREENSHOT OF IRMM'S INTRANET WITH SHES EASY ACCESS PORTAL TO SHE COMMITMENT ETC.

To try and achieve our goal (of triple certification in one go) we dedicated a lot of our time to both giving and receiving training. Table 18 summarizes the relevant training courses provided in 2007.

TABLE 18: QSHE RELATED TRAINING & COMMUNICATIONS DURING 2007±1 MONTH

IMS category	Course name	Nr of participants	Starting date
Quality	Introduction to Lotus Notes application QMS IRMM	5	15/02/07
		6	22/02/07
		1	08/06/07
	Lotus Notes: Management of the Customer complaints	3	22/03/07
		3	29/03/07
	Lotus Notes: Control of documents in the QMS IRMM	2	23/03/07
		1	18/06/07
	IDPM Management Review Pre-audit training	9	26/03/07
	Non-conformities, corrective actions	3	20/06/07
	MSU Quality Day	30	18/10/07
SHE	Generic Process Risk Assessment	31	7 sessions
	Hazard ID & RA database (by ex QM)	12	3 sessions
	Waste Management	167	8 sessions
	Building Responsible Refresher	30	2 sessions
	Emergency Preparedness (On-Call for LIMA)	39	09/01/07
		40	30 sessions
	Emergency preparedness (Fire Brigade)	14	10 per year

IMS category	Course name	Nr of participants	Starting date
	Biosafety	37	7 sessions
	SHES Coding in Purchasing	15	2 sessions
	Wellbeing – Back school	132	7 sessions
	The ISO 14001 & OHSAS 18001 – Our involvement in Safety, Health, and Protection of the Environment	105	15/11/07
		110	19/11/07
	Radiation Protection	60	12/12/06
	Radioactivity – Safe or dangerous?	74	26/03/07
QSHE	Coaching during audits	N/A	Continuous
	On-the-job: Training of auditors to become lead auditors, through participation in internal audits.	3	Continuous
	IRMM Assessment database use	3	28/06/07
Communic-ation based	IRMM activities – an explanation to neighbours (Noise remediation included)	35	1 session
	Wellbeing - Pregnancy & Nursing poster	All IRMM	Issued April '07
QSHE personnel – SHE related training received	ISO14001 implementation at VITO	5	03/05/07
	Preventieadviseur Veiligheidskunde Niv I-UAMS	1	2.3 yrs
	ISO 14001 for Internal Auditors-Vincotte	2	15/03/07
	OHSAS 18001 for Internal Auditors -Vincotte	2	14/06/07
	Transport of Dangerous goods – Non-nuclear	2	3 days
	Transport of Dangerous goods - Nuclear	1	3 days
	Emergency Preparedness (Fire Brigade's external training event)	14	3 days
	Fundamentals of ISO 14001 for Managers and Quality Managers	20	15/05/07

2.3.12. TOOL 12 - INTEGRATED MANAGEMENT REVIEW

TOOL 12 A, B: PLAN, DO

The planning and doing stages of the Integrated Management Review basically involve good communication between the Director, the institute QM and the Head of SHES. Together they elaborate what needs to be covered, by referring to the outcome of the previous year's management review and then these actions are listed in the Annual Management Plan (AMP). The doing stage then means having these actions carried out by the appropriate personnel.

TOOL 12C: EVALUATION OF INTEGRATED MANAGEMENT REVIEW SYSTEM

Perhaps the easiest way of explaining how the integrated management review is carried out is by showing a typical agenda, such as that of the 2007 management review-Part 1-SHE (shown in the sidebar).

The meeting minutes (outcome) are usually prepared in advance of the meeting enabling focussed discussions and any changes (recommendations from the director or others present) are incorporated afterwards and sent around for final approval. The Management Review-Part 2-Quality has the same format and usually both reviews occur with a week or two of each other and have a SHE and a QM presence at *both.*

TYPICAL AGENDA OF AN IRMM MANAGEMENT REVIEW –Part1–SHE (Part 2 – Quality – same format).

1 Main actions 2007
- 1.1 As defined in previous management reviews:
- 1.2 As a result of changed circumstances or new requirements

2 Main assessments and consequences
- 2.1 Assessments related to the evolution of the regulation
- 2.2 Risk assessments
- 2.3 Assessment of the environmental aspects and significance analysis
- 2.4 Audits
- 2.5 External communications and complaints
- 2.6 Non conformances, incidents and accidents and related actions

3 Performances on Safety, Health, Environment
- 3.1 Environment
- 3.2 Safety and health
- 3.3 Staff satisfaction survey

4 Policy 2008

5 Recommendations for 2008

6 Implementation in planning for 2008

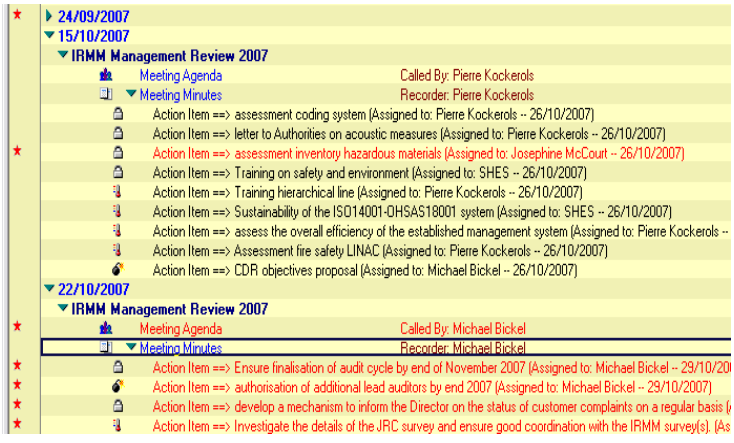

FIGURE 35: SCREEN SHOT OF A TYPICAL USE OF LOTUS NOTES BEING APPLIED FOR THE TRACKING OF ACTIONS ARISING FROM A MANAGEMENT REVIEW MEETING.[23]

[23] At this time the management review took place on two separate days; day 1 (15.10.2007) concerning SHE issues specifically and day 2 (22.10.2007) concerning Quality issues.

As mentioned above, the acting stage is really to close the cycle of continuous improvement by adding the agreed improvements to the AMP and to whatever action lists, may stem from the AMP, such as the Global Prevention Plan or the dynamic action list of the Committee for the Protection and Prevention at Work.

However, every organization needs to benchmark themselves in some form or another. An effective way of doing that is by measuring your performance against a set target and then comparing (benchmarking) with other organizations of a similar nature. The elucidation of many of the QSHE targets were set during the compilation of this work or taken from existing sources. Certain indicators, such as the Core Performance Indicators are already being benchmarked against other JRC institutes and some OH&S indicators (e.g. accident frequency index) are being compared within the JRC.

Ideally, one then uses the results from the Performance Indicators and displays them in such a way that at a glance, one can see how the institute is doing in reaching its goals. One way of doing this is to create score cards. Effective integrated quality, environment, safety and health (QESH) score cards (Mohamed[24], 2003) are a powerful catalyst for making the need for change visible and the opportunity for improvement clear. Using such score cards allows the analysis of whether the targets are being achieved, whether the PI "acceptance range" is adequate and whether continuous improvement (over time) is occurring or not.

Conditional programming within excel allowed the elucidation of a “dashboard” of all the measurable performance indicators presented here (see Table 19) with the future trend summarized by one arrow in the column furthest to the right. A system of traffic lights was used to show whether or not the target is being met (over time), green denoting more than 75%, yellow denoting 50-75%, red denoting 25-50% and black denoting <25% target achievement. The global icon (on the right) is dependent on how many red and black signals preceded it and what the general trend seems to be (declining, staying stable, or improving).

A certain amount of caution is needed when looking at such dashboards or score cards themselves as a full understanding of the performance indicator is necessary to properly interpret them. For example, when one looks at the global icon for the volume of radioactive waste produced, a red downward arrow is given as three black signals had preceded it. However, the reality is that in this case, you have to look at the whole picture and see that since 2006, significant efforts have been made to compress and better sort this waste, resulting in a dramatic improvement. So the message is, first look at the relevant evaluation graph in 2.3.10 and then look at the individual scores per year and finally see if the global icon correctly sums up the overall trend. There are certainly more sophisticated tools by which to create the final dashboard layout (some in use by our sister institute, the IPSC, for global sustainability data but their database is much too complex for our relatively simple data and so I kept to my home-made solution.

[24] Mohamed S. (2003), Scorecard approach to benchmarking organizational safety culture in construction, *Journal of Construction Engineering and Management* **129** (1), pp. 80–88

Since this is the first time score cards and a dashboard have been used for QSHE integrated IRMM and some JRC data, one could expect that this will be further refined and padded out to include all JRC data, allowing true benchmarking within the JRC.

TABLE 19: SCORE CARDS FOR EACH PERFORMANCE INDICATOR AND THE FUTURE TREND (GLOBAL COLUMN).

INDICATOR	Description	Specifics	2001	2002	2003	2004	2005	2006	2007	2008	Global
Core Performance Indicators	01) Total number of high-impact products & services to European policy makers in 2008										
	02) Level of customer satisfaction										
	03) Number of peer reviewed journal articles										
	04) Number of JRC reference reports										
	05) Value of competitive income generated										
	06) Success rate in indirect actions										
	07) Level of utilization of institutional funds										
	08) Ratio of scientific to administrative staff (percentage of scientific staff)										
	09) Percentage of female staff in AD (as opposed to AST) posts										
	10) Percentage of female staff in Management posts										
OH&S Indicators	Frequency & Gravity Indices	Ispra									
		Karlsruhe									
		Geel									
		Petten									
		Seville									
		Brussels									
		JRC Total									
	Radiation Doses (mSv/yr)	Individual									
		Collective									
Environmental	Volume of radioactive waste (m3)										
	Water	M3 per capita IRMM									
	Noise	Noise Measurement station 1									
		Noise Measurement station 2									
		Noise Measurement station 3									
		Noise Measurement station 4									
		Noise Measurement station 5									
		Noise Measurement station 6									
Combined SHE Indicators	OH&S, Env satisfaction	OH&S IRMM									
		OH&S JRC									
		ENV IRMM									
		ENV JRC									
	Emergency Preparedness	Nr of Fire Brigade Exercises per year									
	Assessment frequency	Nr of HI&RA per year									
		Nr of IMS assessments per year									

3. CONCLUSIONS

However tempting it might be to leave the conclusions down to the reader's interpretation of the "dashboard", it is nevertheless imperative to go back through the lessons learned (summarized below) and the improvement actions (also summarized here) deduced throughout this whole "episode" in IRMM.
The intention of this work was not only to aid the author in achieving partial fulfillment of the requirements of the Prevention Advisor – Level 1 in "Veiligheidskunde" but perhaps even more importantly to show to a fellow JRC institute how they can go about achieving an Integrated Management System, step by step, using the tools provided, and as a result, triple certification according to the ISO 9001, the ISO 14001 and the OHSAS 18001.

Perhaps the best way of drawing conclusions from this work is to refer to the lessons learned and the improvement actions suggested, throughout this manuscript.

Lessons Learned:

The lessons learned speak for themselves and add “meat to the bones” of the score cards.

Improvement Actions:

So as to maintain the integrity of the chosen performance indicators, a certain discipline will be required in future years to ensure certain data is (or continues to be) collected. What's disturbing until now is that there are many gaps in the data for the JRC Core Performance indicators (namely in the level of customer satisfaction data; the number of JRC Reference Report data; the value of competitive income generated data and the success rate in indirect actions data and this will have to be one of our improvement priorities if the indicators are going to be of any use to the JRC.

Last but not least, the fact that this institute wide effort, fully supported by the director, resulted in some important improvements that are not always easy to capture by an indicator. They are, of course, the more subtle issues such as an improved atmosphere with staff communicating more openly with each other on institute wide "problems" and solutions. A tangible feeling of goodwill was also experienced by most of the auditors.

As with all management systems, the proof of its true success will now lie in continuing to make improvements such as those listed above and even improvements in areas only hinted at here but described in the Future Perspectives section, which follows.

4. FUTURE PERSPECTIVES

There will hopefully be a consolidation of all QSHE Performance Indicators throughout the JRC, perhaps using this "Tool Kit" as a way of helping the other institutes get started or achieve their goals more quickly so that we (all the JRC institutes) can speak about the same issues, whilst having the same targets in an integrated system.

Less lofty and more practical will be the improvements aiming at further simplifying the system e.g. reduction in the number of procedures and working instructions as well as the introduction of a Hazard identification and Risk Assessment database from which corrective and preventive actions can be generated. Towards this end, a new database for Hazard Identification and Risk Assessment was created, tested, further refined and now launched for use. The benefits of the Lotus Notes based system will include improved clarity, as many drop down lists are provided for e.g. building name, group or area, type of equipment etc); sequential e-signing allowing re-routing to have any advice from the concerned staff properly recorded; ability to allocate (corrective or preventive) actions and to later track the status of the actions in terms of completion. See Annex 1-VII: Flowcharts for Project and Process Risk Assessments.

Another consideration in the 2009 pipeline is to requisition an assessment of the overall efficiency of the established management system (e.g. "IBEC"), in order to optimise the resources.

Further to these, there are some other areas relating to conventional safety and relating to new research topic developments that will be on the 2009 priority lists, being:

- Assessment of the Fire Safety of a Linear Electron Accelerator (LINAC) facility[25] (in final stages of revision) and
- Safe Nanosciences and Nanotechnology[26] - A literature survey will be prepared to better understand the safety, health and environmental issues with regard to safe nanosciences and safe nanotechnology. The current status of this is that 462 documents (regulations, scientific articles and presentations) have been gathered - large amount courtesy of the JRC Nanosciences and Nanotechnologies Thematic Leader plus own foraging - uploaded onto an information exchange "CIRCA" forum entitled "JRC Nanosciences and Nanotechnologies".

[25] McCourt J. (2009), "Assessment of the Fire Safety of a Linear Electron Accelerator (LINAC) facility", serving as partial fulfillment of the UAMS Prevention Advisor -24° promotion- Level I requirements (2007-2009).

[26] McCourt J. (2009), "Safe Nanotechnology in the Workplace", serving as partial fulfillment of the UAMS Prevention Advisor -24° promotion- Level I requirements (2007-2009).

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- "*Wet van 4 augustus 1996, betreffende het welzijn van de werknemers bij de uitvoering van hun werk (B.S. 18.9.1996)*"

1. ANNEX

ANNEX 1-I: IRMM'S DIRECTOR'S COMMITMENT TO QUALITY, SAFETY, HEALTH AND PROTECTION OF THE ENVIRONMENT.

Joint Research Centre

www.jrc.ec.europa.eu

Commitment to Quality, Safety, Health and Protection of the Environment at IRMM

The overall aim is to develop a dynamic balance among the different interests at stake: customers satisfaction with IRMM deliverables, the personal fulfillment of IRMM staff at a safe and healthy work place and the needs for social, economic and environmental sustainability.

IRMM achieves the continuous improvement of effectiveness and efficiency of its research and support activities by deriving from its policy a strategic approach to quality, safety, health, and protection of the environment. This is indispensable to satisfy all stakeholders. Our specific objectives are to:

- ✓ improve the quality of our operational results continuously and at all levels,
- ✓ improve our competitiveness,
- ✓ limit the risks to people and infrastructure associated with our activities by creating a safe and healthy work place, and minimise the impact of our activities on the environment, in particular to:
  - ➢ promote safety at work by careful task preparation,
  - ➢ ensure responsible use of energy, water and other natural resources,
  - ➢ limit the production of waste,
  - ➢ implement the best practices for the handling of hazardous products,
  - ➢ optimise the radiation protection to avoid unnecessary exposure,
  - ➢ reduce the biological risks by working in compliance with all relevant standards and guides,
  - ➢ guarantee the 'trackability' of radioactive and other hazardous materials present on the site,
  - ➢ prevent fire by enhancing the housekeeping within our work environment,
  - ➢ maintain awareness for emergency preparedness,
- ✓ fulfil all our legal and statutory obligations.

In view of these objectives, the Director of IRMM commits himself to

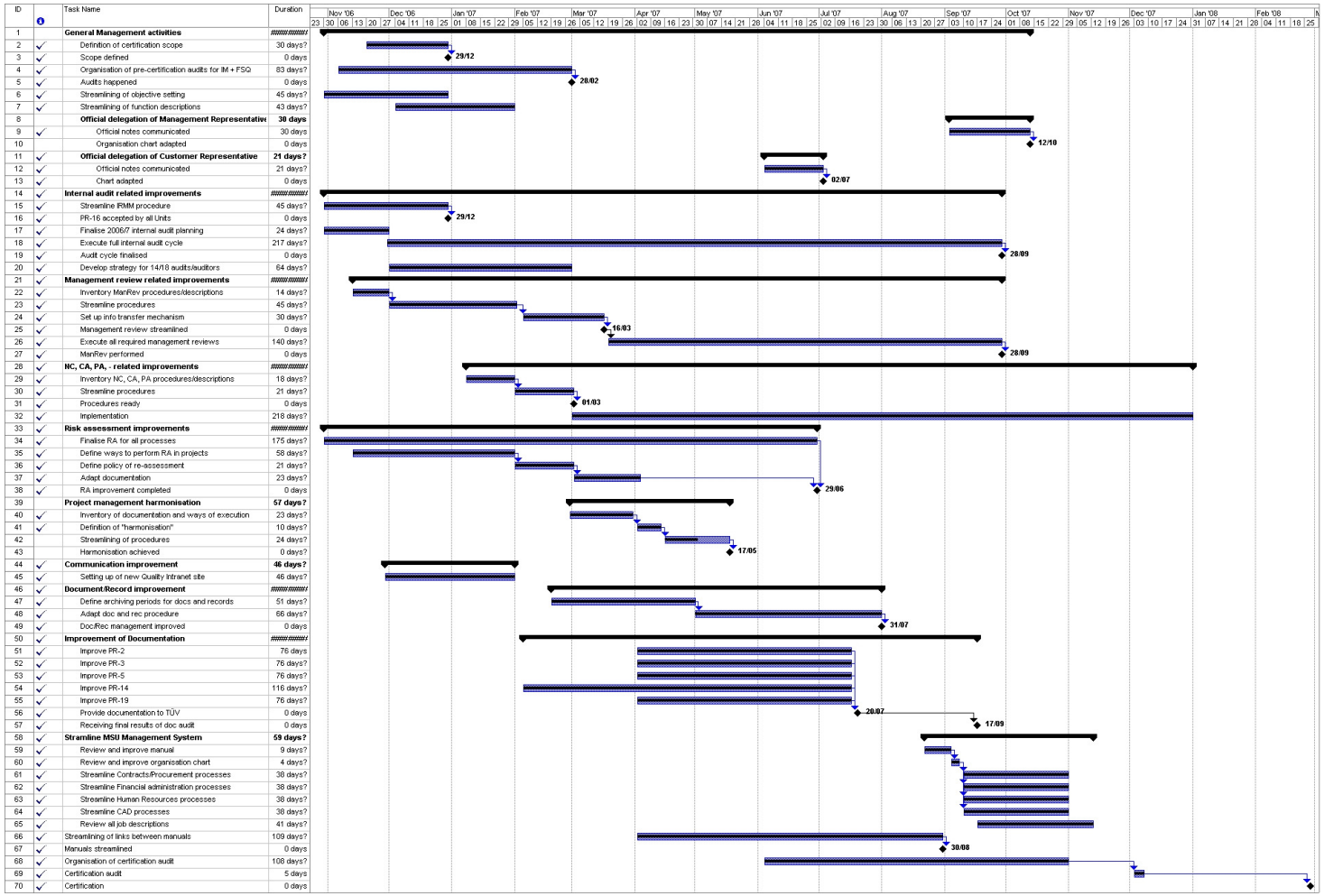
- ✓ communicate to staff the importance of meeting both customers' requirements and legal and statutory obligations,
- ✓ review and, when necessary, to revise the institute policy,
- ✓ ensure that objectives are established with respect to quality, safety, health and environmental protection,
- ✓ ensure the availability of resources required to achieve the established agenda and objectives,
- ✓ assess and review the performance of the management system regularly.

The Director requests all personnel to carry out their activities in accordance with the provisions of the dedicated procedures and rules, hence, within the spirit of the IRMM policy.

JRC EUROPEAN COMMISSION

irmm

ANNEX 1-II: IMPROVEMENT TASKS AND THE ASSOCIATED TIMELINES IDENTIFIED AT THE TRIPLE CERTIFICATION PROJECT PLANNING STAGE



ID		Task Name	Duration
1		**General Management activities**	##########?
2	✓	Definition of certification scope	30 days?
3	✓	Scope defined	0 days
4	✓	Organisation of pre-certification audits for IM + FSQ	83 days?
5	✓	Audits happened	0 days
6	✓	Streamlining of objective setting	45 days?
7	✓	Streamlining of function descriptions	43 days?
8		**Official delegation of Management Representative**	**30 days**
9	✓	Official notes communicated	30 days
10		Organisation chart adapted	0 days
11	✓	**Official delegation of Customer Representative**	**21 days?**
12	✓	Official notes communicated	21 days?
13	✓	Chart adapted	0 days
14	✓	**Internal audit related improvements**	##########?
15	✓	Streamline IRMM procedure	45 days?
16	✓	PR-16 accepted by all Units	0 days
17	✓	Finalise 2006/7 internal audit planning	24 days?
18	✓	Execute full internal audit cycle	217 days?
19	✓	Audit cycle finalised	0 days
20	✓	Develop strategy for 14/18 audits/auditors	64 days?
21	✓	**Management review related improvements**	##########?
22	✓	Inventory ManRev procedures/descriptions	14 days?
23	✓	Streamline procedures	45 days?
24	✓	Set up info transfer mechanism	30 days?
25	✓	Management review streamlined	0 days
26	✓	Execute all required management reviews	140 days?
27	✓	ManRev performed	0 days
28	✓	**NC, CA, PA, - related improvements**	##########?
29	✓	Inventory NC, CA, PA procedures/descriptions	18 days?
30	✓	Streamline procedures	21 days?
31	✓	Procedures ready	0 days
32	✓	Implementation	218 days?
33	✓	**Risk assessment improvements**	##########?
34	✓	Finalise RA for all processes	175 days?
35	✓	Define ways to perform RA in projects	58 days?
36	✓	Define policy of re-assessment	21 days?
37	✓	Adapt documentation	23 days?
38	✓	RA improvement completed	0 days
39		**Project management harmonisation**	**57 days?**
40	✓	Inventory of documentation and ways of execution	23 days?
41	✓	Definition of "harmonisation"	10 days?
42		Streamlining of procedures	24 days?
43		Harmonisation achieved	0 days?
44	✓	**Communication improvement**	**46 days?**
45	✓	Setting up of new Quality Intranet site	46 days?
46	✓	**Document/Record improvement**	##########?
47	✓	Define archiving periods for docs and records	51 days?
48	✓	Adapt doc and rec procedure	66 days?
49	✓	Doc.Rec management improved	0 days
50	✓	**Improvement of Documentation**	##########?
51	✓	Improve PR-2	76 days
52	✓	Improve PR-3	76 days?
53	✓	Improve PR-5	76 days?
54	✓	Improve PR-14	116 days?
55	✓	Improve PR-19	76 days?
56	✓	Provide documentation to TÜV	0 days
57	✓	Receiving final results of doc audit	0 days
58	✓	**Stramline MSU Management System**	**59 days?**
59	✓	Review and improve manual	9 days?
60	✓	Review and improve organisation chart	4 days?
61	✓	Streamline Contracts/Procurement processes	38 days?
62	✓	Streamline Financial administration processes	38 days?
63	✓	Streamline Human Resources processes	38 days?
64	✓	Streamline CAD processes	38 days?
65	✓	Review all job descriptions	41 days?
66	✓	Streamlining of links between manuals	109 days?
67	✓	Manuals streamlined	0 days
68	✓	Organisation of certification audit	108 days?
69	✓	Certification audit	5 days
70	✓	Certification	0 days

1-III: TEMPLATE OF AN IRMM PROCEDURE

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

Institute for Reference Materials and Measurements

Retieseweg 111 B-2440 Geel

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Procedure

Title: Global prevention plan and yearly action plans		**Doc Number** PR-0027 **Revision:** 4
Unit/Sector: All IRMM **Group:** All IRMM	*Approved & Released Procedure*	**Implementation Date :** 16/07/2007
Document Type : SHE general management **Standard Element :** OHSAS 18001 - 4.3.3 Planning of Objectives ISO 14000 - 4.3 Planning		**Review Period** - 365 **Days**

1 Aim

2 Scope

3 Definitions

4 Description

4.1 Global prevention plan

4.2 Annual Safety, Health, Environment management review

4.3 Annual action plan

5 Responsibilities

6 Safety and Protection of the Environment

7 Applicable documents and references
8 Documentation
9 Document Control and Updating Service
10 Distribution

Associated Documents:

PR/0023 – Hazard identification and risk assessment in PROCESSES
PR/0026 – Rules laying down the composition and operation of the Committee for Prevention and Protection at Work
M-0005 – Manual for the SAFETY & HEALTH and protection of the ENVIRONMENT at the IRMM site

Document Revision History:

Revision: 4	Date Created: 29/07/2002 Date of Last Revision: 10/07/2007	Last Approval Date: 10/07/2007

Document Author (Editor): Pierre Kockerols	Manager: (Process Owner for P and WI or Project Leader for PP) Pierre Kockerols

Reason for Change:

Revision:	Sec/Para Changed	Change Made:	Date
1	N/A	Initial issue of the document	
2	N/A	Yearly update prevention plan	15.4.05
3	N/A	Yearly update prevention plan Change of SHES sector name Creation of sections	4.10.06

Electronic Notification List:

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Title: Director

10/07/2007 - Approved by: Alejandro Hermoro

ANNEX 1-IV: INTEGRATED ASSESSMENT SHEETS USED FOR INTERNAL AUDITING AGAINST ISO 9001, ISO 14001 AND OHSAS 18001 PRIOR TO TRIPLE CERTIFICATION[27].

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
General	9001-4.1 a, b, c,d	Required processes are defined? The sequence and interaction of these processes has been determined? The criteria and methods required to ensure the effective operation and control of these processes has been identified and documented? Resources and information necessary to assure adequate monitoring and operation are available?		
	9001-4.1-e,f	The means exists to measure, monitor and analyse these processes? The means exists to implement action based upon these measurements to achieve planned results and continual improvement?		
	9001-gen 14001-gen 18001-gen	There is evidence that the above is accomplished in a manner consistent with the requirements of ISO 9001, 14001, OHSAS 18001? When processes are outsourced, is the method of control documented in the quality management system?		

[27] Compiled by IRMM's Institute Quality Manager (M. Bickel) in Lotus Notes format but presented here in a table form.

[28] **NC = Not covered; CPT = Compliant; NI = Needs improvement; NCP = Non-compliant.**

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	14001-4.1	An environmental management system is established? Documented? Implemented? Maintained? Improved? The scope of the system is defined and documented?		
	18001-4.1	An OH&S management system is established? Is there a safety manual compliant with OHSAS 18001? Is the technical scope defined? Is the geographical scope defined? Are the links with other system documentation defined?		
Management commitment, Policy	9001-5.1 Management commitment 14001-4.2 Environmental policy 18001 4.2 OH&S policy	Commitment of management to quality policy exists? Quality policy is defined? Quality objectives are established? Management review is conducted? Sufficient resources are available? Evidence exists that top management has communicated the importance of meeting customer, regulatory and legal requirements?		
	14001-4.2 a,b,c	Environmental policy is defined?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
		It is appropriate to the scale and nature of activities? Includes commitment to continual improvement? Includes commitment to prevention of pollution? Includes commitment to comply with legal requirements? With other requirements?		
	14001-4.2 d,e,f,g	Policy provides framework for review of objectives and targets? Policy is documented, implemented and maintained? Policy is communicated to all persons working on behalf of IRMM? Is communicated to the public?		
	18001-4.2	Is a SHE policy defined ? Is it appropriate for IRMM and the potential risks? Does it refer to continuous improvement? Does it refer to respect, communication and update of legal requirements?		
Management commitment, Resources, roles, responsibility & authority, QSHE policies.	9001-5.1 Management commitment	Commitment of management to quality policy exists? Quality policy is defined? Quality objectives are established? Management review is conducted? Sufficient resources are available? Evidence exists that top management has communicated the importance of meeting customer, regulatory and legal requirements?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	14001-4.4.1 Resources, roles, responsibility and authority	All required resources for the management system are available, including a) human resources and specialised skills? b)organisational infrastructure?, c) technology?, d) financial resources? Functions, responsibilities and authorities are defined? Documented? Communicated? Environmental Representative (function + responsibilities) is defined? Evidence for reports to top management exists? Evidence for improvement recommendations exists?		
	18001 4.2 OH&S policy	Is a SHE policy defined? Is it appropriate for IRMM and the potential risks? Does it refer to continuous improvement? Does it refer to respect, communication and update of legal requirements?		
	9001-5.3 Quality policy	Quality policy is appropriate? Policy includes commitment to comply and improve the effectiveness of the system? Policy provides framework to establish and review quality objectives? Policy is communicated and understood? Policy is reviewed?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	14001-4.2 a,b,c Environmental policy	Environmental policy is defined? It is appropriate to the scale and nature of activities? Includes commitment to continual improvement? Includes commitment to prevention of pollution? Includes commitment to comply with legal requirements? With other requirements?		
	14001-4. 2 d.e.f.g Environmental policy cont.	Policy provides framework for review of objectives and targets? Policy is documented, implemented and maintained? Policy is communicated to all persons working on behalf of IRMM? Is communicated to the public?		
Customer Focus, Environmental aspects, Planning for hazard identification, risk assessment and risk control	9001 5.2 Customer Focus	Top management has assured that customer needs and expectations have been determined.		
	14001 4.3.1. Environmental aspects	Is there a documented procedure for identification of environmental aspects? Is it implemented? Is it maintained? Environmental aspects of activities, products and services are identified? Are the significant aspects determined? Are they updated? Documented? How is it ensured that significant aspects are taken into account during execution of IRMM activities?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	18001 4.3.1. Planning for hazard identification, risk assessment and risk control	Are there procedures for risk assessment? Are identified risks properly addressed? Are risks taken into account during execution of works? Are identified risks taken into account in the planning of training actions? Are there records from risk assessments in projects/processes? Does a risk assessment inventory exist?		
	14001-4.3.2 Legal and other requirements 18001-4.3.2 Legal and other requirements	Is there a procedure to identify and update legal requirements? Is it implemented? Is it updated? How is access to the requirements organised? How are the requirements taken into account? Is there a procedure to identify and update other requirements? Are the legal and other aspects taken into account when establishing, implementing and maintaining the system?		
Objectives, targets and programme(s), management system planning.	9001-5.4.1 Quality objectives	There is evidence that top management has ensured that quality objectives have been established for relevant functions at various levels in the organization? How? How are institute/unit objectives communicated?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	14001-4.3.3 Objectives, targets and programme(s)	Are environmental objectives defined on institute/unit/person level? Are the objectives measurable where practicable and consistent with the environmental policy? Do they include commitment to prevention of pollution? How are they communicated? Are targets set with respect to environmental protection? Are targets set with respect to legal compliance? How are targets communicated? When establishing and reviewing objectives and targets, has IRMM taken into account or considered: Its legal and other requirements? Its significant environmental aspects? Its technological options? Its financial, operational and business requirements? The view of interested parties? Has a programme been established, implemented to achieve IRMM's objectives and targets, including: • The designation and responsibility for achieving objectives and targets at any relevant function and level; • The means and time-frame by which the programme has to be achieved?		
	18001-4.3.3 Objectives	Are there SHE related IRMM objectives? Are they communicated? Are there SHE related Unit objectives? Are they communicated? Are there SHE related personal objectives? Are they followed up? What are the criteria?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	9001 5.4.2 Quality management system planning	There is evidence that top management has ensured that quality management system planning is aimed at meeting requirements. Are quality objectives defined? Quality targets? How are they documented? How communicated?		
	18001-4.3.4 OH&S management programme	Is there a SHE management programme? Is it regularly reviewed? Are there annual action plans? Are there evaluations?		
Infrastructure, Provision of resources, Resources, roles, responsibility & authority,	9001 6.3 Infrastructure	There is evidence that the organization as taken sufficient actions to determine, provide and maintain the infrastructure to achieve product conformity?		
	9001-6.1 Provision of resources	There is evidence of sufficient resources to continually improve the effectiveness and maintain the quality management system.		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	14001 4.4.1 Resources, roles, responsibility & authority 18001 4.4.1 Resources, roles, responsibility, accountability & authority 9001 5.5.1 Responsibility and authority	All required resources for the management system are available, including ... • human resources and specialised skills? • organisational infrastructure? • technology? • financial resources? Functions, responsibilities and authorities are defined? Documented? Communicated? QSHE Representatives (function + responsibilities) are defined? Evidence for reports to top management exists? Is management to committed to QSHE policies? Is commitment documented (meeting minutes, inspection reports, safety audits, etc)? Evidence for improvement recommendations exists? Organisation chart available?		
	9001-6.2.1 Human resources general,	There is evidence that personnel performing work affecting quality are competent on the basis of appropriate education, training, skills, and experience?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Competence, training and awareness.	14001-4.4.2 Competence, training and awareness,	How is staff qualified with respect to environmental protection/aspects? How is competence and qualification recorded? How are training needs identified, in particular with respect to environmental aspects? How is it organised? How is it recorded? How is internal staff made aware of the environmental protection policy and procedures? How are environmental aspects communicated to staff? How are staff made aware of their roles and responsibilities? How is staff made aware of potential consequences of departures from procedures? How is external staff made aware of the environmental protection policy and procedures? Is a procedure established, implemented and maintained to make persons who work on behalf of IRMM aware of ... ...the importance of conformity with the environmental policy and procedures and with the requirements of the EMS? ... the significant environmental aspects and related or potential impacts associated with their work, and the environmental benefits of improved personal performance? ... their roles and responsibilities in achieving conformity with the requirements of the EMS? ... potential consequences of departure from procedures? Is the link documented between significant aspects, related functions, required competences, gap analysis between required and acquired competences and training programme?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Competence, training and awareness.	9001 6.2.2 Competence awareness and training;	How is the required competence determined? How is this information used to organise training? How is training effectiveness evaluated? How is training recorded?		
	14001 4.4.2 Competence training and awareness	How is staff qualified with respect to environmental protection/aspects? How is competence and qualification recorded? How are training needs identified, in particular with respect to environmental aspects? How is it organised? How is it recorded? How is internal staff made aware of the environmental protection policy and procedures? How are environmental aspects communicated to staff? How are staff made aware of their roles and responsibilities? How is staff made aware of potential consequences of departures from procedures? How external staff? Is a procedure established, implemented and maintained to make persons who work on behalf of IRMM aware of ... ...the importance of conformity with the environmental policy and procedures and with the requirements of the EMS? ... the significant environmental aspects and related or potential impacts associated with their work, and the environmental benefits		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
		of improved personal performance? ... their roles and responsibilities in achieving conformity with the requirements of the EMS? ... potential consequences of departure from procedures?		
	18001 4.4.2 Training awareness and competence	Are the requirements defined for functions having SHE relevance in terms of a) qualification, b) competence, c) experience? How is staff sensitised to SHE matters? How is staff trained to respect SHE requirements, generally and job-specifically? How is staff trained for emergencies?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Communication	9001-5.5.3 Internal communication	Which communication channels exist? Which quality related matters are communicated, how and when?		
	14001-4.4.3 Communication	Has a procedure been established, implemented and maintained with regard to IRMM's environmental aspects and EMS for ... ... internal communication among the various levels and functions in the organisation? ... receiving, documenting and responding to relevant communication from external interested parties? Has IRMM decided whether to communicate externally about its significant environmental aspects? Has this decision been documented? If the decision is to communicate, has a method for this external communication been established and implemented?		
	18001-4.4.3 Consultation and communication	How are SHE matters communicated to staff? How are SHE matters communicated to external workers? How is implication, consultation and representation of staff in SHE matters achieved?		
Documentation	9001: 4.2.1 General documentation requirements 9001-4.2.1-a,b,c,d,e	The documentation includes quality and SHE objectives and policy? The documentation includes a Management Manual? Documented procedures exist as required by the standards? Sufficient documentation exists to assure the effective operation		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	14001-4.4.4-a, d, e	and control of its processes? Required documentation is established, implemented and maintained? Records required by the management system exist?		
	14001 4.4.4. Documentation 9001-4.2.1 14001-4.4.4-b, c 18001 4.4.4.	The documentation supporting the quality management system is appropriate for the size and type of the organisation? The documentation is appropriate for the complexity and interaction of the organization's processes? The documentation is appropriate based on the training and competence of the personnel? The scope of the Management system is documented? Main elements of the EMS are documented? Their interaction? Reference to related documents?		
Control of documents	9001 4.2.3 Control of documents 9001-4.2.3-a,b 14001-4.4.5-a,b 18001-4.4.5	How are documents required by the quality management system controlled? A documented procedure exists? Evidence exists that documents are approved for adequacy prior to use? Documents are reviewed and updated to assure accuracy and revised at regular interval?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	14001 4.4.5 Control of documents 9001-4.2.3-c, d,e,f 14001-4.4.5-c,d,e,f, 18001-4.4.5	Changes and current revision status are clearly identified? Current relevant documentation is available at the point of use? Documents are legible and readily identifiable? Documents of external origin are identified and controlled?		
	18001 4.4.5 Document and data control 9001-4.2.3-g 14001-4.4.5-g 18001-4.4.5	There is evidence that obsolete documents are suitably identified to prevent unintended use and removed promptly when possible? Relevant versions of applicable documents are available at points of use, where required?		
Operational Control	9001 7.1 Planning of product realisation; 14001 4.4.6 Operational control; 18001: 4.4.6 Operational control	There is evidence that the organization has planned and developed the processes needed for product realization? These processes are consistent with requirements of other processes? Are quality objectives for products defined? Are special processes defined for products? Are special documents prepared for products? Are special methods for verification, validation and inspection of products defined? Are criteria for product acceptance defined? Are records available? Sufficient to proof conformity with requirements? Is a quality plan available?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Operational control cont.	9001-7.2.1 Determination of requirements related to the product	How are the customer requirements determined? By whom? How are they recorded? Who is responsible for these records and how are they stored for contract cases? For cases without direct cash flow? How is the fulfilment of implicit requirements assured? How is the fulfilment of regulatory requirement assured? Are there sometimes additional requirements, and how are they determined?		
	7.2.2 Review of requirements related to the product	Evidence exists that the organization reviews requirements related to the product prior to the organizations commitment to provide the product. How is review of product requirements carried out? Who is responsible? Who does it? How is this review recorded? How are requirement changes managed? How are these changes, and the related reviews, recorded?		
	9001-7.3.1 Design and development planning	Evidence exists that the company has a planned and controlled approach to design and development. How is the initiation of new tasks managed? How are projects planned? How is the planning reviewed? How is communication between different groups managed?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	9001-7.3.2 Design and development inputs	Design/development inputs contain functional and performance requirements? Statutory and regulatory requirements? Are the requirements complete?		
Operational control cont.	9001-7.3.3 Design and development outputs	Outputs match and meet the input requirements? Contain all necessary information for purchases? State acceptance criteria? Specify product characteristics?		
	9001-7.3.4 Design and development review	Evaluation of the results for ability to meet defined requirements? Reviews foreseen? Records available? All required staff present?		
	9001 7.3.5 Design and development verification	Evidence exists that verification is in accordance with planned arrangements? Do the outputs meet the requirements? Are records available?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	9001-7.3.6 Design and development validation	There is evidence that design and development validation was performed in accordance with planned arrangements? How is validation done? When? Are records available?		
	9001-7.3.7 Control of design and development changes	There is evidence that design and development changes are reviewed, verified, validated and approved before implementation? How are changes managed? Who reviews, verifies, approves changes? How are changes documented?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Operational control cont.	7.4.1 Purchasing process	The process for purchasing is fully deployed. Which is(are) the process(es) relevant for purchasing? Who are the respective process owners? Where are the processes documented? How are the processes communicated to their users? How is the process performance measured? Which purchase records exist? How are they stored? Evidence exists that the company assures that purchased product conforms to specified purchase requirements. Who edits the specifications of purchased product? Who is responsible for the definition of specifications of purchased product? Who edits the specifications? How are the specifications communicated? Evidence exists that the company assures that purchased product conforms to specified purchase requirements. Who edits the specifications of purchased product? Who is responsible for the definition of specifications of purchased product? Who edits the specifications? How are the specifications communicated? There is evidence that organization selects and approves suppliers based upon their ability to provide product in accordance with the organizations requirements. What are the criteria for supplier selection? Evidence exists of a process with specific criteria for the selection. evaluation and re-evaluation of suppliers. According to which criteria are suppliers evaluated? Which documentation exists on supplier evaluation? Records of all evaluation and attendant actions are available?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Operational control cont.	9001-7.4.2 Purchasing information	Requirements for approval of product, procedures, processes and equipment. What are the approval criteria? Who sets approval criteria? How are approval criteria communicated to the supplier? Who approves purchased goods/services? Requirements for qualification of personnel. Who defines the requirements for personnel involved in a purchased service? How is this qualification verified, and by whom? How is the result of this verification documented? Relevant quality management system requirements. Who defines quality requirements for goods and services? How are they verified, and by whom? How are they documented? There is evidence that the organisation reviews requirements for adequacy prior to communication to the supplier. How are these requirements reviewed, and by whom?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	9001-7.4.3 Verification of purchased product	There is evidence that the organization has established and implemented inspection or other activities to ensure that purchased materials meet requirements. How is inspection of incoming goods organised? Who is responsible for the inspection? Which inspection results are recorded, and where? What is the procedure in case of detection of non-conform product? Which cases of non-conforming product were detected recently? In cases where the organization or its customer intends on performing verification at the supplier's premises, intended arrangements will be stated in the purchasing information.		
Operational control cont.	9001-7.5.1 Control of production and service provision	Is information describing the characteristics of the product available? Are instructions available? Are measuring and monitoring devices available and used? How is delivery organised (sending, approval)? Who approves products and services? How is post-delivery service organised?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	9001-7.5.2 Validation of processes for production and service provision	There is evidence that the organization validates any process for production or service provision where the resulting output cannot be subsequently verified by subsequent monitoring and measurement? Which processes required for production are validated? What are the criteria for validation? How is staff qualified for validation? Validation records available?		
	9001- 7.5.5 Preservation of product	Evidence exists that the organisation is taking care to preserve its product during the entire internal processing and delivery		
	14001-4.4.6	Are there customer requirements related to environmental protection and/or health and safety? Operations associated with significant aspects are identified? Carried out under specified conditions? Documented procedures required? Available? Operating criteria defined? Procedures/environmental aspects communicated to suppliers and contractors?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	18001-4.4.6	Operations with significant risks are identified? Documented instructions are available? How is preparation of instructions organised? Instructions contain reference to risks? How is safety at the work place taken into account? Are SHE issues taken into account during purchasing? How are suppliers informed about IRMM SHE policies? How are sub-contractors informed on IRMM SHE policies?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Control of non conforming product; Emergency preparedness and response	9001 8.3 Control of non conforming product	There is evidence of an effective method in place for identifying non conformities to requirements including preventing unintended use? Availability of written process? Responsibilities: description and distribution, records of deployment, records of non conformities? Evidence of Non Conformities and/or actions taken: List of non- conformities? How do you ensure Completeness? Did you identify non conformities? There is evidence of action taken to eliminate non-conformities? Review of a random Non conformance - Follow up done timely? - Are recorded non-conformities real or can be considered as non conformance? - How is lack of follow up managed? NCMR Indicators? Evidence? Trend analysis? Were there any non-conformancies used during Management review? Was there any impact on AMP, AAR or other strategic decisions? There is a method in place for taking action that precludes the use of non-conforming material for its original or intended purpose? Records are available for review indicating control and compliance to these requirements? There is evidence that corrected non-conforming product is subjected to reverification to assure that it meets stated requirements? There is evidence that methods are in place to take actions relative to non-conforming product already delivered? These actions are appropriate to the potential effects of the problem?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	14001 4.4.7 Emergency preparedness and response 18001-4.4.7 Emergency preparedness and response	Is there a procedure to identify potential emergencies with environmental and/or safety impact? Are there procedure(s) how to respond to emergencies? Has IRMM established measures to prevent or mitigate adverse environmental impacts associated to those actual emergency situations and accidents? Are the procedures periodically reviewed? Are the procedures periodically tested? Are the results recorded and used for improvement? Is there an incident or "near accident" register?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Monitoring and measurement	9001-7.6 Control of monitoring and measuring devices	There is evidence that the measurements taken and measuring devices are selected based on the need to ensure compliance to requirements? How do you manage calibration/maintenance? Is there a documented process? Who is the process owner? How is ensured that the process owner has the technical competence and skill to ensure the effective operation of the process? Records of maintenance/calibration results are available for review? How are the records managed? By whom?		
	9001 8.1 Measurement analysis and improvement General	There is evidence that the methods employed for monitoring, measuring and analysis including statistical techniques have been conveyed including the limits and extent of use?		
	9001-8.2.3 Monitoring and measurement of processes	There is evidence that the organization has identified methods for monitoring and measuring the quality management system processes? How do you analyse and monitor this process?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
		Which performance indicators are defined? If not applicable, please explain why. A review of the results of these methods demonstrates the ability for processes to achieve planned results? How do you plan and implement the actions necessary to achieve the specified required results and to improve the process? How do you follow-up the actions? How are the required results defined? Where planned results have not been achieved there is evidence that the organization has initiated correction and corrective action to assure product conformity.		
Monitoring and measurement cont.	9001-8.2.4 Monitoring and measurement of product	There is evidence that the organization is monitoring and measuring characteristics of the product sufficient to verify that product requirements have been met? There is evidence that these activities are carried out at appropriate stages throughout the product realization process in accordance with planned arrangements? Records of evidence indicating conformity with acceptance criteria and the name of the person authorizing release of product? There is evidence that product release and service delivery is has not proceeded until planned arrangements per 7.1 are satisfied or release has been authorized by the relevant authority and where required the customer		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	9001-8.4 Analysis of data	There is evidence that the organization has determined, collected and analyzed data that demonstrates the suitability and effectiveness of the quality management system? There is evidence that this data is used as a means of identifying actions relative to continual improvement? Sources for this data include monitoring and measurement results among other relevant sources? Analysis of data includes: A. Customer satisfaction? B. conformity to product requirements? C. characteristics and trends of products and processes including opportunities for preventative action? D. suppliers?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Monitoring and measurement	14001-4.5.1 Monitoring and measurement	Which operations do have a significant environmental impact? What are the key parameters? How are they measured? How are they documented? Do procedures contain information how to monitor performance? Is the described monitoring conform with the environmental objectives and targets? How is calibration and maintenance of measuring equipment assured? How documented? List of calibrated equipment available? Calibration frequency defined? Acceptable limits for calibration defined? Are standards available and valid?		
	18001-4.5.1 Performance measurement and monitoring	How is SHE performance measured? How is achievement of objectives evaluated (qualitatively and quantitatively)? How is compliance with legislation verified? How are identified risks dealt with and monitored? Is there a list of critical equipment? How is calibration and maintenance of measuring equipment assured? How documented? List of calibrated equipment available?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
		Calibration frequency defined? Acceptable limits for calibration defined? Are standards available and valid?		
Evaluation of compliance	14001-4.5.2 Evaluation of compliance	Are there procedures ensuring the periodical evaluation of compliance with legal requirements? Are there records of the results of such evaluations? Are there requirements other than legal? Are they evaluated, too? How? Are there records on such evaluations?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Non-conformities, incidents and accidents.	9001-8.3 Control of non-conforming product	There is evidence of an effective method in place for identifying non conformities to requirements including preventing unintended use? Availability of written process? Responsibilities: description and distribution, records of deployment, records of non conformities? Evidence of Non Conformities and/or actions taken: List of non-conformities? How do you ensure Completeness? Did you identify non conformities? There is evidence of action taken to eliminate non-conformities? Review of a random Non conformance - Follow up done timely? - Are recorded non conformances real or can be considered as non conformance? -How is non follow up managed? NCMF Indicators? Evidence? Trend analysis? Were there any non conformancies used during Management review.? Was there any impact on AMP, AAR or other strategic decisions? There is a method in place for taking action that precludes the use of non-conforming material for its original or intended purpose? Records are available for review indicating control and compliance to these requirements? There is evidence that corrected non-conforming product is subjected to reverification to assure that it meets stated requirements? There is evidence that methods are in place to take actions relative to non-conforming product already delivered? These actions are appropriate to the potential effects of the problem?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Non-conformities, incidents and accidents.	9001-8.4 Analysis of data	There is evidence that the organization has determined, collected and analyzed data that demonstrates the suitability and effectiveness of the quality management system? There is evidence that this data is used as a means of identifying actions relative to continual improvement? Sources for this data include monitoring and measurement results among other relevant sources? Analysis of data includes: A. Customer satisfaction? B. conformity to product requirements? C. characteristics and trends of products and processes including opportunities for preventative action? D. suppliers?		
	9001-8.5.2 Corrective action	There is evidence that the organization takes action to eliminate the cause of nonconformities and to prevent recurrences. Reviewing nonconformities including customer complaints? Determining the cause of nonconformities? Evaluating the need for actions to assure nonconformities do not recur? Determining and implementing the action needed? Records available of the results of the actions taken? Reviewing corrective actions taken?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
		Evidence and examples of corrective action records? How are corrective action records controlled in the Institute/Unit/Sector?		
	9001-8.5.3 Preventive action	a) Have appropriate sources of information been used to detect, analyze and eliminate potential causes of nonconformities? b) Have the steps needed to deal with problems requiring preventive action been determined? c) Has preventive action been initiated, and controls applied to ensure that it is effective? d) Has relevant information on actions taken been submitted for management review? Do the sources include: i) processes and work operations which affect product (service) quality; ii) concessions; iii) audit results; iv) quality records; v) service reports; vi) customer complaints; vii) assessment of customer satisfaction (positive as well as negative)?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Non-conformities, incidents and accidents cont.	14001-4.5.3 Nonconformity, corrective action and preventive action	Is there a procedure dealing with non-conformities? Does the procedure define requirements for Identification and mitigation of NC? Investigation and root cause analysis of NC? Corrective action? Preventive action? Records of corrective and preventive action results? Review of effectiveness of corrective and preventive action? Are the actions taken appropriate to the magnitude of the problems and the environmental impacts encountered? Has IRMM ensured that any necessary changes are made to EMS documentation? Is there a synthesis of all NC in order to identify possible major corrective actions?		
	18001-4.5.2 Accidents, incidents, non-conformities and corrective and preventive action	How does IRMM handle ... ... analysis of accidents and incidents? ... reaction to accidents and incidents? How does IRMM handle ... ... implementation of corrective action? ... measurement of effectiveness of corrective actions		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Control of records	9001-4.2.4 Control of records	What is defined as records? Is there a documented procedure for the control of records? How are needed records identified? Records have been identified as to give evidence of effective compliance to the requirements of ISO 9001:2000? Records are retrievable within the definition of the documented procedure outlining the requirements for the control of records? How are records defined on Unit level? How are records archived in the Unit/Sector? The applicable procedure outlines the controls for identification, storage, protection, retrieval, retention time and disposition of records? Give evidence that the logbooks are controlled according to the IRMM procedure		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	14001-4.5.4 Control of records	Has IRMM established and maintained records as necessary to demonstrate conformity to the requirements of its EMS and of the International Standard ISO 14001:2004 and the results achieved? Has IRMM established, implemented and maintained procedures for the identification, storage, protection, retrieval, retention and disposal of records? Are these records legible, identifiable and traceable? Which types of records exist with respect to environmental protection? Where, how and by whom are they managed/stored? Is there a documented procedure?		
	18001-4.5.4 Control of records	What is defined as records? Is there a documented procedure for the control of records? How are needed records identified? Records have been identified as to give evidence of effective compliance to the requirements of OHSAS 18001? Records are retrievable within the definition of the documented procedure outlining the requirements for the control of records?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Internal Audit	9001-8.2.2 Internal audit 14001-4.5.5 Internal audit 18001-4.5.5 Internal audit	There is evidence that the organization plans and conducts audits at regular intervals? The audits are conducted in such a way as to demonstrate that the quality management system conforms to planned arrangements and the requirements of ISO 9001:2000, ISO 14001 and OHSAS 18001? The audits are conducted in such a way as to ascertain that the QSHE requirements of the organization are effectively implemented and maintained? There is evidence that the program was planned taking into the consideration the following the status and importance of the areas/operations to be audited and the results of previous audits. Has IRMM established, implemented and maintained audit procedures that address: • responsibilities and requirements for planning and conducting audits, reporting results and retaining associated records? • the determination of audit criteria, scope, frequency and methods? The selection of auditors is consistent with maintaining objectivity and impartiality. How is auditors' competence defined? There is no evidence that assessors audit their own work? Is an evaluation of the auditors planned and realised (based on audit reports, discussions with auditees, differences between internal and external audits)? The responsibilities and requirements for planning and conducting audits as well as reporting results and maintaining records are documented in a procedure available for review?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Management review	9001-5.1 Management commitment	Commitment of management to quality policy exists? Quality policy is defined? Quality objectives are established? Management review is conducted? Sufficient resources are available? Evidence exists that top management has communicated the importance of meeting customer, regulatory and legal requirements?		
	9001 5.6.1 Management review general;	There is evidence that top management conducts periodic reviews of organizations quality management system? Records are available?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
	9001 5.6.2 Management review input;	Does the management review take into consideration ... ... results of audits? ... customer feedback? ... process performance and product conformity? ... status of preventive and corrective actions? ... follow-up actions from previous management reviews? ... changes that could affect the quality management system? ... recommendations for improvement?		
	9001 5.6.3 Management review output;	Does the management review lead to decisions and actions related to... ... improvement of the effectiveness of the quality management system and its processes? .improvement of product related to customer requirements? ... resource needs?		
	9001: 8.5.1 Continual improvement	Effectiveness of the system is improved by quality policy? Effectiveness of the system is improved by quality objectives? Effectiveness of the system is improved by audit results? Effectiveness of the system is improved by analysis of data? Effectiveness of the system is improved by corrective action? Effectiveness of the system is improved by preventive action? Effectiveness of the system is improved by management review?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Management review cont.	9001-5.6.1 (Policy requirements re-checked)	Is there evidence for the use of • quality policy • quality objectives • audit results • analysis of data • corrective and preventive actions • management review for the improvement of the system?		
	14001-4.2 a,b,c 14001-4.2 d,e,f,g 18001 - 4.2 (Policy requirements re-checked)	SHE policy is defined? It is appropriate to the scale and nature of activities? Includes commitment to continual improvement? Includes commitment to prevention of pollution? Policy provides framework for review of objectives and targets? Policy is documented, implemented and maintained? Policy is communicated to all persons working on behalf of IRMM? Is communicated to the public?		
	14001-4.6 Management review 18001-4.6 Management review	Does Top Management review the organisation's IMS at planned intervals, thereby ensuring its continuing suitability, adequacy and effectiveness? Does this review include:		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
		Assessing opportunities for improvement? The need for changes to the IMS, including the integrated policies and integrated objectives and targets? Associated records about these management reviews? Do the inputs of the management reviews include: Results of internal audits? Evaluations of compliance with legal requirements and with other requirements to which the organisation subscribes? Communication from external interested parties, including complaints? The environmental performance of IRMM? The extent to which objectives and targets have been met?		

Chapter	Reference	Requirements	Finding[28] (NC, CPT, NI, NCP)	Written evidence
Management review cont.	14001-4.6 Management review 18001-4.6 Management review cont.	The status of corrective and preventive actions? Follow-up actions from previous management reviews? Changing circumstances, including developments in legal and other requirements related to the organisation's environmental aspects/risks? Recommendations for improvement? Do the outputs of the management reviews include decisions and actions related to possible changes to the integrated policies, objectives and targets, and other elements of the IMS, consistent with the commitment to continual improvement? Is there a conclusion to the management review? Does this conclusion inform about the fact that the IMS is (or is not): • suitable to the company? • adequate? • effective? • efficient? Does this conclusion inform about the fact that the personnel has made itself familiar with the IMS?		

ANNEX 1-V: EXAMPLE OF A TRIPLE ASSESSMENT AUDIT REPORT, WITH 2/14 FINDINGS SHOWN AND 1 DEFICIENCY STATEMENT.

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Institute for Reference Materials and Measurements

irmm

Retieseweg 111 B-2440 Geel

Assessment Report

Lead Assessor: Michael Bickel	**Date of Assessment :** 13/06/2008 **Copy To:** Peter Schillebeeckx Peter Ruthusen Peter Siegler Stefan Kopecky Jean Claude Drohe
Assessed Unit /Sector : NP - Neutron Physics **Process or Area assessed :** NP Experiments LINAC	
Assessment Name: 2008-2010 Integrated audit **Assessment Type :** Internal Assessment **Assessment Team Members :** Luc Peeters Josephine McCourt Michael Bickel	**Assessment Scope :** ISO 9001:2000 4.2.1 General documentation requirements, 4.2.3 Control of documents, 7.2.1 Determination of requirements related to the product, 7.2.3 Customer communication, 7.3.1 Design and development planning, 7.3.2 Design and development input, 7.3.3 Design and development output, 7.3.4 Design and development review, 7.3.5 Design and development verification, 7.3.6 Design and development validation, 7.3.7 Control of design and development changes, 8.2.2 Internal Audit ISO 14001 4.4.4. Documentation, 4.4.5 Control of documents, 4.4.6 Operational control, 4.5.5 Internal audit OHSAS 18001 4.3.1 Planning for hazard identification risk assessment and risk control, 4.4.4 Documentation, 4.4.5 Document and data control, 4.4.6 Operational control, 4.5.4 Audit **Management Representative :** Michael Bickel

Full Report: The detailed findings are listed in the attached finding sheets :
General Documentation requirements :
Document Control :
Risk assessment :
Determination of customer requirements :
Customer Communication :
Development planning :
Development input :
Development output :
Development review :
Development verification :
Development validation :
Development changes :
Non-conformities :
Internal audit :

Summary Statement :
Improvement of the system is observable since last audit.

The Strengths of the System :
The Unit / process / projects are very well organised and documented. Staff are competent and motivated for their work, they are ready to present both project management and project results openly.

Opportunities Found :
Some potential for improvement was detected during the audit:

Project communication:
Document control:
Organisation chart:
Management manual:

Link to Recommendations:

Deficiencies :
One deficiency related to safety matters was detected .

Link to Deficiency Statements:

Personnel Interviewed :
Peter Siegler, Peter Schillebeeckx, Jean Claude Drohe

Report Author: Michael Bickel

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Retieseweg 111 B-2440 Geel

Internal Assessment Findings Form

Assessment Element : 14001 4.4.6 Operational control; 18001 4.4.6 Operational control (9001) 9001 7.3.1 Design and development planning; 18001 4.4.6 Operational control (14001) 9001 7.3.1 Design and development planning; 14001 4.4.6 Operational control (18001) **Category:** ISO 9001:2000 7.3.1 Design and development planning ISO 14001 4.4.6 Operational control OHSAS 18001 4.4.6 Operational control **Unit to be Assessed :** NP - Neutron Physics **Group to be Assessed :** NP LINAC **Process or area** NP Experiments LINAC	**Assessment Name :** 2008-2010 Integrated audit **Assessment Type :** 9/14/18 integrated internal audit
Assessor: Michael Bickel, Josephine McCourt/jrc, Luc Peeters/jrc	**Date:** 13/06/2008

Legend:
CPT = Compliant (meets requirements)
NI = Needs Improvement
NA = Not Applicable (element is not used or needed within the Quality System)
NC = Not Covered (element has not been looked at during the audit)
NCPT = Not Compliant with the stated objective (element is not in place or not acceptable)

Reference	Requirements	Finding	Evidence
9001-7.3.1	Evidence exists that the company has a planned and controlled approach to design and development. How is the initiation of new tasks managed? How are projects planned? How is the planning reviewed? How is communication between different groups managed?	CPT	The project plan is composed of the entries required by PR-6 (risk assessment are attached to the experimental sheets, which describe the experiment details, see below). These documents are accessible to all staff involved via the NP record library. This was verified for - 241Am: measurements of total and capture cross sections in the resonance region - Total and capture cross section measurements for low-activation and advanced structural materials. Link Field:
18001-4.4.6	Operations with significant risks are identified? Documented instructions are available? How is preparation of instructions organised? Instructions contain reference to risks? How is safety ate the work place taken into account? Are SHE issues taken into account during purchasing? How are suppliers informed about IRMM SHE policies? How are sub-contractors informed on IRMM SHE policies?	CPT	For each of the above mentioned tasks risk assessment are available, one for the detector and one for the target setting. The risk assessments of both tasks (see above) are rather generic due to the rather low hazard of the experiment itself. Nevertheless, they cover the activities and refer to documented instructions (e.g. to WI-3 and WI-49) in the case of the second task verified. Link Field:

Reference	Requirements	Finding	Evidence
9001-7.3.4	Evaluation of the results for ability to meet defined requirements? Reviews foreseen? Records available? All required staff present?	CPT	MP-internal project reviews are carried out during the NP management meetings. All projects exhibiting "different from normal" status are discussed and, if necessary, adapted in their planning. Minutes of such meetings exist in the NP meeting database (see example below). In addition, the 6-monthly review is carried out on IRMM level. External reviews are also carried out in the form of meetings, e.g. for JEFF projects or IAEA projects, which often aim at comparison of data from various research institutions. As an example, the IAEA document "INDC(NDS)-468" contains the minutes of a meeting of 2004-12, where P. Schillebeeckx participated as an advisor. Chapter 2.2 and 2.11 of that document refer to data comparison between IRMM capture/transmission data with photon production sdata from another institute. Link Field:

18001-4.4.6	Operations with significant risks are identified? Documented instructions are available? How is preparation of instructions organised? Instructions contain reference to risks? How is safety ate the work place taken into account? Are SHE issues taken into account during purchasing? How are suppliers informed about IRMM SHE policies? How are sub-contractors informed on IRMM SHE policies?	CPT	There is an obligation to account for Fissile Materials and this is is managed on an institute basis by SHES (Freddy Van der Straat) who receives input at the Unit level by Key Measurement Point managers. All movements of fissile material (in, out and within IRMM) are accounted for in this "Gestion Matieres Fissiles-GMF" and reported to DG TREN monthly and once annually, the latter combined with an inspection by DG TREN auditors. There is a second level of radioactive material accounting, required for ARBIS compliance, which includes all radioactive sources (not only fissile material) and this is known as the RADMAT inventory. The information herein is further fed into the IRMM Hazardous Materials Inventory, which is an internal document used for VLAREM compliance and for eventual use in emergencies. Link Field:

Deficiency Statement & Corrective Action Request Form

Issued By: Josephine McCourt/rc **Organization:** IRMM	**Reference #:** DS# -0039 **Date Sent:** 19/08/2008

Company Name:	Institute for Reference Materials and Measurements	**Assigned To:**	Peter Schillebeeckx
Address:	Retieseweg 111, B-2440 Geel	**Unit/Sector:** **Copy To:**	NP - Neutron Physics Michael Bickel Luc Peeters Jean Claude Drohe

Element Audited:	Assessment Finding for ISO 9001:2000 5.2 Customer focus; 14001 4.3.1 Environmental aspects; 18001 4.3.1 Planning for hazard identification risk assessment and risk control
Process or area audited:	NP Experiments LINAC
Deficiency Statement:	**Inadequate use of PPE during liquid nitrogen filling .**

Request Type:	Requirements Issue	**Associated Documents :** Doc Link to Assessment Findings
Problem Statement:	The auditors witnessed an operator filling a nitrogen dewar without appropriate personal protective equipment (PPE). The operator had started filling the dewar without any PPE (except his own glasses) and just before shutting off the LN valve, he put on gloves (was also aware at this stage that we were there). The face shield and glove use signs were very well displayed and the necessary PPE was available.	

Date Due: 31/10/2008 **Date Completed :** 27/08/2008	**Action Taken :** Staff informed. **Link to Evidences :** minutes of the unit meeting

ANNEX 1-VI: HAZARD IDENTIFICATION AND RISK ASSESSMENT METHODOLOGY

Hazard Identification and Risk assessment refers to the process of evaluating risks to workers' safety and health from hazards at the workplace.
Apart from being legally required in many EU countries, including Belgium, it is good practice to carry out Hazard Identification and Risk assessments as they allow effective measures to be taken to protect workers' health. The accident prevention process starts with the reduction and, where feasible, total elimination of potential risks, followed by the implementation of collective prevention measures and, in the final instance, personal protection solutions. By identifying the hazards and evaluating the risks, the employer, or person in control of the work should be able to:

- Make a decision as to the protective measures required, taking into account relevant legal requirements;
- Check whether the measures in place are adequate;
- Prioritise any further measures found to be required;
- Show that an informed judgement has been made on workers' safety and health (e. g. to workers or to the regulatory authorities);
- See whether an improvement in the level of protection to workers has been achieved.

The methodology applied here is based on a three step approach:

1) an identification as to which categories of hazard could induce a significant risk in the process (or project) and an assessment of the degree of significance.
2) a more thorough risk assessment for those categories identified as significant in step 1.
3) finally a synthesis of the prevention measures and communication thereof.

The system was tailored in-house to cope with the broad scope of work carried out at IRMM as well as the more intangible factors, such as institute culture and individual cultures.

Step 1: Hazard identification and Preliminary Risk Assessment

The process owner starts completing a short form (**Annex 1-VIII**) initially describing the process and then completes a hazard identification and preliminary risk assessment by giving a rating of 0 to 3 for each of the six categories of hazards and aspects, typical of IRMM's processes. These hazards and aspects are:

- Fire or Explosion hazards (hazards related to the use of heat generating equipment, hazards related to the increasing of the fire load or the use of flammable or explosive products)
- Radiation exposure hazard (external exposure to radiation, internal contamination)
- Inadvertent loss of radioactive material (non controlled escape of contaminated or activated material, loss of radioactive sources)
- Chemical or biological hazards (health hazards for biological or chemical contamination, hazard for releases)
- Conventional safety related hazards (hazard for accidents causing injuries, wounds, electrocution, …)

- Waste and environmental aspects (production of nuclear or non nuclear waste, liquid releases, …)

The process owner then contacts the Safety, Health, Environment and Security (SHES) sector (of IRMM), for advice on how to perform a more thorough risk assessment (step 2) if any of the attributed ratings are equal to, or are greater than, 2. The Prevention Advisor (from the SHES sector) will also add the appropriate regulatory requirements in the Legal Aspects section. If the Prevention Advisor and the Process Owner both consider that a further thorough risk assessment would have no added value then step 2 is skipped and step 3 is then carried out.

Step 2: Thorough Risk Assessment

a) If a more thorough investigation of the risks is required then the Process Owner and the Prevention Advisor decide on the most suitable way to perform the risk assessment. Two ways can be followed:

- by completing the IRMM SHE Check List and/or
- by executing a more advanced risk assessment technique, suitable for the process that is being investigated.

The IRMM SHE set of check-lists (**Annex 1-XIII**) provide a quick way to identify the risks, to quantify them and to evaluate where specific prevention measures will be necessary. It is available as an Excel file, with a sheet for each of the six categories of hazards and aspects at IRMM. The methodology is based on the Fine method (later further refined by Graham and Kinney), namely taking three criteria into account, the seriousness of the risk, the frequency of exposure and the probability of occurrence. For those hazards or aspects for which the 'risk ranking' is determined to be too high, specific measures must be defined.

b) For those processes for which the check-list seems to be too restrictive or does not provide an adequately thorough investigation, other risk assessment techniques may be applied e.g. for:

- fluid systems: hazard and operability assessment HAZOP
- mechanical equipment: failure mode effect analysis FMEA
- complex interacting systems: event tree analysis ETA
- glove box equipment: specific glove box checklist.

c) The risk assessment is carried out with, or at least reviewed by, the SHES sector.

Step 3: Synthesis and communication of prevention measures.

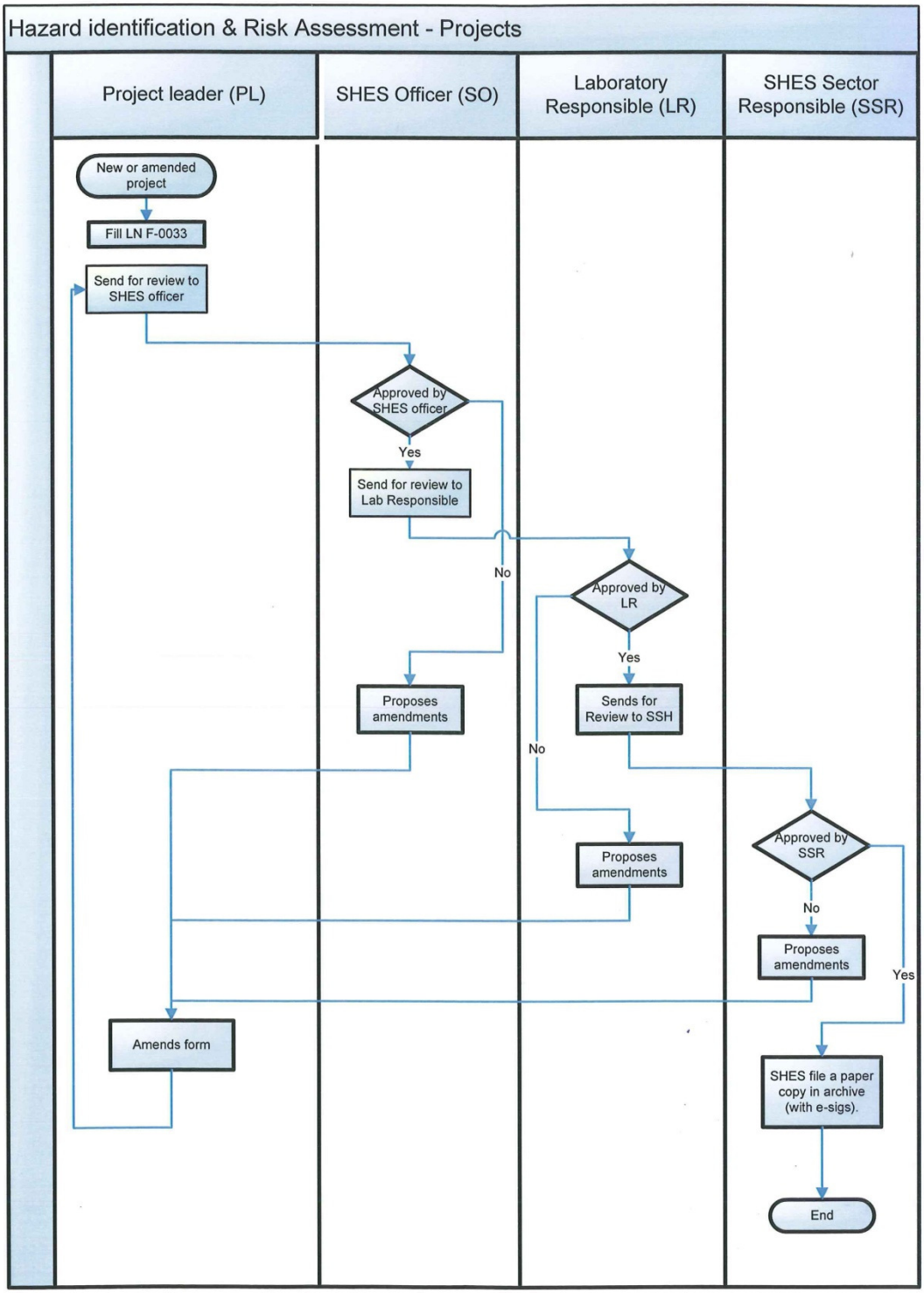
a) On form F-0047 a synthesis is made of the SPECIFIC PREVENTION MEASURES, i.e. the prevention measure decided as a result of the risk assessment and which are not “standard measures” already applicable at IRMM for all processes.

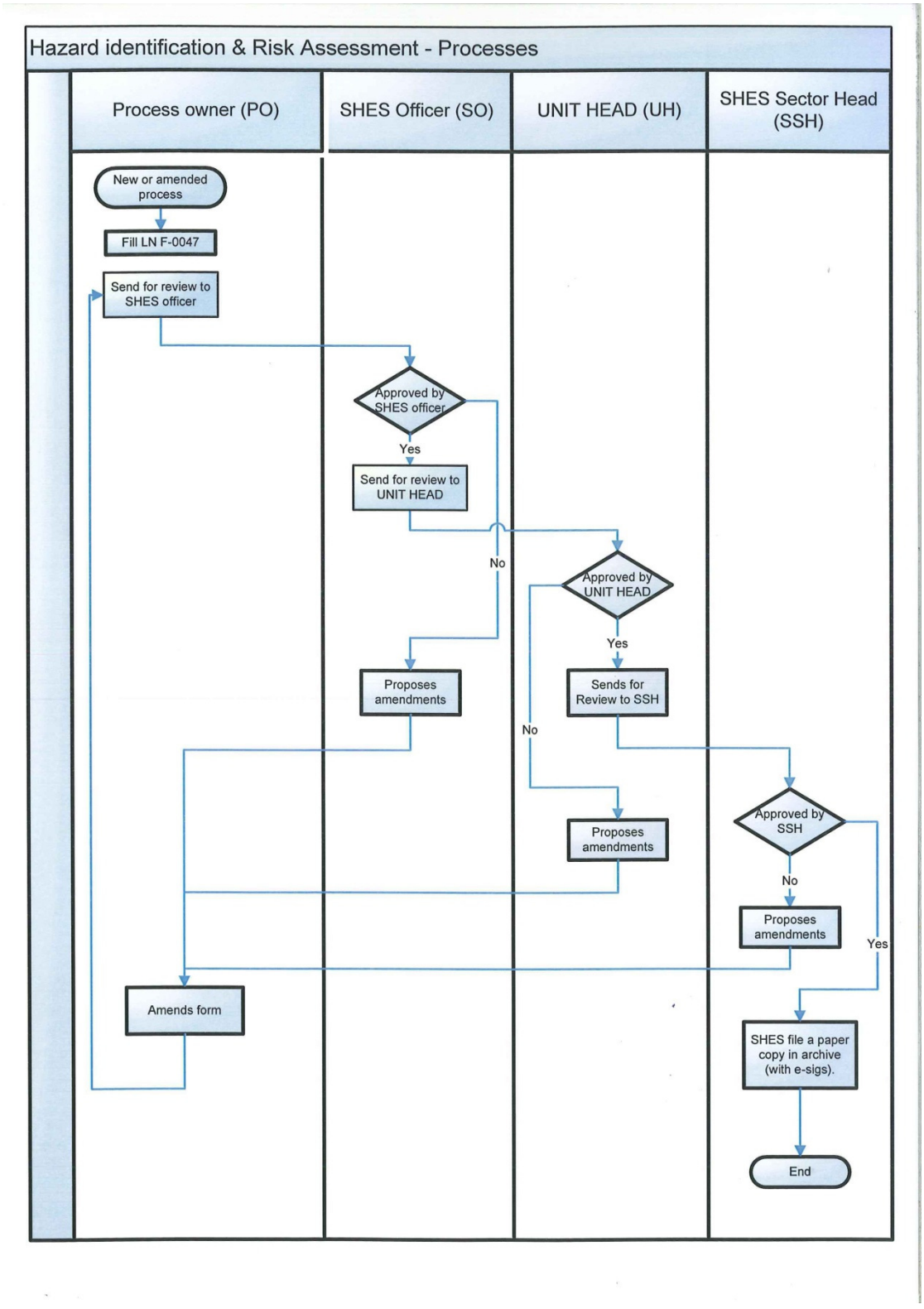
b) The form is then finalised by appending the relevant documentation and by signature of the process owner, the SHES sector head and the unit head.

c) The process owner makes sure that the form, or at least the measures, are communicated to all relevant parties.

d) The process owner ensures the implementation of the prevention measures. The owner also regularly verifies that the decided measures are understood and applied.

ANNEX 1-VII: FLOWCHARTS FOR PROJECT AND PROCESS RISK ASSESSMENTS




Hazard identification & Risk Assessment - Processes
Process owner (PO)
SHES Officer (SO)
UNIT HEAD (UH)
SHES Sector Head (SSH)
New or amended process
Fill LN F-0047
Send for review to SHES officer
Approved by SHES officer
Yes
Send for review to UNIT HEAD
No
Proposes amendments
Approved by UNIT HEAD
Yes
Sends for Review to SSH
No
Proposes amendments
Approved by SSH
No
Proposes amendments
Yes
Amends form
SHES file a paper copy in archive (with e-sigs).
End

ANNEX 1-VIII: AN EXAMPLE OF A HI&RA USING THE NEW DATABASE.

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HAZARD IDENTIFICATION & RISK ASSESSMENT IN PROJECTS (2009-0001)

(1) New Project

Author: Rozle Jakopic Date: 06/01/2009	Building: 010 Main Building
Unit/Sector: D04-IM-Isotope Measurements	Room/lab etc: 44

Project Identification and name : Microwave assisted acid digestion of soil samples with the MARS 5 microwave digestion system

Description of the work : Digestion of Soil samples (IAEA Soil-6, IAEA-135, IAEA-368, etc.) by microwave digestion system MARS 5 .
Approximately 0.1 g soil is pre-digested in the open digestion vessels with 4 ml conc. HNO3, 1 ml conc. H2O2 and 2 ml conc. HF. The vessels are then closed and placed into the microwave carousel according to the MARS 5 manual. All the preparation steps are done in the medium clean laboratory (MCL) in the Isotope Measurement Unit . The carousel with the closed vessels is transferred to the MARS 5 microwave digestion unit in the Main building for the microwave digestion (in order to avoid cross contamination with the samples of the other users of the instrument). After the microwave digestion the vessels are cooled for a few hours /overnight. The carousel with the closed vessels is transferred back to the medium clean laboratory (MCL) for further processing .
Types of equipment : Microwave digestion system MARS 5

Start on : 06/01/2009 Completed by : 31/01/2009

Project Leader : Rozle Jakopic
Project Team :
SHES Officer :
Laboratory and Building Responsible : Timotheos Altzitzoglou

Remarks (if applicable) : S:\D00-RS\SHES Public\08Bio&ChemSafety\MSDS

HAZARD IDENTIFICATION & RISK ASSESSMENT	0: Trivial (Not significant) 1: Normal (As for routine works) 2: Increased (Higher than for routine works)

	3: Acute (Stringent care needed)
(1) Fire or Explosion hazards (Hazards related to the use of heat generating equipment, hazards related to ncreased fire load or use of flammable or explosive products)	○ 0 ○ 1 ● 2 ○ 3
(2) Radiation exposure hazard (External exposure to radiation, internal contamination)	○ 0 ● 1 ○ 2 ○ 3
(3) Chemical hazard (Health hazards for chemical contamination, hazard for releases)	○ 0 ○ 1 ● 2 ○ 3
(4) Biological hazard (Health hazards for biological contamination, hazard for releases)	○ 0 ○ 1 ● 2 ○ 3
(5) Conventional safety related hazards (Hazard for accidents causing injuries, wounds, electrocution, ...)	○ 0 ○ 1 ● 2 ○ 3
(6) Inadvertent loss of hazardous material (non controlled escape of contaminated, activated or hazardous material or source)	○ 0 ○ 1 ● 2 ○ 3
(7) Waste and other environmental aspects (Production of nuclear or non nuclear waste, liquid releases, ...)	○ 0 ○ 1 ● 2 ○ 3

Legal Aspects (to be completed by SHES)
Regulatory requirements to be taken into consideration :

Risk Hazard nr.	Prevention Measures Field visible if score is ≥ 2
(1) Fire or Explosion hazards	*1. The MARS 5 instrument has following inherent prevention measures for the risk of explosion of vessels: safety membranes in the vessel lids which break in case of too high pressure as well as pressure and temperature monitor probes in the control vessel.* *2. Pre-digest samples for at least 15 min before closing the vessels in order to reduce high pressure build up in the vessels during the digestion.* *3. Always use MARS5 temperature and pressure control probe in the control vessel* *4. Do not proceed with the digestion program if an error message occurs (failure or problems with pressure or temperature probe or too high pressure or temperature)* *5. Monitor the pressure and the temperature during the digestion and abort program in case of a sudden pressure rise.* *6. Implement low power step (300W) combined with cooling step in the beginning of the program before using high power (1200 W)* *7. Do not use more than 0.5 g sample per digestion vessel.*

(3) Chemical hazard	The following concentrated acids are used for the digestion: nitric acid (HNO_3), hydrofluoric acid (HF), hydrogen peroxide (H_2O_2) ***1. Read each MSDS sheet carefully before commencing lab work.*** ***2. Wear a lab coat, goggles (safety spectacles, face shield, if appropriate) and gloves for all sample and chemical manipulation.*** ***3. Wear additional gloves when working with HF.*** ***4. The preparation of all acid solutions and other reagents needs to be carried out under the fume hood*** ***5. Store acid solutions and reagents in a ventilated chemical cupboard or in a fume hood whilst still in use.*** ***6. Follow prevention measures given in (1) Fire or Explosion hazards in order to prevent release of acid vapor.*** ***7. Re-energize vessel lids before running the microwave program to ensure that the vessels are tightly closed. The risk is minimal since the MARS5 system stops the heating program immediately in case of a sudden pressure loss in the control vessel***
(4) Biological hazard	None
(5) Conventional safety related hazards	***1. In order to avoid burns monitor temperature of the vessels on the display before removing the carousel out of the microwave system.*** ***2. See 6) points 2 and 3.***
(6) Inadvertent loss of hazardous material	***1. Follow prevention measures given in (1) Fire or Explosion hazards in order to prevent release of acid vapor.*** ***2. Place the closed vessels in a glovebox and allow to cool for several hours, before opening, to avoid acid spills and acid vapor escape.*** ***3. Transfer cool digestion vessel contents to volumetric (or other labware) either in the glovebox or under a fume hood.***
(7) Waste and other environmental aspects	All standards and sample waste arising from this work needs to be ***Handled according to IRMM PR 0192 and using the same personal protective equipment as described in 4.2*** ***Collect acid waste in the designated containers in the medium clean laboratory (MCL) where they are collected and disposed of regularly by the responsible for chemical waste disposal*** In the event of a spillage, the ensuing waste (gloves, used wipes etc) should be disposed of as follows: ***Place all used materials in the blue Solid Waste bin.***

Appended Documents (if applicable) :

Hold Points	
Contact project leader :	
Contact SHES Officer:	
Contact Laboratory and Building Responsible:	

Approval			
	Project Leader	Laboratory and Building Responsible	SHES Head of Sector
For Approval by:	Rozle Jakopic	Timotheos Altzitzoglou	
Date:			
Approval:	E Signature:	E Signature:	E Signature:

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ANNEX 1-IX PROTECTION OF THE ENVIRONMENT AT IRMM – ASPECT IDENTIFICATION AND SIGNIFICANCE ANALYSIS

The aim of the procedure "Protection of the Environment at IRMM – aspect identification and significance analysis" is to describe the methodology that leads to the identification of the aspects and impacts relevant to the environment and aims to allow a quantitative significance analysis of these aspects.

IDENTIFICATION

The first step involved identifying all the relevant activities, the result of which is shown in the main body (Table 10: IRMM Activities with possible environmental significance).

The second step was to decide upon the appropriate Environmental Aspects to be taken into consideration at IRMM. These were:

1) Pollution by waste: all IRMM
2) Primary energy consumption: all IRMM
3) Risk loss of hazardous material: IM unit, NP unit, RM unit, SHES sector
4) Environmental radiation exposure: NP unit
5) Noise to the environment and noise: ISM unit, RM unit
6) Air emissions: IM unit, RM unit, ISM unit, NP unit
7) Water emissions: ISM unit, RM unit
8) Use of general resources (other than primary ones already considered): RM unit, FSQ unit, IM unit
9) Risk soil contamination: ISM unit, FSQ, RM, IM units, SHES sector
10) Changes to the landscape and biotope (including the neighbourhood): ISM unit

The next phase involved discussions at unit level and at institute level to try and elaborate to which extent each of the identified environmental aspects could be considered as input or output to the processes (activities). An example of one of these environmental schemes (for one unit) is provided here as an illustration along with the legend for deciphering the scheme.

TABLE 1-X: LEGEND TO ACCOMPANY THE ENVIRONMENTAL SCHEME, SHOWN BELOW IN FIGURE 1-XI

Circumstances	Occurrence	Denoted by:	Weighting factor (Casp)
Normal condition:	Continuously ongoing.	——→	1
Abnormal condition:	At a frequency rate of approximately once a year to once every five years.	– – –→	0.5
Emergency situation:	Occurring approximately once every fifty years.	·····→	0.2

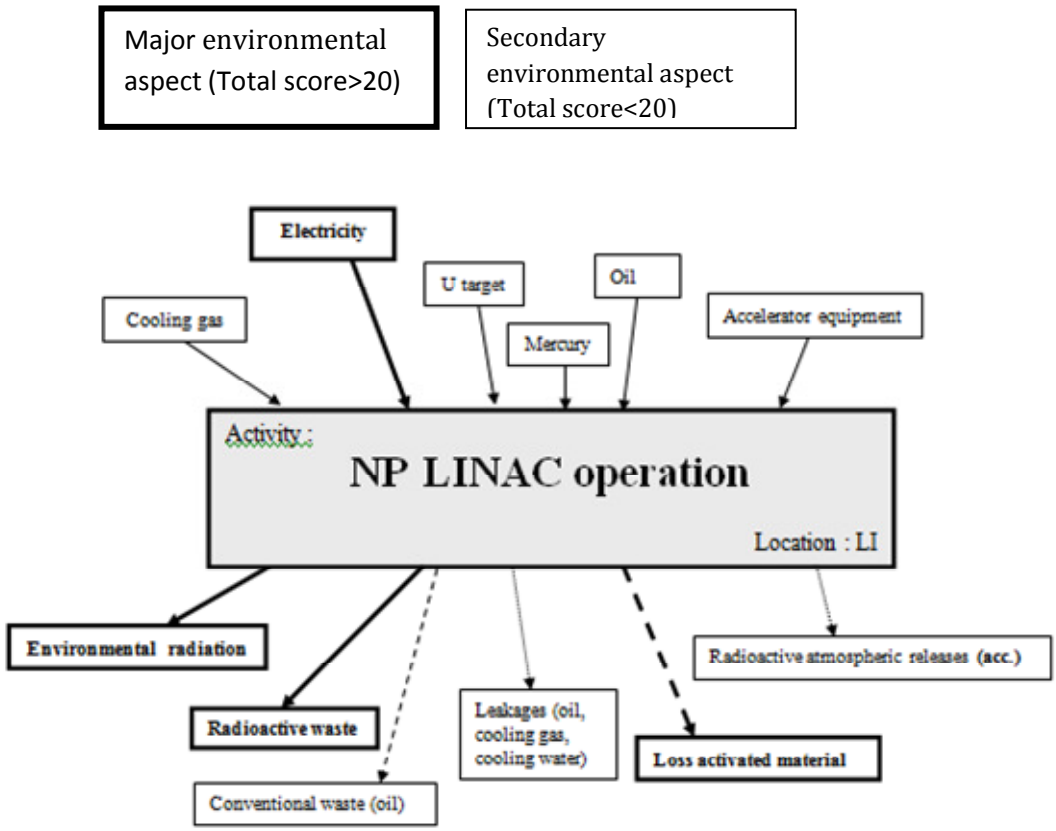

FIGURE 1-XI: ENVIRONMENTAL SCHEMES -FOR ONE UNIT (NP) AND ONE PROCESS (LINAC OPERATION).

For each of these aspects following information is listed:

- Site (building) where this aspect is applicable
- Condition for which this aspect is applicable
  - -normal condition: continuously ongoing
  - -abnormal condition: at a frequency rate of approximately once a year to once every five years
  - -emergency situation: occurring approximately once every fifty years
- Details: description of the aspect
- Impact on the environment

A detailed graphical illustration (including all sub-aspects) is shown in the main report (Figure 11)

SIGNIFICANCE ANALYSIS:

Having identified the relevant environmental aspects, the next stage was to elucidate their importance. This was done by means of attributing weighting to each aspect as follows:

Five criteria were applied, each of them appointed a weight depending on its importance for IRMM's environmental management system:

Criterium	Weight (Wcrit)
Ecological impact	2
Risk of regulatory deviation	3
(Is part of)EC, JRC, IRMM Policy	2
Impact on IRMM image	2
Cost	1

The significance of every aspect is analysed by considering the relevance of the criteria vs. the aspect (Rcrit,asp) and by multiplying the Rcrit,asp with the respective weight factor (Wcrit).

In the last phase of the scoring, the applicable condition (Casp) is taken into consideration (see Table 1-X)

The significance score (Sasp):

$$\text{Score Sasp} = \text{Casp} \times \text{Sum} [\text{Wcrit} \times \text{Rcrit,asp}]$$

The detailed results of the significance analysis are stored in the Lotus Notes based 'EMS aspects register' and are summarized here in Annex 1-XII: IRMM activities and their respective environmental aspect scores (1/3 tables). Depending on the outcome of the significance analysis, more or less attention is then dedicated to controlling and monitoring the requirements to reduce it and to the yearly planning of remedial actions. See Figure 11: IRMM's Environmental aspects and their weighted scores

ANNEX 1-XII: IRMM ACTIVITIES AND THEIR RESPECTIVE ENVIRONMENTAL ASPECT SCORES (1/3 TABLES)

See Figure 11: IRMM's Environmental aspects and their weighted scores

Activity	Condition	Ecological significance	Regulatory significance	Significance for the JRC/IRMM policy	Significance for IRMM image	Costs	Score	Probability weighting	Total score	Conclusion
Waste-Radioactive-IM	N	5	5	2	10	10	59	1	59	Further improve waste characterization
Energy-Warm water provision-ISM	N	5	5	5	2	10	49	1	49	Plan energy conservation strategy
Energy-Chillers-ISM	N	5	5	5	2	10	49	1	49	Plan energy conservation strategy
Energy-Sanitary water distribution-ISM	N	5	5	5	2	5	44	1	44	Plan energy conservation strategy
Waste-Radioactive-NP Linac	N	5	5	2	5	5	44	1	44	Further improve waste characterization
Noise-Chillers-ISM	N	2	5	2	10	0	43	1	43	Remedial actions
Noise-Cooling towers-ISM	N	2	5	2	10	0	43	1	43	Remedial actions
Noise-Compressed air distribution-ISM	N	2	5	2	10	0	43	1	43	Remedial actions
Air emissions-Legionella in cooling towers-ISM	N	5	5	0	5	5	40	1	40	Further improve control measures
Waste-Radioactive-IM	N	2	5	2	5	5	38	1	38	Further improve waste characterization
Risk loss of Haz Mat-radioactive source-IM	A	2	10	10	10	2	76	0.5	38	Further improve general housekeeping of the site, further implement accountancy radioactive material
Risk loss of Haz Mat-Activated material-NP Linac	A	2	10	10	10	2	76	0.5	38	Further improve general housekeeping of the site, further implement accountancy radioactive material
Waste-Radioactive-VdG	A	2	10	10	10	2	76	0.5	38	Further improve general housekeeping of the site, further implement accountancy radioactive material
Risk loss of Haz Mat-Radioactive source-NP VdG	N	2	5	2	5	5	38	1	38	Further improve waste characterization
Risk loss of Haz Mat-Radioactive source-SHES	A	2	10	10	10	2	76	0.5	38	Further improve general housekeeping of the site, further implement accountancy radioactive material
Energy-compressed air distribution-ISM	N	5	2	5	2	5	35	1	35	Plan energy conservation strategy
Environmental radiation exposure-VdG operation-NP	N	2	5	2	5	2	35	1	35	Further improve control and monitoring measures
Energy-medium voltage power distribution-ISM	N	2	5	5	0	5	34	1	34	Plan energy conservation strategy
Energy-Cooling towers-ISM	N	2	2	5	2	10	34	1	34	Plan energy conservation strategy
Energy-Humidifiers-ISM	N	2	2	5	2	10	34	1	34	Plan energy conservation strategy

Table 2/3

Activity	Condition	Ecological significance	Regulatory significance	Significance for the JRC/IRMM policy	Significance for IRMM image	Costs	Score	Probability weighting	Total score	Conclusion
Noise-Diesel Generators-ISM	N	2	5	2	5	0	33	1	33	No immediate action
Waste-Chemical-FSQ	N	5	2	2	5	2	32	1	32	Further improve waste characterization
Energy-Street lighting-ISM	N	2	5	2	2	5	32	1	32	Plan energy conservation strategy
Energy-Building lighting-ISM	N	2	5	2	2	5	32	1	32	Plan energy conservation strategy
Risk loss of Haz Mat-Radioactive source-NP Linac	A	2	5	10	10	2	61	0.5	31	Further improve general housekeeping of the site, further implement accountancy radioactive material
Noise-Cooled storage compressors-RM	N	2	5	0	5	0	29	1	29	Remedial actions
Soil contamination risk-Drainage polluted water-ISM	N	2	5	2	2	2	29	1	29	No immediate action
Energy-UPS power distribution-ISM	N	2	2	5	2	5	29	1	29	Plan energy conservation strategy
Water emissions-Household and industrial effluents-ISM	N	5	2	2	2	5	29	1	29	No immediate action
Waste-Lead-ISM	N	5	5	0	0	2	27	1	27	No immediate action
General resource use-Chemicals - FSQ	N	2	2	2	5	2	26	1	26	No immediate action
Energy-Workshop activities-ISM	N	2	2	5	2	2	26	1	26	Plan energy conservation strategy
Environmental radiation exposure-Linac operation-NP	N	2	2	2	5	2	26	1	26	Further improve control and monitoring measures
Noise-Sawing machine-ISM	N	2	5	2	0	0	23	1	23	No immediate action
General resource use-Water-Cooling towers-ISM	N	2	2	2	2	5	23	1	23	No immediate action
General resource use-Water-Sanitary water-ISM	N	2	2	2	2	5	23	1	23	No immediate action
Waste-Chemical-RM	N	2	2	2	2	5	23	1	23	Further improve waste characterization
Energy-Linac Operation-NP	N	2	0	2	2	10	22	1	22	Further improve control measures
Soil contamination risk-Controlled area aqueous effluents-ISM	A	2	5	5	5	2	41	0.5	20.5	Further improve control measures
Waste-Chemical-IM	N	2	2	2	2	2	20	1	20	No immediate action
Energy-Heating, venting and airco-IRMM	N	5	0	2	0	5	19	1	19	Plan energy conservation strategy
Air emissions-Release of radioactive dust-IM	E	10	10	5	10	10	90	0.2	18	Not significant
Air emissions-Accidental radioactive atmospheric release-Linac operation-NP	E	5	10	10	10	10	90	0.2	18	Not significant

Table 3/3

Activity	Condition	Ecological significance	Regulatory significance	Significance for the JRC/IRMM policy	Significance for IRMM image	Costs	Score	Probability weighting	Total score	Conclusion
Energy-CRM Storage-RM	N	2	0	2	2	5	17	1	17	Not significant
Air emissions-Chiller coolant replacement-ISM	A	5	5	2	0	5	34	0.5	17	Not significant
Energy-VdG operation-NP	N	2	0	2	2	5	17	1	17	Not significant
Waste-Conventional-Cleaning-ISM	N	5	0	2	0	2	16	1	16	Not significant
Waste-Conventional-Paper-ISM	N	5	0	2	0	2	16	1	16	Not significant
Risk Landscape,Biotope-Building constructions-ISM	A	10	2	0	2	2	32	0.5	16	Not significant
Air emissions-Biohazardous atmospheric release-RM	E	10	10	2	10	5	79	0.2	16	Not significant
Soil contamination risk-Leakages of oil, coolants-ISM	A	2	5	2	2	2	29	0.5	14.5	Not significant
Air emissions-SF6 and CO2 leakages-VdG operation-NP	A	2	5	2	2	2	29	0.5	15	Not significant
Risk loss of Haz Mat-Contaminated components-VdG-NP	E	5	5	10	10	5	70	0.2	14	Not significant
Waste-Batteries-ISM	A	5	5	0	0	2	27	0.5	13.5	Not significant
Water emissions-Biohazardous liquid release-RM	E	5	10	0	10	5	65	0.2	13	Not significant
Waste-Workshop activities-ISM	N	2	2	0	0	2	12	1	12	Not significant
Energy-Use of fuel-ISM	N	2	2	0	0	2	12	1	12	Not significant
Waste-Special waste-INF	N	2	0	2	0	2	10	1	10	Not significant
Energy-Building constructions-ISM	A	2	0	5	2	2	20	0.5	10	Not significant
General resource use-Water-Building constructions-ISM	A	2	2	2	2	2	20	0.5	10	Not significant
Risk Smell-Storage of chemical products (paint, thinner, glue,oil, etc.)-ISM	N	2	2	0	0	0	10	1	10	Not significant
Soil contamination Risk-Effluents from fire extinguishing-SHES	A	0	2	0	0	2	8	1	8	Not significant
Waste-Conventional-Packaging-ISM	A	2	2	0	0	2	12	0.5	6	Not significant
Air emissions-Painting works and PVC floor (solvents)-ISM	A	2	2	0	0	2	12	0.5	6	Not significant

IRMM HSE risk and impact ranking (PR/0023)

General risk ranking method

S : SERIOUSNESS					Value
	personnel		**cost**	**irmm image**	
Small	injury without sick-leave	external contamination	< 500 euro	no negative publicity	1
Important	injury with sick-leave	contamination with positive internal indication	500-5.000 euro	DG level	3
Serious	permanent injury	internal contamination needing medical care	50.000-500.000 euro	negative press release	7
Very serious	one casualty	many serious internal contaminations	500.000-5.000.000 euro	major press agitation	15
Catastrophe	many casualties	n/a	> 5.000.000 euro	closure IRMM	40

x

F : FREQUENCY OF EXPOSURE	Value
Very seldom (less than once a year)	0,5
Seldom (about yearly)	1
Monthly	2
Weekly	3
Regularly (about once a day)	6
Continuously	10

x

P : PROBABILITY OF OCCURENCE	Value
Almost impossible	0,2
Possible but not probable	0,5
Possible in border cases	1
Unusual	3
Probable	6
To be expected	10

=

R = S x F x P : RISK RANKING	
R < 20	**Limited risk - acceptable**
20 < R < 70	**Attention required**
70 < R < 200	**Measures required**
200 < R < 400	**Immediate measures required**
R > 400	**Stop activity**

Note: This ranking method (Kinney method) does not apply for the "waste and environmental aspects". Latter impact ranking system explained below.

Environmental impact ranking

Env : environmental impact		weigh 2 x
Small	small quantities, low risk	2
Medium	important quantities + low risk or small quantities + high risk	5
High	important quantities + high risk	10

+

Leg : risk for a regulatory deviation		weighte 3 x
Small	regulatory deviation is not probable or has no consequences	2
Medium	regulatory deviation is possible and has limited consequences	5
High	regulatory deviation is possible and has serious consequences	10

+

Pol : EC, JRC, IRMM policy		weighte 2 x
Small	is not a major EC or JRC concern or is not part of the IRMM HSE commitment	2
Medium	is part of the IRMM HSE commitment	5
High	is part of IRMM HSE commitment and is a specific concern expressed by EC or JRC	10

+

Ima : IRMM image		weighte 1 x
Small	has only a potential impact on IRMM image	2
Medium	has a limited impact on the IRMM image	5
High	has a major impact on IRMM image	10

+

euro : cost of the environmental impact		weighte 1 x
Small	< 100 euro/year	2
Medium	100 - 10.000 euro/year	5
High	> 10.000 euro/year	10

=

R = 2 x Env + 3 x Leg + 2 x Pol + 1 x Ima + 1 x euro : (weighted) IMPACT RANKING	
R < 20	**Limited risk - acceptable**
20 < R < 50	**Attention required**
R > 50	**Measures required**

"FIRE OR EXPLOSION" RISK RANKING, ACCOMMODATING BEFORE AND AFTER PREVENTIVE MEASURE VALUES.

EUROPEAN COMMISSION
DIRECTORATE GENERAL JRC
JOINT RESEARCH CENTRE
Institute for Reference Materials and Measurements
IRMM

Date :
Process owner :
RS officer :

IRMM check-list for HSE risk assessments

FIRE or EXPLOSION hazards

Process:
Equipment or sub-process :

1) Possible causes of FIRE	Y/N	estimated risk without specific measures				specific measures to be taken	estimated risk with specific measures			
		S	F	P	R		S	F	P	R
flammable liquids										
flammable material (paper, plastic,...)										
electrical										
mechanical sparks (cutting devices)										
heating source(s)					0					0
open flame										
other cause :										

2) Possible causes of EXPLOSION	Y/N	estimated risk without specific measures				specific measures to be taken	estimated risk with specific measures			
		S	F	P	R		S	F	P	R
explosive gas atmosphere										
explosive dust mixture										
electrical spark(s)										
electrostatic electricity										
heating source(s)										
mechanical spark(s)					0					0
lightning										
flame										
other cause :										

"RADIATION EXPOSURE" RISK RANKING, ACCOMMODATING BEFORE AND AFTER PREVENTIVE MEASURE VALUES.

EUROPEAN COMMISSION
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JOINT RESEARCH CENTRE
Institute for Reference Materials and Measurements
IRMM

Date : 0
Process owner : 0
RS officer : 0

IRMM check-list for HSE risk assessments

RADIATION exposure hazard

Process: 0
Products (isotope and activity) : 0

a) External exposure	Y/N	estimated risk without specific measures			specific measures to be taken	estimated risk with specific measures		
		µSv/h	h	mSv		µSv/h	h	mSv
average gamma dose rate				0				0
average neutron dose rate				0				0

b) Incidental internal contamination hazard	Y/N	estimated risk without specific measures				specific measures to be taken	estimated risk with specific measures			
		S	F	P	R		S	F	P	R
by inhalation					0					0
by wound					0					0
by ingestion					0					0

"CHEMICAL AND BIOLOGICAL HEALTH HAZARD" RISK RANKING, ACCOMMODATING BEFORE AND AFTER PREVENTIVE MEASURE VALUES

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JOINT RESEARCH CENTRE
Institute for Reference Materials and Measurements
IRMM

Date :	0
Process owner :	0
RS officer :	0

IRMM check-list for HSE risk assessments

CHEMICAL and BIOLOGICAL health hazard

Process:	0
Products (and handled quantities) :	0

1) Incidental chemical contamination hazard	**Y/N**	***estimated risk without specific measures***				**specific measures to be taken**	***estimated risk with specific measures***			
		S	**F**	**P**	**R**		**S**	**F**	**P**	**R**
by inhalation					**0**					**0**
by wound					**0**					**0**
by ingestion					**0**					**0**
2) Incidental biological contamination hazard	**Y/N**	***estimated risk without specific measures***				**specific measures to be taken**	***estimated risk with specific measures***			
		S	**F**	**P**	**R**		**S**	**F**	**P**	**R**
by inhalation					**0**					**0**
by wound					**0**					**0**
by ingestion					**0**					**0**

"INADVERTENT LOSS OF RADIOACTIVE MATERIAL" RISK RANKING, ACCOMMODATING BEFORE AND AFTER PREVENTIVE MEASURE VALUES

EUROPEAN COMMISSION
DIRECTORATE GENERAL JRC
JOINT RESEARCH CENTRE
Institute for Reference Materials and Measurements
IRMM

Date :	0
Process owner :	0
RS officer :	0

IRMM check-list for HSE risk assessments

Inadvertent LOSS of radioactive material

Process:	0
Equipment or sub-process :	0

Possible situations or events	**Y/N**	***estimated risk without specific measures***				**specific measures to be taken**	***estimated risk with specific measures***			
		S	**F**	**P**	**R**		**S**	**F**	**P**	**R**
loss of sealed or unsealed source					**0**					**0**
non controlled 'escape' of activated material					**0**					**0**
non controlled 'escape' of contaminated material					**0**					**0**
non controlled evacuation of non empty (transport) package					**0**					**0**
other cause :					**0**					**0**
					0					**0**

"CONVENTIONAL SAFETY RELATED HAZARDS" RISK RANKING, ACCOMMODATING BEFORE AND AFTER PREVENTIVE MEASURE VALUES

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JOINT RESEARCH CENTRE
Institute for Reference Materials and Measurements
IRMM

Date :	0
Process owner :	0
RS officer :	0

IRMM check-list for HSE risk assessments

CONVENTIONAL safety related hazards

Process:	0
Equipment or sub-process :	0

1) Mechanical hazards	**Y/N**	***estimated risk without specific measures***				**specific measures to be taken**	***estimated risk with specific measures***			
		S	**F**	**P**	**R**		**S**	**F**	**P**	**R**
injury by cutting or puncture					0					0
injury by crushing					0					0
injury by drawing-in or trapping					0					0
injury by impact of object					0					0
injury by falling from height					0					0
injury by high pressure fluid					0					0
other hazard :					0					0
					0					0
					0					0

2) Electrical hazards	**Y/N**	***estimated risk without specific measures***				**specific measures to be taken**	***estimated risk with specific measures***			
		S	**F**	**P**	**R**		**S**	**F**	**P**	**R**
contact with low voltage (< 1000 V)					0					0
approach high voltage (> 1000 V)					0					0
contact equipment faulty under tension					0					0
injury by (thermal) short cut reaction					0					0
other hazard :					0					0
					0					0

3) Thermal hazards	**Y/N**	***estimated risk without specific measures***				**specific measures to be taken**	***estimated risk with specific measures***			
		S	**F**	**P**	**R**		**S**	**F**	**P**	**R**
burns by heat sources					0					0
burns by excessive low temperature					0					0
other hazard :					0					0
					0					0

4) Other physical agents	**Y/N**	***estimated risk without specific measures***				**specific measures to be taken**	***estimated risk with specific measures***			
		S	**F**	**P**	**R**		**S**	**F**	**P**	**R**
excessive noise (> 80 dBA)					0					0
excessive vibrations					0					0
ultraviolet radiation					0					0
laser beam					0					0
other hazard :					0					0
					0					0

5) Ergonomics and work environment	**Y/N**	***estimated risk without specific measures***				**specific measures to be taken**	***estimated risk with specific measures***			
		S	**F**	**P**	**R**		**S**	**F**	**P**	**R**
unhealthy postures or excessive effort					0					0
inadequate lighting					0					0
annoying noise					0					0
inadequate ergonomic design					0					0
excessive high ambiant temperature					0					0
low ambiant temperature					0					0
other hazard :					0					0
					0					0
					0					0

"WASTE AND ENVIRONMENTAL ASPECTS" RISK RANKING, ACCOMMODATING BEFORE AND AFTER PREVENTIVE MEASURE VALUES

EUROPEAN COMMISSION
DIRECTORATE GENERAL JRC
JOINT RESEARCH CENTRE
Institute for Reference Materials and Measurements
IRMM

Date : 0
Process owner : 0
RS officer : 0

IRMM check-list for HSE risk assessments

WASTE and ENVIRONMENTAL aspects

Process:

Equipment or sub-process :

1) Solid and liquid waste production	Y/N	*estimated IMPACT without specific measures*						specific measures to be taken
		Env	Leg	Pol	Ima	€	R	
solid or liquid radioactive waste							0	
hazardous chemical waste							0	
hazardous biological waste							0	
conventional waste (paper, plastic, …)							0	
liquid radioactive suspected effluents (B02)							0	
liquid chemical suspected effluents							0	
liquid biohazardous suspected effluents							0	
other waste :							0	
							0	
2) Incidental liquid or atmospheric releases	**Y/N**	*estimated IMPACT without specific measures*						specific measures to be taken
		Env	Leg	Pol	Ima	€	R	
incidental atmospheric radioactive release							0	
incidental release of chemical products								
incidental release of biohazardous products							0	
soil contamination by leakage or spillage							0	
other releases :							0	
							0	
3) Consumption of energy and resources	**Y/N**	*estimated IMPACT without specific measures*						specific measures to be taken
		Env	Leg	Pol	Ima	€	R	
electricity consumption							0	
heating or cooling consumption								
water consumption							0	
use of valuable natural resources							0	
other consumption :							0	
							0	
4) Other environmental nuisances	**Y/N**	*estimated IMPACT without specific measures*						specific measures to be taken
		Env	Leg	Pol	Ima	€	R	
environmental radiation							0	
noise to the vicinty							0	
inadvertent loss of GMO material							0	
modification fauna/flora of the site							0	
other nuisance :							0	
							0	

UNIVERSITEIT ANTWERPEN MANAGEMENT SCHOOL

1-XIV: INTERVIEW OF CONTRACT AGENTS (CA) ON DEPARTURE. DATE: _____

INSTITUTE/UNIT: _____

Interviewee details: M/F; Country of origin: _____

Mother tongue: _____; First foreign language: _____; Other languages:_____

Educational level: Secondary O; Tertiary Technical O; BSc O; MSc O;PhD O; Age:_____; Contract duration & type:_____

Safety aspect	Questions	Answers
SITE SHE INDUCTION	How was the safety induction carried out? How was institute wide safety training?	Security issue explanation? **Y / N** Emergency instruction explanation? **Y / N** Site tour? **Y / N** Interval after arrival? Annual emergency training whilst in IRMM? **Y / N** Other institute wide safety trainings? **Y / N** If yes, which?
UNIT SHE INDUCTION	What did the Unit tour consist of?	Explanation of Chemical Spill treatment? **Y / N** Tour of Eye wash/safety shower locations? **Y / N** PPE available shown/provided? **Y / N** Safe Handling & Storage of dangerous substances procedure (IRMM PR 0053) explanation? **Y / N** Waste management at IRMM procedure (PR 0192) explanation? **Y / N** Risk Assessment involvement? **Y / N** Purchase code explanation? **Y / N** Awareness of MSDS library? **Y / N**
Language & Communication	How were language issues (if any) dealt with? How were cultural differences handled (within team, with supervisor)?	Is appropriate language training available? **Y / N** Cultural differences:
Supervision	How was the supervision in the first month in terms of safety awareness (e.g. adequately familiar with instruments, lab environment, nature of hazards before being left alone)?	SHE part of analytical procedure? **Y/N**
Near incidents and incidents	How were near incidents and incidents reported (if reported).	
Safety culture	Describe how you perceive the level of safety culture to be?	Low □, Medium □, High □

UNIVERSITEIT ANTWERPEN MANAGEMENT SCHOOL

1-XV: INTERVIEW OF PROJECT LEADER (HIERARCHICAL LINE) DATE: _____

INSTITUTE/UNIT: _____

Interviewee details: M/F; Country of origin: _____

Mother tongue: _____; First foreign language: _____; Other languages:_____

Educational level: Secondary O; Tertiary Technical O; BSc O; MSc O;PhD O; ENGINEERING (Type)_____ Age:_____; Contract duration & type:_____

Safety aspect	Questions	Answers
UNIT SHE INDUCTION	What unit SHE induction arrangements are made for a new contractual agent? What does the Unit tour consist of?	Explanation of Chemical Spill treatment? **Y / N** Tour of Eye wash/safety shower locations? **Y / N** PPE available shown/provided? **Y / N** Safe Handling & Storage of dangerous substances procedure (IRMM PR 0053) explanation? **Y / N** Waste management at IRMM procedure (PR 0192) explanation? **Y / N** Risk Assessment involvement? **Y / N** Purchase code explanation? **Y / N** Awareness of MSDS library? **Y / N**
Language & Communication	How are language issues (if any) dealt with? How are cultural differences handled (within team, with supervisor)?	Is appropriate language training available? **Y / N** Cultural differences:
Supervision	Do you see SHE induction as part of your role as PL? What means do you use to assess the level of supervision the new TA will need? How do you test that the new TA is adequately familiar with instruments, lab environment, nature of hazards before being left alone?	SHE induction as part of PL role? **Y/N** Supervision assessment tools; Successful functionality test performance (under supervision) **Y/N**; Check on good laboratory practice (waste treatment, hazardous substance manipulation etc) Y/N; SHE part of analytical procedure? **Y/N**.
Near incidents and incidents	How are near incidents and incidents reported (if reported).	
Safety culture	Describe how you perceive the level of safety culture to be?	Low □, Medium □, High □

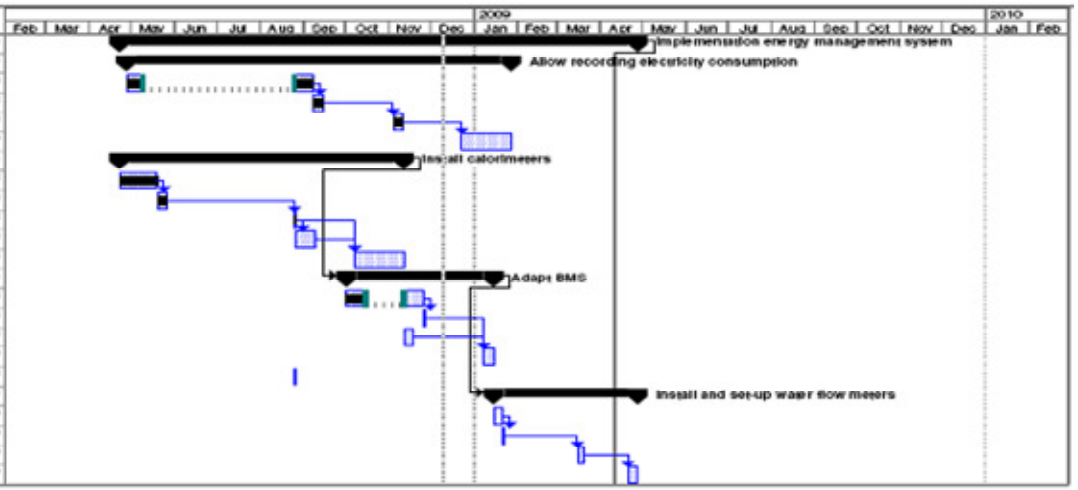
UNIVERSITEIT ANTWERPEN MANAGEMENT SCHOOL

1-XVI: INTERVIEW OF ACTION LEADERS ; FUNCTION:_____ ; DATE: _____
INSTITUTE/UNIT: _____
Interviewee details: M/F; Country of origin: _____
Mother tongue: _____; First foreign language: _____; Other languages:_____
Educational level: Tertiary Technical O; BSc O; MSc O;PhD O; ENGINEERING (Type)_____

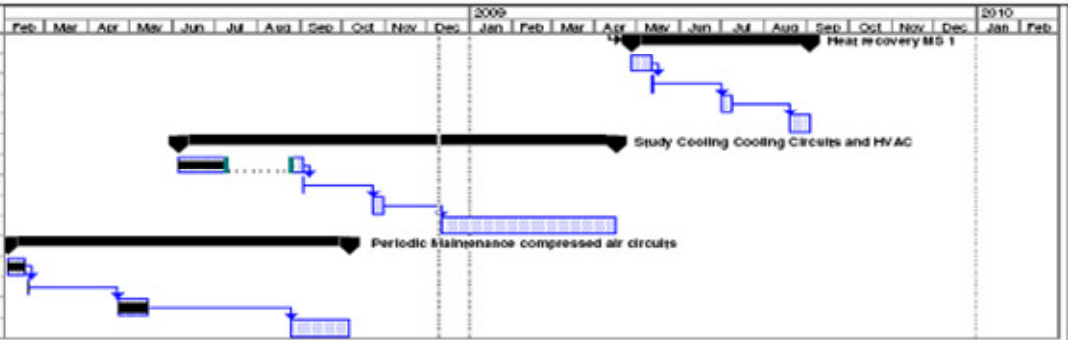
Safety aspect	Questions	Answers
SITE SHE INDUCTION	How is safety induction carried out? Is there institute wide safety training?	Security issue explanation? **Y / N** Emergency instruction explanation? **Y / N** Site tour? **Y / N** Normal Interval after arrival? Annual emergency training in IRMM? **Y / N** Other institute wide safety trainings? **Y / N** If yes, which?
UNIT SHE INDUCTION	1) Are Unit Heads provided instruction as to their SHE responsibilities? If so, how? 2) Do Unit Heads instruct Project Leaders of their SHE responsibility? If so, how?	1) 2)
Language & Communication	1) How are language issues (if any) dealt with? 2) How are cultural differences handled (within team, with supervisor)?	1) Is appropriate language training available? **Y / N** 2) Cultural differences:
Supervision	1) How are Project Leaders "supervised"? 2) Is there a reward system (e.g. more CDR points) for extra SHE awareness/duties?	1) 2)
Near incidents and incidents	1) How are near incidents and incidents reported (if reported). 2) Are SHE issues dealt with in the management review?	1) 2)
Safety culture	Describe how you perceive the level of safety culture to be?	Low □, Medium □, High □

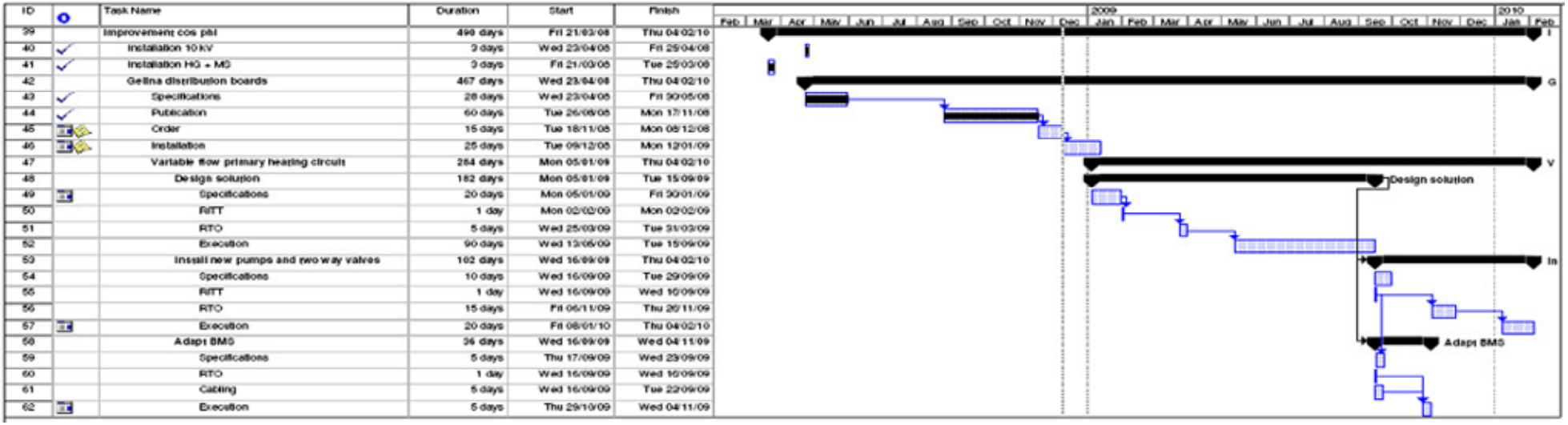
1-XVII: ACTION PLAN FOR THE 2009 ENERGY CONSERVATION MEASURES – ESTABLISHED BY THE ISM UNIT.

ID	Task Name	Duration	Start	Finish
1	Implemenssation energy managemens syseem	264 days	Wed 23/04/08	Mon 27/04/09
2	Allow recording elecricity consumption	196,5 days	Mon 28/04/08	Tue 27/01/09
3	Specifications	19 days	Mon 28/04/08	Mon 05/09/08
4	RITT	5 days	Mon 08/09/08	Mon 15/09/08
5	RTO	5 days	Tue 04/11/08	Tue 11/11/08
6	Execution	25 days	Tue 23/12/08	Tue 27/01/09
7	Insall calortmeers	145 days	Wed 23/04/08	Tue 11/11/08
8	Specifications	19 days	Wed 23/04/08	Mon 19/05/08
9	RITT	5 days	Tue 20/05/08	Mon 26/05/08
10	RTO	1 day	Tue 26/08/08	Tue 26/08/08
11	Cabling	10 days	Wed 27/08/08	Tue 09/09/08
12	Execution	25 days	Wed 08/10/08	Tue 11/11/08
13	Adapt BMS	75 days	Thu 02/10/08	Wed 14/01/09
14	Specifications	20 days	Thu 02/10/08	Tue 28/11/08
15	RTO	1 day	Wed 26/11/08	Wed 26/11/08
16	Cabling	6 days	Wed 12/11/08	Tue 18/11/08
17	Execution	5 days	Thu 08/01/09	Wed 14/01/09
18	Nominate and define task of "Energy liaison"	1 day	Tue 26/08/08	Tue 26/08/08
19	Insall and set-up waser flow meers	72 days	Thu 15/01/09	Mon 27/04/09
20	Specifications	5 days	Thu 15/01/09	Wed 21/01/09
21	RITT	1 day	Thu 22/01/09	Thu 22/01/09
22	RTO	5 days	Mon 16/03/09	Fri 20/03/09
23	Execution	5 days	Tue 21/04/09	Mon 27/04/09



ID	Task Name	Duration	Start	Finish
24	Heat recovery MS 1	92 days	Tue 28/04/09	Wed 02/09/09
25	Specifications	10 days	Tue 28/04/09	Mon 11/05/09
26	RITT	1 day	Tue 12/05/09	Tue 12/05/09
27	RTO	5 days	Thu 02/07/09	Wed 08/07/09
28	Execution	10 days	Thu 20/08/09	Wed 02/09/09
29	Study Cooling Cooling Circuits and HVAC	225 days	Fri 06/06/08	Thu 16/04/09
30	Specifications	90 days	Fri 06/06/08	Tue 02/09/08
31	RITT	1 day	Wed 03/09/08	Wed 03/09/08
32	RTO	5 days	Fri 24/10/08	Thu 30/10/08
33	Execution	90 days	Fri 12/12/08	Thu 16/04/09
34	Periodic Maimenance compressed air circuits	176 days	Mon 04/02/08	Mon 06/10/08
35	Specifications monitoring equipment	10 days	Mon 04/02/08	Fri 15/02/08
36	RITT	1 day	Mon 18/02/08	Mon 18/02/08
37	RTO	15 days	Wed 23/04/08	Tue 13/05/08
38	Implenentation	90 days	Tue 26/08/08	Mon 06/10/08




ID
Task Name
Duration
Start
Finish
39 Improvement cos pbl 490 days Fri 21/03/08 Thu 04/02/10
40 Installation 10 kV 3 days Wed 23/04/08 Fri 25/04/08
41 Installation HG + MG 3 days Fri 21/03/08 Tue 25/03/08
42 Gellna distribution boards 467 days Wed 23/04/08 Thu 04/02/10
43 Specifications 28 days Wed 23/04/08 Fri 30/05/08
44 Publication 60 days Tue 26/08/08 Mon 17/11/08
45 Order 15 days Tue 18/11/08 Mon 08/12/08
46 Installation 25 days Tue 09/12/08 Mon 12/01/09
47 Variable flow primary heating circuit 284 days Mon 05/01/09 Thu 04/02/10
48 Design solution 182 days Mon 05/01/09 Tue 15/09/09
49 Specifications 20 days Mon 05/01/09 Fri 30/01/09
50 RITT 1 day Mon 02/02/09 Mon 02/02/09
51 RTO 5 days Wed 25/03/09 Tue 31/03/09
52 Execution 90 days Wed 13/05/09 Tue 15/09/09
53 Install new pumps and two way valves 102 days Wed 16/09/09 Thu 04/02/10
54 Specifications 10 days Wed 16/09/09 Tue 29/09/09
55 RITT 1 day Wed 16/09/09 Wed 16/09/09
56 RTO 15 days Fri 06/11/09 Thu 26/11/09
57 Execution 20 days Fri 08/01/10 Thu 04/02/10
58 Adapt BMS 36 days Wed 16/09/09 Wed 04/11/09
59 Specifications 5 days Thu 17/09/09 Wed 23/09/09
60 RTO 1 day Wed 16/09/09 Wed 16/09/09
61 Cabling 5 days Wed 16/09/09 Tue 22/09/09
62 Execution 5 days Thu 29/10/09 Wed 04/11/09
2009
2010
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb
Design solution
Adapt BMS

TRIPLE CERTIFICATION – ISO 9001

CERTIFICATE

TÜV CERT

Management system as per
DIN EN ISO 9001 : 2000

In accordance with TÜV CERT procedures, it is hereby certified that

JRC
EUROPEAN COMMISSION

IRMM - Institute for Reference Materials and Measurements
Retieseweg 111
2440 Geel
Belgium

irmm
Institute for Reference Materials and Measurements

applies a management system in line with the above standard for the following scope

Execution and management of research and development activities towards highest quality measurement standards, to support European policies in the areas of life sciences, food, environment, agriculture, health, industrial competitiveness, nuclear safety and security

Certificate Registration No. 44 100 060617
Audit Report No. 3501 9999

Valid until 2011-01-20

G. Brüntigam
TÜV CERT Certification Body
at TÜV NORD CERT GmbH

Essen, 2008-01-21

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TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen www.tuev-nord-cert.com

IAF
TGA-ZM-30-96-00

TÜV NORD

TRIPLE CERTIFICATION – ISO 14001

CERTIFICATE

TÜV CERT

Management system as per
DIN EN ISO 14001 : 2005

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Retieseweg 111
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irmm
Institute for Reference Materials and Measurements

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Audit Report No. 3502 0030

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TGA-ZM-30-96-60

TÜV NORD

CERTIFICATE

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OHSAS 18001 : 1999

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Retieseweg 111
2440 Geel
Belgium

irmm
Institute for Reference Materials and Measurements

applies a management system in line with the above standard for the following scope

Execution and management of research and development activities towards highest quality measurement standards, to support European policies in the areas of life sciences, food, environment, agriculture, health, industrial competitiveness, nuclear safety and security

Certificate Registration No. 44 116 066017
Audit Report No. 3502 0031

Valid until 2011-01-20

B. Meyer

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SWISS CERTIFICATION
SCESm 098

TÜV NORD

European Commission

EUR 23960EN – Joint Research Centre – Institute for Reference Materials and Measurements
Title: An integrated OHSAS 18001, ISO 14001 and ISO 9001 Management System in the Institute for Reference Materials and Measurements
Author: Josephine McCourt.
Luxembourg: Office for Official Publications of the European Communities
2009 – 161 pp. – 21.0 x 29.7 cm
EUR – Scientific and Technical Research series – ISSN 1018-5593
ISBN 978-92-79-13057-1
DOI 10.2787/14277

Abstract
In today's company climate, certification and/or accreditation by an appropriate body is becoming the norm. There are many reasons to explain this tendency and in IRMM's case (Institute for Reference Materials and Measurements, one of the European Commission's Joint Research Centre's (JRC) seven institutes), these were so as to enhance safety, health, environmental and security performances; assure compliance with regulatory requirements and with EC policies; improve customer satisfaction (quality); enhance image of the institute and improve cost efficiency.
IRMM can be considered as similar, in some ways, to EU Member State national laboratories but being at EU level and having the other "Directorates-General" (DGs) of the Commission as customers. These customers need to be able to categorically state that the measurements carried out in the JRC laboratories are of top quality and that in striving to obtain these high quality results, all environmental and occupational health and safety regulations of the Commission and of the respective member state were followed. As mentioned above, having appropriate accreditation and triple certification provides a management system through which these demands can be met. Aiming to attain triple certification (OHSAS 18001, ISO 14001 and ISO 9001) in ~ 2 years would normally be considered too much of a burden to place on staff and internal auditors alike. However, approaching this in an integrated way, conversely provided not only the mechanism for achieving it in such a short time but also the vehicle for maintaining it, with minimal resources (if comparing against going for certification one by one), and dramatic simplification.
IRMM's long (50 years) experience in the nuclear field meant that the long standing good practices in this area could be immediately applied to the bio-safety and chemical laboratories, so it would be untrue to say that the starting point was zero.
Nevertheless, the triple certification process brought a synergy to the institute which had hitherto been unknown with the net encompassing: the legal register and how new or changed regulations are followed up; the methodology for risk assessments; the scoring of the environmental aspects; the integration of safety and environmental objectives in the staff evaluation system; certain Safety, Health, Environment (SHE) procedures with a management support overlap e.g. coding system for purchases; internal and external communication aspects; integrated auditing; the reporting of non conformances, incidents and accidents and the way management reviews are carried out. The integration process also involved an examination of the Performance Indicators (including core process and SHE indicators), highlighting their strengths and weaknesses. This work includes some newly chosen performance indicators and their respective targets in the areas of Safety, Health and Environment. It also includes the first score cards of our Integrated Management System which when displayed on a "dashboard" provide a straightforward means of benchmarking our institute with our fellow institutes in the JRC.
Last but not least, the fact that this institute wide effort, fully supported by the director, resulted in improvements in inter-departmental communication, enhanced awareness by the hierarchical line of their SHE responsibilities and duties and involvement of all staff, in one way or another. How this was achieved in this 2 year period, starting in January 2006 and ending with the external audit in December, 2007 will be described in this work with the aim of showing all (including SHE) benefits of a truly integrated management system.

The mission of the JRC 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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