ระบบการจัดการสิ่งแวดล้อม : ข้อแนะนำทั่วไปเกี่ยวกับหลักการ ระบบ และเทคนิคในทางปฏิบัติ

ENVIRONMENTAL MANAGEMENT SYSTEMS :
GENERAL GUIDELINES ON PRINCIPLES, SYSTEMS AND
SUPPORT TECHNIQUES

มาตรฐานผลิตภัณฑ์อุตสาหกรรม
ระบบการจัดการสิ่งแวดล้อม :
ข้อแนะนำทั่วไปเกี่ยวกับหลักการ ระบบ
และเทคนิคในทางปฏิบัติ

มอก. 14004 — 2548

สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

กระทรวงอุตสาหกรรม ถนนพระรามที่ 6 กรุงเทพฯ 10400
โทรศัพท์ 0 2202 3300

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้เป็นส่วนหนึ่งในอนุกรมมาตรฐานผลิตภัณฑ์อุตสาหกรรมที่เกี่ยวกับระบบการจัดการสิ่งแวดล้อม ซึ่งกำหนดขึ้นเพื่อช่วยให้หน่วยงานสามารถนำระบบการจัดการสิ่งแวดล้อมไปใช้หรือปรับปรุงระบบที่ใช้อยู่แล้วให้สอดคล้องกับหลักการของการพัฒนาอย่างยั่งยืน และเข้ากับวัฒนธรรม สังคม และกรอบการดำเนินงานของหน่วยงานได้ โดยมาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้จะเพิ่มตัวอย่าง คำอธิบาย และทางเลือกต่าง ๆ ที่จะช่วยทั้งการจัดทำระบบการจัดการสิ่งแวดล้อม และเสริมสร้างระบบที่มีอยู่แล้วให้เข้มแข็งขึ้น

กระทรวงอุตสาหกรรมเคยประกาศใช้มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้มาแล้ว โดยรับมาตรฐาน ISO 14004 ฉบับปี 1996 มาใช้ในระดับเหมือนกันทุกประการ (identical) ทั้งเนื้อหาและรูปแบบเป็นมาตรฐานเลขที่ มอก.14004-2539

เนื่องจาก ISO ได้แก้ไขปรับปรุงมาตรฐาน ISO 14004 เป็นฉบับปี 2004 กระทรวงอุตสาหกรรมจึงดำเนินการแก้ไขมาตรฐานเลขที่ มอก.14004-2539 เป็นมาตรฐานเลขที่ มอก.14004-2548 โดยรับ ISO 14004:2004 Environmental management systems – general guidelines on principles, systems and support techniques มาใช้ในระดับเหมือนกันทุกประการ (identical) โดยใช้มาตรฐาน ISO ฉบับภาษาอังกฤษเป็นหลัก

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้กำหนดขึ้นเพื่อให้ทันกับความต้องการของผู้ใช้ และจักแปลเป็นภาษาไทยในโอกาสอันสมควร หากมีข้อสงสัยโปรดติดต่อสอบถามที่สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

คณะกรรมการมาตรฐานผลิตภัณฑ์อุตสาหกรรมได้พิจารณามาตรฐานนี้แล้ว เห็นสมควรเสนอรัฐมนตรีประกาศตามมาตรา 15 แห่งพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม พ.ศ. 2511

ประกาศกระทรวงอุตสาหกรรม

ฉบับที่ 3385 (พ.ศ. 2548)

ออกตามความในพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม

พ.ศ. 2511

เรื่อง ยกเลิกและกำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม

ระบบการจัดการสิ่งแวดล้อม : ข้อแนะนำทั่วไปเกี่ยวกับหลักการ ระบบ และเทคนิคในทางปฏิบัติ

————————————————

โดยที่เป็นการสมควรปรับปรุงมาตรฐานผลิตภัณฑ์อุตสาหกรรม ระบบการจัดการสิ่งแวดล้อม : ข้อแนะนำทั่วไปเกี่ยวกับหลักการ ระบบ และเทคนิคในทางปฏิบัติ มาตรฐานเลขที่ มอก.14004-2539 และกำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม ระบบการจัดการสิ่งแวดล้อม : ข้อแนะนำทั่วไปเกี่ยวกับหลักการ ระบบ และเทคนิคในทางปฏิบัติ มาตรฐานเลขที่ มอก.14004-2548 ขึ้นใหม่

อาศัยอำนาจตามความในมาตรา 15 แห่งพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม พ.ศ. 2511 รัฐมนตรีว่าการกระทรวงอุตสาหกรรมออกประกาศกระทรวงอุตสาหกรรมไว้ดังต่อไปนี้

1. ยกเลิกประกาศกระทรวงอุตสาหกรรมซึ่งออกตามความในพระราชบัญญัติมาตรฐานผลิตภัณฑ์อุตสาหกรรม พ.ศ. 2511 จำนวน 1 ฉบับ คือ ประกาศกระทรวงอุตสาหกรรมฉบับที่ 2208 (พ.ศ. 2539) เรื่อง กำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม ระบบการจัดการสิ่งแวดล้อม : ข้อแนะนำทั่วไปเกี่ยวกับหลักการ ระบบ และเทคนิคในทางปฏิบัติ มาตรฐานเลขที่ มอก.14004-2539 ลงวันที่ 28 พฤศจิกายน 2539

ทั้งนี้ ตั้งแต่วันที่ 15 พฤษภาคม พ.ศ. 2549 เป็นต้นไป

2. กำหนดมาตรฐานผลิตภัณฑ์อุตสาหกรรม ระบบการจัดการสิ่งแวดล้อม : ข้อแนะนำทั่วไปเกี่ยวกับหลักการ ระบบ และเทคนิคในทางปฏิบัติ มาตรฐานเลขที่ มอก.14004-2548 ดังมีรายการละเอียดต่อท้ายประกาศนี้

ทั้งนี้ ให้มีผลตั้งแต่วันที่ประกาศในราชกิจจานุเบกษา เป็นต้นไป

ประกาศ ณ วันที่ 6 กรกฎาคม พ.ศ. 2548

วัฒนา เมืองสุข

รัฐมนตรีว่าการกระทรวงอุตสาหกรรม

มาตรฐานผลิตภัณฑ์อุตสาหกรรม
ระบบการจัดการสิ่งแวดล้อม :
ข้อแนะนำทั่วไปเกี่ยวกับหลักการ ระบบ
และเทคนิคในทางปฏิบัติ

บทนำ

ด้วย ISO/TC 207 ได้ปรับปรุง ISO 14004:1996 ให้มีเนื้อหาสอดคล้องกับการประยุกต์ใช้ ISO 14001:2004 โดยเพิ่มเติมตัวอย่าง คำอธิบายและทางเลือกต่าง ๆ เพื่อช่วยในการพัฒนาปรับปรุงระบบการจัดการสิ่งแวดล้อมที่ได้ ดำเนินการอยู่ให้มีความเข้มแข็งมากยิ่งขึ้น และเพื่อความสะดวกในการใช้ได้กำหนดเลขข้อให้มีความสอดคล้องกับ ข้อกำหนดของ ISO 14001:2004 พร้อมทั้งมีคำแนะนำและตัวอย่างในทางปฏิบัติ ซึ่งระบุไว้ในกรอบสี่เหลี่ยม เพื่อให้ง่ายต่อการทำความเข้าใจ

ขอบข่าย

มาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ระบุข้อแนะนำในการนำหลักการของระบบการจัดการสิ่งแวดล้อมไปใช้ในการจัดระบบ ภายในหน่วยงาน รวมทั้งการประสานระบบการจัดการสิ่งแวดล้อมเข้ากับระบบการบริหารงานอื่น ๆ
ข้อแนะนำนี้ใช้ได้กับทุกหน่วยงานที่ต้องการนำระบบการจัดการสิ่งแวดล้อมไปใช้ หรือปรับปรุงระบบที่มีอยู่แล้ว โดย ไม่ต้องคำนึงถึงขนาด ประเภท สถานที่ตั้ง หรือระดับความเจริญเติบโตของหน่วยงาน
ข้อแนะนำนี้จัดทำขึ้นในรูปแบบเดียวกับ ISO 14001:2004 และมีเนื้อหาสอดคล้องกัน แต่ไม่ได้แปลความหมาย ในมาตรฐานดังกล่าว

เอกสารอ้างอิง

ไม่มีเอกสารอ้างอิง

บทนิยาม

ความหมายของคำที่ใช้ในมาตรฐานผลิตภัณฑ์อุตสาหกรรมนี้ ให้เป็นไปตาม ISO 14004:2004 ข้อ 3

ข้อแนะนำทั่วไปเกี่ยวกับหลักการ ระบบ และเทคนิคในทางปฏิบัติ

ให้ข้อแนะนำเกี่ยวกับการจัดทำระบบการจัดการสิ่งแวดล้อมตามข้อกำหนดซึ่งระบุไว้ 6 เรื่อง ได้แก่ ข้อกำหนดทั่วไป นโยบายสิ่งแวดล้อม การวางแผน การนำไปใช้และการปฏิบัติ การตรวจสอบและการทบทวนการจัดการ โดยเพิ่มตัวอย่าง คำอธิบาย และทางเลือกต่าง ๆ ที่จะช่วยในการจัดทำระบบการจัดการสิ่งแวดล้อม

รายละเอียดให้เป็นไปตามมาตรฐาน ISO 14004:2004 ข้อ 4

ภาคผนวก

ตารางแสดงตัวอย่างความสอดคล้องกันระหว่างองค์ประกอบต่าง ๆ ในระบบการจัดการสิ่งแวดล้อม

รายละเอียดให้เป็นไปตามมาตรฐาน ISO 14004:2004 Annex A

Environmental management systems — General guidelines on principles, systems and support techniques

1 Scope

This International Standard provides guidance on the establishment, implementation, maintenance and improvement of an environmental management system and its coordination with other management systems.

NOTE   While the system is not intended to manage occupational health and safety issues, they may be included when an organization seeks to implement an integrated environmental and occupational health and safety management system.

The guidelines in this International Standard are applicable to any organization, regardless of its size, type, location or level of maturity.

While the guidelines in this International Standard are consistent with the ISO 14001 environmental management system model, they are not intended to provide interpretations of the requirements of ISO 14001.

2 Normative references

No normative references are cited. This clause is included in order to retain clause numbering identical with the previous edition (ISO 14004:1996).

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
auditor
person with the competence to conduct an audit

[ISO 9000:2000, 3.9.9]

3.2
continual improvement
recurring process of enhancing the **environmental management system** (3.9) in order to achieve improvements in overall **environmental performance** (3.11) consistent with the **organization's** (3.20) **environmental policy** (3.13)

NOTE   The process need not take place in all areas of activity simultaneously.

[ISO 14001:2004, 3.2]

3.3
correction
action taken to eliminate a detected **nonconformity** (3.18)

NOTE   Adapted from ISO 9000:2000, 3.6.6.

1

3.4
corrective action
action to eliminate the cause of a detected **nonconformity** (3.18)

[ISO 14001:2004, 3.3]

3.5
document
information and its supporting medium

NOTE 1   The medium can be paper, magnetic, electronic or optical computer disc, photograph or master sample, or a combination thereof.

NOTE 2   Adapted from ISO 9000:2000, 3.7.2.

[ISO 14001:2004, 3.4]

3.6
environment
surroundings in which an **organization** (3.20) operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation

NOTE   Surroundings in this context extend from within an **organization** (3.20) to the global system.

[ISO 14001:2004, 3.5]

3.7
environmental aspect
element of an **organization's** (3.20) activities or products or services that can interact with the **environment** (3.6)

NOTE   A significant environmental aspect has or can have a significant **environmental impact** (3.8).

[ISO 14001:2004, 3.6]

3.8
environmental impact
any change to the **environment** (3.6), whether adverse or beneficial, wholly or partially resulting from an **organization's** (3.20) **environmental aspects** (3.7)

[ISO 14001:2004, 3.7]

3.9
environmental management system
EMS
part of an **organization's** (3.20) management system used to develop and implement its **environmental policy** (3.13) and manage its **environmental aspects** (3.7)

NOTE 1   A management system is a set of interrelated elements used to establish policy and objectives and to achieve those objectives.

NOTE 2   A management system includes organizational structure, planning activities, responsibilities, practices, **procedures** (3.23), processes and resources.

[ISO 14001:2004, 3.8]

3.10
environmental objective
overall environmental goal, consistent with the **environmental policy** (3.13), that an **organization** (3.20) sets itself to achieve

[ISO 14001:2004, 3.9]

2

3.11
environmental performance
measurable results of an **organization's** (3.20) management of its **environmental aspects** (3.7)

NOTE   In the context of **environmental management systems** (3.9), results can be measured against the **organization's** (3.20) **environmental policy** (3.13), **environmental objectives** (3.10), **environmental targets** (3.14) and other environmental performance requirements.

[ISO 14001:2004, 3.10]

3.12
environmental performance indicator
EPI
specific expression that provides information about an **organization's** (3.20) **environmental performance** (3.11)

[ISO 14031:1999, 2.10]

3.13
environmental policy
overall intentions and direction of an **organization** (3.20) related to its **environmental performance** (3.11) as formally expressed by top management

NOTE   The environmental policy provides a framework for action and for the setting of **environmental objectives** (3.10) and **environmental targets** (3.14).

[ISO 14001:2004, 3.11]

3.14
environmental target
detailed performance requirement, applicable to the **organization** (3.20) or parts thereof, that arises from the **environmental objectives** (3.10) and that needs to be set and met in order to achieve those objectives

[ISO 14001:2004, 3.12]

3.15
interested party
person or group concerned with or affected by the **environmental performance** (3.11) of an **organization** (3.20)

[ISO 14001:2004, 3.13]

3.16
internal audit
systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the environmental management system audit criteria set by the **organization** (3.20) are fulfilled

NOTE   In many cases, particularly in smaller organizations, independence can be demonstrated by the freedom from responsibility for the activity being audited.

[ISO 14001:2004, 3.14]

3.17
management performance indicator
MPI
environmental performance indicator (3.12) that provides information about the management efforts to influence an **organization's** (3.20) **environmental performance** (3.11)

[ISO 14031:1999, 2.10.1]

3

3.18
nonconformity
non-fulfilment of a requirement

[ISO 9000:2000, 3.6.2]

3.19
operational performance indicator
OPI
environmental performance indicator (3.12) that provides information about the **environmental performance** (3.11) of an **organization's** (3.20) operations

[ISO 14031:1999, 2.10.2]

3.20
organization
company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration

NOTE   For organizations with more than one operating unit, a single operating unit may be defined as an organization.

[ISO 14001:2004, 3.16]

3.21
preventive action
action to eliminate the cause of a potential **nonconformity** (3.18)

[ISO 14001:2004, 3.17]

3.22
prevention of pollution
use of processes, practices, techniques, materials, products, services or energy to avoid, reduce or control (separately or in combination) the creation, emission, or discharge of any type of pollutant or waste, in order to reduce adverse **environmental impacts** (3.8)

NOTE   Prevention of pollution can include source reduction or elimination, process, product or service changes, efficient use of resources, material and energy substitution, reuse, recovery, recycling, reclamation and treatment.

[ISO 14001:2004, 3.18]

3.23
procedure
specified way to carry out an activity or a process

NOTE 1   Procedures can be documented or not.

NOTE 2   Adapted from ISO 9000:2000, 3.4.5.

[ISO 14001:2004, 3.19]

3.24
record
document (3.5) stating results achieved or providing evidence of activities performed

NOTE   Adapted from ISO 9000:2000, 3.7.6.

[ISO 14001:2004, 3.20]

4

4   Environmental management system elements

4.1   General

4.1.1   The environmental management system model

The environmental management system detailed in this International Standard follows a "Plan-Do-Check-Act" (PDCA) management model. The environmental management system model and the ongoing process of continual improvement are illustrated in Figure 1. For more information on the PDCA model, see *Practical help — The environmental management system model.*
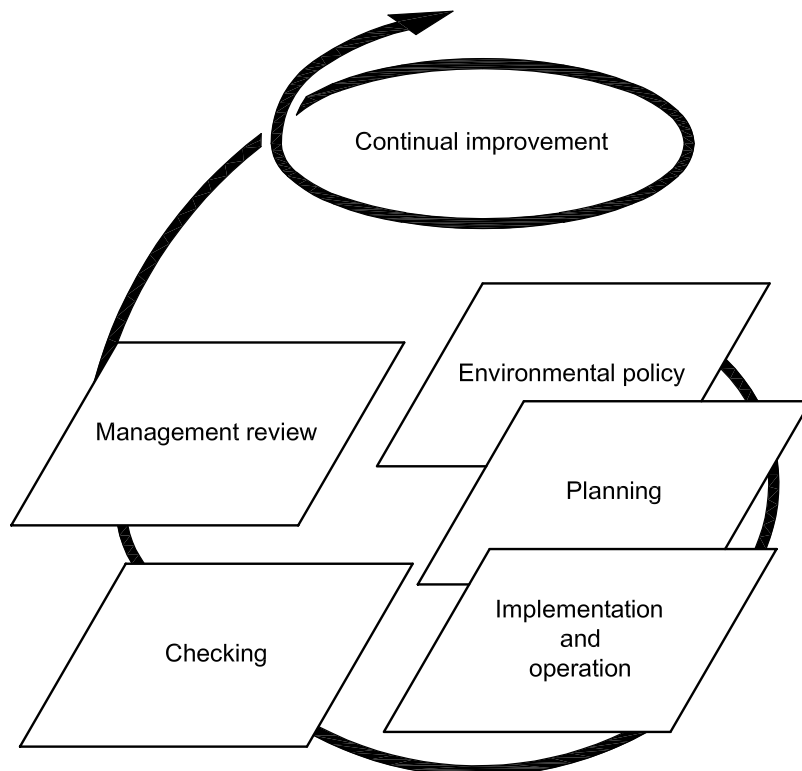

Figure 1 — Environmental management system model for this International Standard

An environmental management system is best viewed as an organizing framework that should be continually monitored and periodically reviewed to provide effective direction for an organization's environmental management in response to changing internal and external factors. All levels in the organization should accept responsibility for working to achieve environmental improvements, as applicable.

When first establishing an environmental management system an organization should begin where there is obvious benefit, for example by focusing on immediate cost savings or regulatory compliance mainly related to its significant environmental aspects. As the environmental management system takes shape, procedures, programmes and technologies can be put in place to further improve environmental performance. As the environmental management system matures, environmental considerations can be integrated into all business decisions.

5

Practical help — The environmental management system model

PDCA is an ongoing, iterative process that enables an organization to establish, implement and maintain its environmental policy (see 4.2) based on top management's leadership and commitment to the environmental management system (see 4.1.2). After the organization has evaluated its current position in relation to the environment (see 4.1.4,) the steps of this ongoing process are the following:

a) **Plan**: establish an ongoing planning process (see 4.3) that enables the organization to

    1) identify environmental aspects and associated environmental impacts (see 4.3.1),

    2) identify and monitor applicable legal requirements and other requirements to which the organization subscribes, and set internal performance criteria where appropriate (see 4.3.2),

    3) set environmental objectives and targets and formulate programme(s) to achieve them (see 4.3.3.1 and 4.3.3.2), and

    4) develop and use performance indicators (see 4.3.3.3).

b) **Do**: implement and operate the environmental management system (see 4.4)

    1) create management structures, assign roles and responsibilities with sufficient authority,

    2) provide adequate resources (see 4.4.1),

    3) train persons working for or on behalf of the organization and ensure their awareness and competence (see 4.4.2),

    4) establish processes for internal and external communication (see 4.4.3),

    5) establish and maintain documentation (see 4.4.4),

    6) establish and implement document control(s) (see 4.4.5),

    7) establish and maintain operational control(s) (see 4.4.6), and

    8) ensure emergency preparedness and response (see 4.4.7).

c) **Check:** assess environmental management system processes (see 4.5)

    1) conduct ongoing monitoring and measurement (see 4.5.1),

    2) evaluate status of compliance (see 4.5.2),

    3) identify nonconformity and take corrective and preventive actions (see 4.5.3),

    4) manage records (see 4.5.4), and

    5) conduct periodic internal audits (see 4.5.5).

d) **Act:** review and take action to improve the environmental management system (see 4.6)

    1) conduct management reviews of the environmental management system at appropriate intervals (see 4.6.1), and

    2) identify areas for improvement (see 4.6.2).

This ongoing process enables the organization to continually improve its environmental management system and its overall environmental performance.

4.1.2 Top management commitment and leadership

To ensure success, an early step in establishing or improving an environmental management system involves obtaining commitment from the top management of the organization to improve the environmental management of its activities, products and services. The ongoing commitment and leadership of the top management are crucial. Identifying the benefits that an environmental management system can bring, as well as the challenges that an environmental management system can avoid, may help to secure top management's commitment and leadership.

6

4.1.3 Scope of the environmental management system

Top management need to define the scope of the organization's environmental management system. That is, top management should determine the boundaries of the organization to which the environmental management system applies. Once the scope of the environmental management system has been defined, all activities, products and services of the organization that are within the defined scope should be included in the environmental management system.

4.1.4 Initial environmental review

An organization with no existing environmental management system should assess its current position with regard to the environment by means of a review. The aim of this review should be to consider the environmental aspects of the organization's activities, products and services as a basis for establishing its environmental management system.

Organizations with an existing environmental management system may not need to undertake such a review, although such a review could assist them in improving their environmental management system.

The review should cover the following four key areas:

a) identification of environmental aspects, including those associated with normal operating conditions, abnormal conditions including start-up and shut-down, and emergency situations and accidents;

b) identification of applicable legal requirements and other requirements to which the organization subscribes;

c) examination of existing environmental management practices and procedures, including those associated with procurement and contracting activities;

d) evaluation of previous emergency situations and accidents.

The review can also include additional considerations, such as

— an evaluation of performance compared with applicable internal criteria, external standards, regulations, codes of practice and sets of principles and guidelines,

— opportunities for competitive advantage, including cost reduction opportunities,

— the views of interested parties, and

— other organizational systems that can enable or impede environmental performance.

The results of the review can be used to assist the organization in setting the scope of its environmental management system, developing or enhancing its environmental policy, setting of its environmental objectives and targets, and determining the effectiveness of its approach to maintaining compliance with applicable legal requirements and other requirements to which the organization subscribes.

7

Practical help — Initial environmental review

Methods that can be used to examine existing environmental management practices and procedures include

a) interviews with persons previously or currently working for or on behalf of the organization to determine the scope of the organization's past and current activities, products and services,

b) evaluation of internal and external communications that have taken place with the organization's interested parties, including complaints, matters related to applicable legal requirements or other requirements to which the organizations subscribes, past environmental or related incidents and accidents,

c) gathering information related to current management practices, such as

    1) process controls on purchasing hazardous chemicals,

    2) the storage and handling of chemicals (e.g. secondary containment; housekeeping, storage of incompatible chemicals),

    3) controls on fugitive emissions,

    4) waste disposal methods,

    5) emergency preparedness and response equipment,

    6) use of resources (e.g. use of office lights after working hours),

    7) vegetation and habitat protection during construction,

    8) temporal changes in processes (e.g. changes to crop rotation patterns affecting fertilizer discharges to water),

    9) environmental training programmes,

    10) review and approval process for operational control procedures, and

    11) completeness of monitoring records and/or ease in retrieving historical records.

The review can be conducted using checklists, process flowcharts, interviews, direct inspection and past and current measurements, results of previous audits or other reviews depending on the nature of the organization's activities, products and services. The results of the review should be documented so that it can be used to contribute to setting the scope and establishing or enhancing the organization's environmental management system, including its environmental policy.

4.2 Environmental policy

An environmental policy establishes the principles of action for an organization. It sets the level of environmental responsibility and performance required of the organization, against which all subsequent actions will be judged. The policy should be appropriate to the environmental impacts of the organization's activities, products and services (within the defined scope of the environmental management system) and should guide the setting of objectives and targets.

A growing number of international organizations, including government, industry associations and citizens' groups, have developed guiding principles. Such guiding principles help organizations to define the overall scope of their commitment to the environment. They also help to give different organizations a common set of values. Guiding principles such as these can assist an organization in developing its policy, which can be as individual as the organization for which it is developed. The responsibility for setting environmental policy rests with an organization's top management. The environmental policy can be included in or linked with other policy documents of the organization. The organization's management is responsible for implementing the policy and for providing input to the formulation and modification of the policy. The policy should be communicated to all persons working for or on behalf of the organization. In addition, the policy should be made available to the public (see 4.4.3.2 for a discussion of external communication methods).

8

In developing its environmental policy, an organization should consider

a) its mission, vision, core values and beliefs;

b) coordination with other organizational policies (e.g. quality, occupational health and safety);

c) the requirements of, and communication with, interested parties;

d) guiding principles;

e) specific local or regional conditions;

f) its commitments to prevention of pollution and continual improvement;

g) its commitment to comply with legal requirements and other requirements to which the organization subscribes.

Practical help — Environmental policy

The environmental policy should recognize that all activities, products and services within the defined scope of an organization's environmental management system can cause impacts on the environment.

The issues addressed in the policy therefore depend on the nature of the organization. The policy should state commitments to, among other things,

a) comply with or exceed applicable legal requirements and other requirements to which the organization subscribes which relate to its environmental aspects,

b) prevent pollution, (see *Practical help — Prevention of pollution*), and

c) achieve continual improvement through the development of environmental performance evaluation procedures and associated indicators.

The policy might also include other commitments to

d) minimize any significant adverse environmental impacts of new developments through the use of integrated environmental management procedures and planning,

e) design products taking into account environmental aspects, and

f) set an example of leadership in the field of environmental management.

Practical help — Prevention of pollution

Prevention of pollution can be incorporated into the design and development of new products and services, as well as into the development of associated processes. Such strategies can, for example, help an organization to conserve resources and reduce waste and emissions associated with products and services. (Guidance on product design concepts and practices can be found in ISO/TR 14062.)

Source reduction can often be the most effective practice because it has the double benefit of avoiding the generation of waste and emissions and simultaneously saving resources. However, prevention of pollution through source reduction may not be practicable in some circumstances and for some organizations. The organization should consider using a hierarchy of approaches for prevention of pollution. Such a hierarchy should give preference to preventing pollution at its source, and can be structured as follows:

a) source reduction or elimination (including environmentally sound design and development, material substitution, process, product or technology changes and efficient use and conservation of energy and material resources);

b) internal reuse or recycling (reuse or recycling of materials within the process or facility);

c) external reuse or recycling (transfer of materials offsite for reuse or recycling);

d) recovery and treatment (recovery from waste streams on or offsite, treatment of emissions, and releases on wastes on or offsite to reduce their environmental impacts);

e) control mechanisms, such as incineration or controlled disposal, where permissible. However, the organization should use methods such as these only after other options have been considered.

4.3 Planning

> **General guidance — Planning**
>
> Planning is critical to the fulfilment of an organization's environmental policy and the establishment, implementation, and maintenance of its environmental management system. An organization should have a planning process that includes the following elements:
>
> a) identification of environmental aspects and the determination of those which are significant;
>
> b) identification of applicable legal requirements and other requirements to which the organization subscribes;
>
> c) setting of internal performance criteria where appropriate;
>
> d) setting of objectives and targets and establishment of programme(s) to achieve them.
>
> Such a planning process can help an organization focus its resources on those areas that are most important to achievement of its goals. Information generated by the planning process can also be used in the establishment and improvement of other parts of the environmental management system, such as training, operational control and monitoring and measurement.
>
> Planning is an ongoing process. It is used both to establish and implement elements of the environmental management system and to maintain and improve them, based on changing circumstances and inputs and outputs of the environmental management system itself. As part of the planning process, an organization should consider how it would measure and evaluate its performance in meeting its policy commitments, objectives and targets, and other performance criteria. One approach that can be useful is to establish performance indicators during the planning process.
>
> NOTE   See subclauses 4.3.3.3 and 4.5.1 and ISO 14031 for guidance on performance indicators and evaluation.

4.3.1 Environmental aspects

4.3.1.1 Overview

An effective environmental management system begins with understanding how an organization can interact with the environment (see 4.3.1.2). The elements of an organization's activities, products and services that can interact with the environment are called environmental aspects. Examples include a discharge, an emission, consumption or reuse of a material, or generation of noise. An organization implementing an environmental management system should identify the environmental aspects it can control and those that it can influence (see 4.3.1.3).

Changes to the environment, either adverse or beneficial, that result wholly or partially from environmental aspects are called environmental impacts. Examples of adverse impacts include pollution of air, and depletion of natural resources. Examples of beneficial impacts include improved water or soil quality. The relationship between environmental aspects and associated impacts is one of cause and effect. An organization should have an understanding of those aspects that have or can have significant impacts on the environment, i.e. significant environmental aspects (see 4.3.1.4).

Since an organization can have many environmental aspects and associated impacts, it should establish criteria and a method to determine those that it will consider significant (see 4.3.1.5). Several factors should be considered when establishing criteria, such as environmental characteristics, information on applicable legal requirements and other requirements to which the organization subscribes, and concerns of interested parties (internal and external). Some of these criteria can be applied to an organization's environmental aspects directly and some to their associated environmental impacts.

Identifying significant environmental aspects and associated impacts is necessary in order to determine where control or improvement is needed and to set priorities for management action (see 4.3.1.5). An organization's policy, objectives and targets, training, communications, operational controls and monitoring programmes should be primarily based on knowledge of its significant environmental aspects, although issues such as

10

applicable legal requirements and other requirements to which the organization subscribes and the views of interested parties will also need to be taken into account. The identification of significant environmental aspects is an ongoing process that enhances an organization's understanding of its relationship to the environment and contributes to continual improvement of its environmental performance through enhancement of its environmental management system.

As there is no single approach for identifying environmental aspects and environmental impacts and determining significance that will suit all organizations, the guidance that follows serves to explain key concepts to those implementing or improving an environmental management system. Each organization should choose an approach that is appropriate to its scope, nature and scale and that meets its needs in terms of detail, complexity, time, cost and availability of reliable data. The use of (a) procedure(s) to apply the approach selected can help to achieve consistency.

Further guidance and additional examples are contained in the following subclauses and in Table A.1.

4.3.1.2 Understanding activities, products and services

Almost all activities, products and services have some impact on the environment, which may occur at any or all stages of the activities, products or services life cycle, i.e. from raw material acquisition and distribution, to use and disposal. Such impacts may be local, regional or global, short or long term, with varying levels of significance. An organization should understand the activities, products and services that fall within the scope of its environmental management system, and may find it useful to group them for identification and evaluation of environmental aspects. Grouping or categorizing activities, products and services can assist an organization in identifying common or similar environmental aspects. A grouping or category could be based on common characteristics, such as organizational units, geographical locations, operations workflow, materials or energy use in product groups, or environmental media affected (e.g. air, water, land). To be useful, the size of a category should be large enough for meaningful examination, yet small enough to be clearly understood.

NOTE   See ISO 14031 for examples of categories of activities, products and services.

4.3.1.3 Identifying environmental aspects

An organization should identify environmental aspects within the scope of its environmental management system that are associated with its past, ongoing and planned activities, products and services. In all cases, the organization should consider normal and abnormal operating conditions including start-up and shut-down maintenance and emergency situations and accidents.

In addition to those environmental aspects an organization can control directly, it should also consider aspects that it can influence, e.g. those related to products and services used by the organization and those related to products and services it provides. When evaluating its ability to influence the environmental aspects associated with an activity, product or service, an organization should give consideration to legal or contractual authority, its policies, local or regional issues and its obligations and responsibilities to interested parties. The organization should also consider the implications on its own environmental performance, for example by the purchase of products containing hazardous materials. Examples of situations in which these considerations can apply include activities carried out by contractors or subcontractors, design of products and services, materials, goods or services supplied and used, and the transport, use, reuse or recycling of products placed on the market.

To identify and have an understanding of its environmental aspects, an organization should collect quantitative and/or qualitative data on the characteristics of its activities, products and services such as inputs and outputs of materials or energy, processes and technology used, facilities and locations, transportation methods and human factors (e.g. impaired vision or hearing). In addition it can be useful to collect information on

a)   cause and effect relationships between elements of its activities, products, and services and possible or actual changes to the environment,

b)   environmental concerns of interested parties, and

c)   possible environmental aspects identified in government regulations and permits, in other standards, or by industry associations, academic institutions, etc.

11

The process of identifying environmental aspects will benefit from the participation of those individuals who are familiar with the organization's activities, products and services. Although there is no single approach for identifying environmental aspects, the approach selected can for example consider

— emissions to air,

— releases to water,

— releases to land,

— use of raw materials and natural resources (e.g. land use, water use),

— local/community environmental issues,

— use of energy,

— energy emitted (e.g. heat, radiation, vibration),

— waste and by-products, and

— physical attributes (e.g. size, shape, colour, appearance).

Consideration should therefore be given to aspects related to the organization's activities, products and services, such as

— design and development,

— manufacturing processes,

— packaging and transportation,

— environmental performance and practices of contractors, and suppliers,

— waste management,

— extraction and distribution of raw materials and natural resources,

— distribution, use and end of life, and

— wildlife and biodiversity.

NOTE   See ISO/TR 14062 for guidance on environmental aspects of product design.

4.3.1.4 Understanding environmental impacts

An understanding of an organization's environmental impacts is necessary when identifying environmental aspects and determining their significance. Many approaches are available. An organization should choose one that suits its needs.

Readily available information on the types of environmental impacts associated with an organization's environmental aspects may be adequate for some organizations. Other organizations can choose to use cause-and-effect diagrams or flowcharts illustrating inputs, outputs or mass/energy balances or other approaches such as environmental impact assessments or life cycle assessments.

NOTE   See ISO 14040, ISO 14041, ISO 14042 and ISO 14043 for guidance on life cycle assessments.

The approach chosen should be capable of recognizing

a) positive (beneficial) as well as negative (adverse) environmental impacts,

b) actual and potential environmental impacts,

c) the part(s) of the environment that might be affected, such as air, water, soil, flora, fauna, cultural heritage, etc.,

d) the characteristics of the location that might affect the impact such as local weather conditions, height of water table, soil types, etc., and

e) the nature of the changes to the environment (such as global vs. local issues, length of time for which the impact occurs, potential for impact to accumulate in strength over time).

12

4.3.1.5 Determining significant environmental aspects

Significance is a relative concept; it cannot be defined in absolute terms. What is significant for one organization may not be significant for another. Evaluating significance involves applying both technical analysis and judgement by the organization. The use of criteria should help an organization to establish which environmental aspects and associated impacts it considers significant. Establishing and applying such criteria should provide consistency and reproducibility in the assessment of significance.

When establishing criteria for significance, an organization should consider the following:

a) environmental criteria (such as scale, severity and duration of the impact, or type, size and frequency of an environmental aspect);

b) applicable legal requirements (such as emission and discharge limits in permits or regulations, etc.);

c) the concerns of internal and external interested parties (such as those related to organizational values, public image, noise, odour or visual degradation).

Significance criteria can be applied either to an organization's environmental aspects or to their associated impacts.   Environmental criteria can apply to both environmental aspects and environmental impacts, but in most situations they apply to environmental impacts. When applying criteria, an organization can set levels (or values) of significance associated with each criterion, for example based on a combination of likelihood (probability/frequency) of an occurrence and its consequences (severity/intensity). Some type of scale or ranking can be helpful in assigning significance, for example quantitatively in terms of a numeric value, or qualitatively in terms of levels such as high, medium, low or negligible.

An organization may choose to evaluate the significance of an environmental aspect and associated impacts, and may find it useful to combine results from the criteria. It should decide which environmental aspects are significant, e.g. by using a threshold value.

To facilitate planning, an organization should maintain appropriate information on the environmental aspects identified and those considered significant. The organization should use this information to understand the need for and to determine operational controls. Information on identified impacts should be included as appropriate. It should be reviewed and updated periodically, and when circumstances change to ensure it is up to date. For these purposes, it can be helpful to maintain them in a list, register, database or other form.

NOTE   The determination of significant environmental aspects does not require an environmental impact assessment.

13

Practical help — Possible information sources for determining environmental aspects and environmental impacts

Possible information sources include

a) general information documents, such as brochures, catalogues and annual reports,

b) operations manuals, process flowcharts, or quality and product plans,

c) reports from previous audits, assessments or reviews, such as initial environmental reviews or life cycle assessments,

d) information from other management systems, such as quality or occupational health and safety,

e) technical data reports, published analyses or studies, or lists of toxic substances,

f) applicable legal requirements and other requirements to which the organization subscribes,

g) codes of practice, national and international policies, guidelines and programmes,

h) purchasing data,

i) product specifications, product development data, Material/Chemical Safety Data Sheets (M/CSDS), or energy and material balance data,

j) waste inventories,

k) monitoring data,

l) environmental permit or licence applications,

m) views of, requests from, or agreements with interested parties, and

n) reports on emergency situations and accidents.

4.3.2 Legal and other requirements

General guidance — Legal and other requirements

An organization should establish, implement and maintain procedures to identify and have access to legal requirements and other requirements to which the organization subscribes that are applicable to the environmental aspects of its activities, products and services. The purpose of such procedures is to enable the organization to be aware of the various requirements and determine how they apply to the environmental aspects of the organization's activities, products and services. An organization should ensure that appropriate information about applicable legal requirements and other requirements to which the organization subscribes is communicated to all persons working for or on behalf of the organization, such as contractors or suppliers whose responsibilities relate to, or whose actions can affect, the organization's compliance with such requirements.

An organization should have a process in place to anticipate and prepare for new or changed requirements, so that appropriate action can be taken to maintain compliance. It should also consider how applicable legal requirements and other requirements to which the organization subscribes might apply to or affect new or modified activities, products and services.

Several sources can be used to identify and maintain up-to-date information about applicable legal requirements and other requirements to which the organization subscribes. Such sources include all levels of government, industry associations or trade groups, commercial databases and publications, and professional advisors and services.

4.3.2.1 Legal requirements

Legal requirements refer broadly to any requirement or authorization that is related to an organization's environmental aspects as issued by a governmental authority (including international, national, state/provincial and local authorities) and has legal force.

14

Legal requirements can take many forms, such as

a) legislation, including statutes and regulations,

b) decrees and directives,

c) permits, licences or other forms of authorization,

d) orders issued by regulatory agencies,

e) judgements of courts or administrative tribunals,

f) customary or indigenous law, and

g) treaties, conventions and protocols.

To facilitate the tracking of legal requirements, an organization may find it helpful to maintain an up-to-date register or list of applicable legal requirements.

An organization may also consider going beyond compliance with existing legal requirements. Enhanced reputation, competitive advantage, anticipation or influence of new legal requirements, improved environmental performance and improved relations with the public and authorities can offset the potential added cost.

NOTE   See 4.5.2 for guidance on the evaluation of compliance with legal requirements.

4.3.2.2 Other requirements

Depending on its circumstances and needs, an organization may subscribe voluntarily to requirements, other than legal requirements, that apply to the environmental aspects of its activities, products and services. Such other environmental requirements, if applicable, can include

a) agreements with public authorities,

b) agreements with customers,

c) non-regulatory guidelines,

d) voluntary principles or codes of practice,

e) voluntary environmental labelling or product stewardship commitments,

f) requirements of trade associations,

g) agreements with community groups or non-governmental organizations,

h) public commitments of the organization or its parent organization, and

i) corporate/company requirements.

Some of these commitments or agreements may address a range of issues in addition to environmental matters. The environmental management system need only address such commitments or agreements to the extent that they relate to the organization's environmental aspects.

An organization should identify and keep track of the other requirements to which it subscribes. To facilitate this, the organization can

— identify other requirements in its environmental policy, and

— maintain an up-to-date compilation of other requirements in a list, register, database or other form.

Information on internal performance criteria, together with applicable legal requirements and other requirements to which the organization subscribes, can assist an organization in developing its objectives and targets. Where legal and other requirements do not exist or are insufficient to meet the organization's needs, an organization may develop and implement internal performance criteria to meet its needs. Examples of internal performance criteria might include limitations on types and quantities of fuels or hazardous substances that can be used or managed at a facility or limitations on air emissions that go beyond legal compliance requirements.

15

Practical help — Commitment to compliance

Compliance with applicable legal requirements and other requirements to which the organization subscribes is a core commitment of an environmental management system. This commitment should be reflected in the environmental management system planning process and be implemented through the environmental management system. Top management should periodically review the adequacy of the environmental management system to ensure its effectiveness, including its compliance-related components.

For convenience, the principal compliance-related components of the environmental management system are summarized in the following list. An organization should establish, implement and maintain processes and provide adequate resources to

a) establish a policy that includes a commitment to compliance with applicable legal requirements and other requirements to which the organization subscribes (see 4.2),

b) identify, have access to and understand applicable legal requirements and other requirements to which the organization subscribes (see 4.3.2),

c) set objectives and targets that consider the need for compliance (see 4.3.3),

d) achieve compliance-related objectives and targets, by implementing

— programmes that identify roles, responsibilities, procedures, means and timeframes to achieve compliance-related objectives and targets (see 4.3.3.2), and

— operational controls (including procedures, as necessary) to implement the commitment to compliance and compliance-related objectives and targets (see 4.4.6).

e) ensure that all persons working for or on behalf of the organization and whose work is related to (a) significant aspect(s) have received appropriate training regarding applicable legal requirements and other requirements to which the organization subscribes, related procedures that apply to them, and the consequences of failing to meet applicable legal requirements (see 4.4.2),

f) periodically evaluate compliance with applicable legal requirements and with other requirements to which the organization subscribes (see 4.5.2),

g) identify any instances of noncompliance or nonconformance (and foreseeable potential noncompliance or nonconformance) and take prompt action to identify, implement and follow up corrective actions (see 4.5.3),

h) maintain and manage records of its compliance with applicable legal requirements and other requirements to which the organization subscribes (see 4.5.4),

i) address compliance-related features when conducting periodic audits of the environmental management system (see 4.5.5), and

j) consider changes in applicable legal requirements and with other requirements to which the organization subscribes when undertaking the management review (see 4.6.1).

The commitment to compliance reflects an expectation that an organization employ a systematic approach to achieve and maintain compliance with applicable legal requirements and other requirements to which the organization subscribes.

16

4.3.3 Objectives, targets and programme(s)

General guidance — Objectives, targets and programme(s)

In the planning process, an organization sets objectives and targets to fulfil the commitments established in its environmental policy and achieve other organizational goals. The process of setting and reviewing objectives and implementing programmes to achieve them provides a systematic basis for the organization to improve environmental performance in some areas whilst maintaining its level of environmental performance in others. Both management and operational performance can be addressed through the setting of objectives.

4.3.3.1 Setting objectives and targets

In setting objectives and targets, an organization should consider several inputs, including

a) principles and commitments in its environmental policy,

b) its significant environmental aspects (and information developed in determining them),

c) applicable legal requirements and other requirements to which the organization subscribes,

d) effects of achieving objectives on other activities and processes,

e) views of interested parties,

f) technological options and feasibility,

g) financial, operational, and organizational considerations, including information from suppliers and contractors,

h) possible effects on the public image of the organization,

i) findings from environmental reviews, and

j) other organizational goals.

Objectives should be set at the top level of the organization and at other levels and functions where activities important to meeting the environmental policy commitments and overall organizational goals are carried out. Objectives should be consistent with the environmental policy, including the commitment to prevention of pollution, compliance with applicable legal requirements and other requirements to which the organization subscribes, and continual improvement.

An objective can be expressed directly as a specific performance level, or may be expressed in a general manner and further defined by one or more targets. When targets are set, they should be measurable by performance levels that need to be met to ensure the achievement of the related objectives. Targets may need to include a specified time frame to be delivered by the programme.

The environmental objectives an organization sets should be considered as part of its overall management objectives. Such integration can enhance the value of not only the environmental management system but also the other management systems to which the integration applies.

Objectives and targets can be applicable across an organization or more narrowly to site-specific or individual activities. For example, a manufacturing facility may have an overall energy-reduction objective that can be achieved by conservation activities in one individual department. In other situations however, all parts of an organization may need to contribute in some way to achieve the organization's overall objective. It is also possible that different parts of an organization, pursuing the same overall objective, may need to implement different actions to achieve their departmental objectives.

An organization should identify the contributions of different levels and functions of the organization in achieving the objectives, and make the individual members of the organization aware of their responsibilities.

Performance indicators can be used to track progress in achieving the objectives and targets (see 4.3.3.3). Documentation and communication of objectives and targets improves an organization's ability to achieve its objectives and targets. Information concerning objectives and related targets should be provided to those

17

responsible for achieving them and to other personnel who need such information to carry out related functions, such as operational control.

4.3.3.2 Programme(s) for achieving objectives and targets

Part of the planning process should include the elaboration of a programme for achieving the organization's environmental objectives and targets. The programme should address roles, responsibilities, processes, resources, timeframes, priorities and the actions necessary for achieving the environmental objectives and targets. These actions may deal with individual processes, projects, products, services, sites or facilities within a site. Organizations may integrate programmes to achieve environmental objectives and targets with other programmes within their strategic planning process. Programmes to achieve objectives and targets help an organization to improve its environmental performance. They should be dynamic. When changes in processes, activities, services and products within the scope of the environmental management system occur, the objectives and targets and associated programmes should be revised as necessary.

To achieve its objectives and targets, an organization may find it useful to follow a process: for each policy commitment, identify each objective and target that corresponds to that commitment, establish one or more programmes to achieve each objective and target, and identify specific performance indicators and actions to implement each programme. The specific objectives and targets may then need to be redefined to ensure that the performance indicators and actions can address them. This process can be repeated as appropriate, for example if the policy is changed or after a management review. Table A.2 gives examples of the steps in this process.

4.3.3.3 Performance indicators

An organization should establish measurable environmental performance indicators. Such indicators should be objective, verifiable and reproducible. They should be appropriate to the organization's activities, products and services, consistent with its environmental policy, practical, cost-effective and technologically feasible. These indicators can be used to track an organization's progress in achieving its objectives and targets. They can also be used for other purposes, such as part of an overall process for evaluating and improving environmental performance. The organization should consider the use of both management and operational environmental performance indicators appropriate to its significant environmental aspects.

An organization's environmental performance indicators are an important tool for monitoring continual improvement.

NOTE   See ISO 14031 and ISO/TR 14032 for further guidance on the selection and use of environmental performance indicators.

18

Practical help — Performance indicators

Progress towards an objective can generally be measured using environmental performance indicators such as

a)   quantity of raw material or energy used,

b)   quantity of emissions such as CO_2,

c)   waste produced per quantity of finished product,

d)   efficiency of material and energy used,

e)   number of environmental incidents (e.g. excursions above limits),

f)   number of environmental accidents (e.g. unplanned releases),

g)   percentage waste recycled,

h)   percentage recycled material used in packaging,

i)   number of service vehicle kilometres per unit of production,

j)   quantities of specific pollutants emitted, e.g. NO_x, SO_2, CO, VOCs, Pb, CFCs,

k)   investment in environmental protection,

l)   number of prosecutions, and

m) land area set aside for wildlife habitat.

4.4 Implementation and operation

General guidance — Implementation and operation

An organization should provide resources, capabilities, structures and support mechanisms necessary to

a)   achieve its environmental policy, objectives and targets,

b)   meet the changing requirements of the organization,

c)   communicate on environmental management system matters with interested parties, and

d)   provide for the ongoing operation and continual improvement of the environmental management system to improve the organization's environmental performance.

To effectively manage environmental matters, the environmental management system can be designed or revised so that it is effectively aligned and integrated with existing management system processes. Such integration can help an organization to balance and resolve conflicts between environmental and other organizational objectives and priorities, if they exist.

Management system elements that can benefit from integration include organization policies, resource allocation, operational controls and documentation, information and support systems, training and development, organization and accountability structure, reward and appraisal systems, measuring and monitoring systems, internal audit processes, and communication and reporting.

4.4.1 Resources, roles, responsibility and authority

The management of an organization should determine and make available appropriate resources to establish, implement, maintain and improve the environmental management system. These resources should be provided in a timely and efficient manner.

19

When identifying the resources needed to establish, implement and maintain the environmental management system, an organization should consider

— infrastructure,

— information systems,

— training,

— technology, and

— financial, human and other resources specific to its operations.

Resource allocations should consider both the current and future needs of an organization. In allocating resources, an organization can develop procedures to track the benefits as well as the costs of its environmental or related activities. Issues such as the cost of pollution control, wastes and disposal can be included.

Resources and their allocation should be reviewed periodically, and in conjunction with the management review to ensure their adequacy. In evaluating adequacy of resources, consideration should be given to planned changes and/or new projects or operations.

Practical help — Human, physical and financial resources

The resource base and organizational structure of a small or medium-sized enterprise (SME) can impose certain limitations on environmental management system implementation. To overcome these limitations, an SME can consider cooperative strategies with

a) larger client and supplier organizations, to share technology and knowledge,

b) other SMEs in a supply chain or local basis to define and address common issues, share experiences, facilitate technical development, use facilities jointly, and collectively engage external resources,

c) standardization organizations, SME associations, chambers of commerce, for training and awareness programmes, and

d) universities and other research centres, to support productivity improvements and innovation.

Successful establishment, implementation and maintenance of an environmental management system depends to a great extent on how top management defines and assigns responsibilities and authority within the organization (see *Practical help — Structure and responsibility*).

The top management should assign (a) representative(s) or function(s) with sufficient authority, awareness, competence and resources to

a) ensure the establishment, implementation and the maintenance of the environmental management system at all applicable levels of the organization, and

b) report to the top management on environmental management system performance and its opportunities for improvement.

The responsibilities of the management representative may include interactions with interested parties on issues pertaining to the environmental management system. The management representative can have a variety of other responsibilities within the organization. In small organizations, the general manager may perform this function.

An organization should define and communicate the responsibilities and authorities of persons working for or on behalf of the organization whose work relates to its environmental management. Environmental responsibilities should not be seen as confined to the environmental function, but can also include other areas of an organization, such as operational management or other staff functions (e.g. purchasing, engineering, quality, etc.). The resources provided by the top management should enable the fulfilment of the responsibilities assigned. The responsibilities and authorities should be reviewed when a change in structure of the organization occurs.

20

Practical help — Structure and responsibility

To ensure effective establishment and implementation of an environmental management system, it is necessary to assign appropriate responsibilities.

The following examples illustrate environmental responsibilities.

Example of environmental responsibilities	Typical person(s) responsible
Establish overall direction	President, chief executive officer (CEO), Board of directors
Develop environmental policy	President, CEO, and others as appropriate
Develop environmental objectives, targets and programmes	Relevant managers
Monitor overall environmental management system performance	Chief environmental manager
Assure compliance with applicable legal requirements and other requirements to which the organization subscribes	All managers
Promote continual improvement	All managers
Identify customers' expectations	Sales and marketing staff
Identify requirements for suppliers	Purchasers, buyers
Develop and maintain accounting procedures	Finance/accounting managers
Conform to environmental management system requirements	All persons working for or on behalf of the organization
Review the operation of the environmental management system	Top management

NOTE   Companies and institutions have different organizational structures and need to define environmental management responsibilities based on their own work processes. In the case of an SME, for example, the owner can be the person responsible for all of these activities.

4.4.2 Competence, training and awareness

Top management has a key responsibility for building awareness and motivating employees by explaining an organization's environmental values, communicating its commitment to the environmental policy, and encouraging all persons working for or on behalf of the organization to accept the importance of achieving the environmental objectives and targets for which they are responsible or accountable. It is the commitment of individual people, in the context of shared environmental values, that transforms an environmental management system from paperwork into an effective process. Persons working for or on behalf of an organization should be encouraged to make suggestions that can lead to improved environmental performance.

An organization should ensure that all persons working for or on behalf of the organization are aware of the importance of conforming to the environmental policy and the requirements of the environmental management system, their role and responsibilities within the environmental management system, the significant actual or potential environmental aspects and associated impacts of their work activities, benefits of improved performance, and the consequences of the departure from applicable environmental management system requirements.

NOTE 1   All persons working for or on behalf of an organization include employees, contractors and, as applicable, other involved parties.

Those persons undertaking work activities that involve (a) significant actual or potential environmental aspect(s) or associated impact(s) should be competent to do so in a manner that meets the requirements of the environmental management system. For those activities that are most important in the management of its environmental aspects, the organization should identify the knowledge, understanding, skills, or abilities that

21

make an individual competent to perform them. Once required competence is identified, the organization should ensure that persons performing these activities have the required competence.

NOTE 2   See 4.5.5 for guidance on auditor competence.

Competence is based on appropriate education, training, skills and/or experience. Competence requirements should be considered in recruiting, training and developing future skills and abilities of persons working for or on behalf of the organization. Competence should also be considered in selecting contractors and others working for or on behalf of the organization.

An organization should identify and assess any differences between the competence needed to perform an activity and that possessed by the individual required to perform the activity. This difference can be rectified through additional education, training, skills development, etc.

Training programmes should reflect the responsibilities defined within the environmental management system and take into account the audience's existing knowledge and understanding of the subject material. Environmental management system-related training programmes can include

a)   identification of employee training needs,

b)   design and development of a training plan to address defined training needs,

c)   verification of conformity with environmental management system training requirements,

d)   training of target employee groups,

e)   documentation and monitoring of training received, and

f)   evaluation of training received against defined training needs and requirements.

Practical help — Competence, training and awareness

Examples of the types of environmental training that can be provided by an organization are as follows

Type of training	Audience	Purpose
Raising awareness of the importance of environmental management	Senior managers	To gain commitment and alignment to the organization's environmental policy
Raising general environmental awareness	All employees	To gain commitment to the environmental policy, objectives and targets of the organization and instil a sense of individual responsibility
Training in environmental management system requirements	Persons with responsibilities in the environmental management system	To instruct on how to meet requirements, conduct procedures, etc.
Skills enhancement	Employees with environmental responsibilities	To improve performance in areas of the organization, e.g. operations, research and development, and engineering
Compliance training	Employees whose actions can affect compliance	To achieve compliance with regulatory training requirements and improve compliance with applicable legal requirements and other requirements to which the organization subscribes.

22

4.4.3 Communication

General guidance — Communication

An organization should establish, implement and maintain procedures for communicating internally and externally on its environmental policy, performance or other information, based on its own needs and the needs of interested parties. Interested parties can include, for example, neighbours, non-governmental organizations, customers, contractors, suppliers, investors, emergency services and regulators.

The purposes and benefits of such communication can include

a) demonstrating the organization's commitment and efforts to improve environmental performance, as well as the results of such efforts,

b) raising awareness and encouraging dialogue about the organization's environmental policy, environmental performance and other relevant achievements,

c) receiving, considering and responding to questions, concerns or other inputs, and

d) promoting continual improvement of environmental performance.

4.4.3.1 Internal communication

Communication between and among the levels and functions within an organization is crucial to the effectiveness of the environmental management system. For example, communication is important for problem solving, for coordination of activities, for follow-up on action plans and for further development of the environmental management system. The provision of appropriate information to an organization's employees serves to motivate them and encourage acceptance of the organization's efforts to improve its environmental performance. This can assist employees to fulfil their responsibilities and the organization to meet its environmental objectives and targets. An organization should have a process to encourage feedback from and involvement of all levels of the organization and receive and respond to employees' suggestions and concerns. It will often be important to provide information to others working on behalf of the organization, such as contractors and suppliers. Results from environmental management system monitoring, audit and management review should be communicated to appropriate persons within the organization.

A variety of internal communication methods are available, for example minutes of meetings, bulletin-board postings, internal newsletters, suggestion boxes/schemes, websites, e-mail, meetings and joint committees.

4.4.3.2 External communication

Communication with external interested parties can be an important and effective tool for environmental management. Proactive methods can increase the effectiveness of external communication. An organization should consider the potential costs and benefits of different approaches in developing a communication plan that is appropriate for its particular circumstances. It should also consider whether to communicate externally to its interested parties about its environmental aspects including those that relate to its supply and product chains.

At a minimum, an organization should establish, implement and maintain procedures for receiving, documenting and responding to relevant communication from external parties. An organization might also find it useful to document its procedure for external communication.

Whatever decisions an organization makes with regard to communicating externally on a proactive basis, its decision should be recorded. An organization should have in place a process for communicating with external interested parties in case of emergency situations or accidents that could affect or concern them.

A variety of external communication methods that can encourage understanding and acceptance of an organization's environmental management efforts and promote dialogue with interested parties are available. Methods of communication include, for example: informal discussions; organization open days, focus groups, community dialogue, involvement in community events, websites and e-mail, press releases, advertisements and periodic newsletters, annual (or other periodic) reports and telephone hotlines.

23

Practical help — Internal and external communication

Examples of information to be communicated include

a) general information about the organization,

b) management statement if applicable,

c) environmental policy, objectives and targets,

d) environmental management processes (including employee and interested party involvement),

e) the organization's commitments to continual improvement and prevention of pollution,

f) information related to environmental aspects of products and services, conveyed through for example environmental labels and declarations,

g) information on the organization's environmental performance including trends (e.g. waste reduction, product stewardship, past performance),

h) the organization's compliance with legal and other requirements to which the organization subscribes, and corrective actions taken in response to identified instances of noncompliance,

i) supplementary information in reports, such as glossaries,

j) financial information such as cost savings or investments in environmental projects,

k) potential strategies to improve an organization's environmental performance,

l) information related to environmental incidents, and

m) sources for further information, such as contact person(s) or websites.

For both internal and external environmental communication, it is important to remember that

— information should be understandable and adequately explained,

— information should be traceable,

— the organization should present an accurate picture of its performance,

— if possible, information should be presented in comparable forms (e.g. similar units of measurement).

4.4.3.3 Communication processes

An organization should take into account its nature and size, its significant environmental aspects and the nature and needs of its interested parties when establishing a communications programme.

An organization should consider the following process steps:

a) gather information, or make inquiries including from interested parties;

b) determine the target audience(s) and information or dialogue needs;

c) select information relevant to the audience's interests;

d) decide on the information to be communicated to the target audience(s);

e) determine which methods are appropriate for communication;

f) evaluate and periodically determine the effectiveness of the communications process.

4.4.4 Documentation

To ensure that its environmental management system is understood and operating effectively, an organization should develop and maintain adequate documentation. The purpose of such documentation is to provide necessary information to employees and other interested parties as appropriate. Documentation should be collected and maintained in a way that reflects the culture and needs of an organization, building onto and

24

improving its existing information system. The extent of the documentation can differ from one organization to another but it should describe the environmental management system (see *Practical help — Documentation* below).

An organization may choose to summarize information in the form of a manual, which constitutes an overview or summary of the environmental management system and can provide direction to related documentation. The structure of any such environmental management system manual need not follow the clause structure of ISO 14001 or any other standard.

For effective management of its key processes (i.e. those related to its identified significant environmental aspects), an organization should establish (a) procedure(s) that describe, in appropriate detail, a specified way of carrying out each process. If an organization decides not to document a procedure, appropriate employees need to be informed, through communication or training, of the requirements to be satisfied (see 4.4.2).

Records, which provide information on results achieved or evidence of activities performed, are part of an organization's documentation, but are generally controlled through different management processes (see 4.5.4).

Documents can be managed in any medium (paper, electronic, photos, posters) that is useful, legible, easily understood and accessible to those needing the information contained therein. There can be advantages to maintaining documents electronically, such as ease of updating, controlling access, and ensuring that all users are using the valid versions of documents.

If processes of the environmental management system are aligned with those from other management systems, an organization can combine relevant environmental documentation with documentation of these other management systems.

Practical help — Documentation

Examples of documents include

a) statements of policy, objectives and targets,

b) description of the scope of the environmental management system,

c) descriptions of programmes and responsibilities,

d) information on significant environmental aspects,

e) procedures,

f) process information,

g) organizational charts,

h) internal and external standards,

i) site emergency plans, and

j) records.

4.4.5 Control of documents

Control of environmental management system documents is important to ensure

a) documents can be identified with the appropriate organization, division, function, activity or contact person,

b) documents (other than records) are regularly reviewed, revised as necessary and approved by authorized personnel prior to issue,

c) the current versions of relevant documents are available at all locations where operations essential to the effective functioning of the system are performed, and

d) obsolete documents are promptly removed from all points of issue and points of use. In some circumstances, for example, for legal and/or knowledge preservation purposes, obsolete documents can be retained.

Documents can be effectively controlled by

— developing an appropriate document format that includes unique titles, numbers, dates, revisions, revision history and authority,

— assigning the review and approval of documents to individuals with sufficient technical capability and organizational authority, and

— maintaining an effective document distribution system.

4.4.6 Operational control

> **General guidance — Operational control**
>
> An organization needs to apply some type of operational controls to meet its environmental policy commitments, achieve its objectives and targets, comply with applicable legal requirements and other requirements to which the organization subscribes and manage its significant environmental aspects. To plan for effective and efficient operational controls, an organization should identify where such controls are needed and for what purpose. It should establish the types and levels of controls that meet the organization's needs. The operational controls selected should be maintained and evaluated periodically for their continuing effectiveness.

4.4.6.1 Identifying needs for operational controls

An organization might use operational controls to

a) manage identified significant environmental aspects,

b) ensure compliance with legal requirements and other requirements to which the organization subscribes,

c) achieve objectives and targets and ensure consistency with its environmental policy, including the commitment to prevention of pollution and continual improvement, and

d) avoid or minimize environmental risks.

When identifying needs for operational controls, an organization should consider all of its operations, including those related to management functions such as purchasing, sales, marketing, research and development, design and engineering; day-to-day process operations such as manufacturing, maintenance, laboratory analysis and product storage; and external processes such as delivery of products and services.

An organization should also consider how contractors or suppliers might affect its ability to manage environmental aspects, achieve objectives and targets, and otherwise comply with applicable legal requirements and other requirements to which the organization subscribes. An organization should establish operational controls that are needed, such as documented procedures, contracts or supplier agreements, and communicate them to its contractors and suppliers as appropriate.

4.4.6.2 Establishing operational controls

Operational controls can take various forms, such as procedures, work instructions, physical controls, use of trained personnel or any combination of these. The choice of the specific control methods depends on a number of factors, such as the skills and experience of people carrying out the operation and the complexity and environmental significance of the operation itself.

A common approach to establishing operational controls includes

a) choosing a method of control;

b) selecting acceptable operating criteria;

c) establishing procedures, as needed, that define how identified operations are to be planned, carried out and controlled; and

d) documenting these procedures, as needed, in the form of instructions, signs, forms, videos, photos, etc.

26

In addition to procedures, work instructions, and other control mechanisms, operational controls can include provisions for measurement and evaluation and for determining whether operating criteria are being met.

An organization may choose to establish procedures to enhance its ability to implement controls in a consistent manner. Operational controls can be a significant component of an organization's environmental management programme(s) (see 4.3.3.2).

Operational controls should be addressed in training those persons involved in control functions to ensure that operational controls are carried out as planned.

NOTE   See 4.4.2 for further guidance on training.

Once operational controls have been established, an organization should monitor the continuing application of these controls as well as the effectiveness of the controls and plan and take corrective actions as needed.

Practical help — Operational control

An organization should consider the different operations associated with its significant environmental aspects when establishing or modifying operational controls and procedures. Examples of such operations include

a) acquisition, construction or modification of property and facilities,

b) contracting,

c) customer service,

d) handling and storage of raw materials,

e) marketing and advertising,

f) production and maintenance processes,

g) purchasing,

h) research, design, and development engineering,

i) storage of products,

j) transportation, and

k) utility processes (e.g. energy and water supply, recycling, waste and wastewater management).

4.4.7 Emergency preparedness and response

An organization should establish, implement and maintain (a) procedure(s) detailing how to identify potential emergency situations and potential accidents that can have an adverse environmental impact(s), and the appropriate mitigation and response actions if such situations occur. The procedure(s) and associated controls should include, where appropriate, consideration of

a) accidental emissions to the atmosphere;

b) accidental discharges to water and land; and

c) specific environment and ecosystem effects from accidental releases.

The procedure(s) should take into account potential consequences of abnormal operating conditions, potential emergency situations and potential accidents.

Practical help — Emergency preparedness and response

It is the responsibility of each organization to establish (an) emergency preparedness and response procedure(s) that suits its own particular needs. In establishing its procedure(s), the organization should include consideration of

a) the nature of on-site hazards (e.g. flammable liquid, storage tanks, compressed gases and measures to be taken in the event of spillages or accidental releases),

b) the most likely type and scale of an emergency situation or accident,

c) the potential for (an) emergency situation(s) or accident(s) at a nearby facility (e.g. plant, road, railway line),

d) the most appropriate method(s) for responding to an accident or emergency situation,

e) the actions required to minimize environmental damage,

f) training of emergency response personnel,

g) emergency organization and responsibilities,

h) evacuation routes and assembly points,

i) a list of key personnel and aid agencies, including contact details (e.g. fire department, spillage clean-up services),

j) the possibility of mutual assistance from neighbouring organizations,

k) internal and external communication plans,

l) mitigation and response action(s) to be taken for different types of accident or emergency situation(s),

m) need for process(es) for a post-accident evaluation to establish and implement corrective and preventive actions,

n) periodic testing of emergency response procedure(s),

o) information on hazardous materials, including each material's potential impact on the environment, and measures to be taken in the event of accidental release,

p) training plans and testing for effectiveness, and

q) process for post-accident evaluation to define corrective and preventive actions.

4.5 Checking

General guidance — Checking

Checking involves measurement, monitoring and evaluation of an organization's environmental performance. Preventive action should be used to identify and prevent possible problems before they occur. Corrective action consists of identifying and correcting problems in the environmental management system.

A process for identifying nonconformity in the environmental management system and taking corrective or preventive action helps an organization operate and maintain the environmental management system as it intends. Keeping records and managing them effectively gives the organization a reliable source of information on the operation and results of the environmental management system. Periodic audits of the environmental management system help the organization verify that the system is designed and operating according to plan. All of these tools support the evaluation of performance.

4.5.1 Monitoring and measurement

An organization should have a systematic approach for measuring and monitoring its environmental performance on a regular basis. Monitoring involves collecting information, such as measurements or

28

observations, over time. Measurements can be either quantitative or qualitative. Monitoring and measurements can serve many purposes in an environmental management system, such as

a) tracking progress on meeting policy commitments, achieving objectives and targets, and continual improvement,

b) developing information to identify significant environmental aspects,

c) monitoring emissions and discharges to meet applicable legal requirements or other requirements to which the organization subscribes,

d) monitoring consumption of water, energy or raw materials to meet objectives and targets,

e) providing data to support or evaluate operational controls,

f) providing data to evaluate the organization's environmental performance, and

g) providing data to evaluate the performance of the environmental management system.

To achieve these purposes, an organization should plan what will be measured, where and when it should be measured, and what methods should be used. To focus resources on the most important measurements, the organization should identify the key characteristics of processes and activities that can be measured and that provide the most useful information.

NOTE   See 4.3.3.3 for further guidance on performance indicators.

Measurements should be conducted under controlled conditions with appropriate processes for assuring the validity of results, such as adequate calibration or verification of monitoring and measurement equipment, use of qualified personnel, and use of suitable quality control methods.

When necessary to ensure valid results, measuring equipment should be calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards. If no such standards exist, the basis used for calibration should be recorded. Written procedures for conducting measurement and monitoring can help to provide consistency in measurements and enhance the reliability of data produced.

The results of measurement and monitoring should be analysed and used to identify both successes and areas requiring correction or improvement.

4.5.2 Evaluation of compliance

An organization should establish, implement and maintain a procedure for periodically evaluating its compliance with the legal requirements that are applicable to its environmental aspects, as part of its commitment to compliance. The organization should record the results of this evaluation.

The scope of a compliance evaluation can encompass multiple legal requirements or a single requirement. A variety of methods can be used to assess compliance, including processes such as

a) audits,

b) document and/or records review,

c) facility inspections,

d) interviews,

e) project or work reviews,

f) routine sample analysis or test results, and/or verification sampling/testing, and

g) facility tour and/or direct observation.

An organization should establish a frequency and methodology for evaluation of compliance that suits its size, type and complexity. Frequency can be affected by factors such as past compliance performance or specific legal requirements. It can be beneficial to have an independent review conducted periodically.

29

A compliance evaluation programme can be integrated with other assessment activities. These can include management system audits, health and safety assessments or inspections or quality assurance checks.

Similarly, an organization should periodically evaluate its compliance with other requirements to which it subscribes (for further guidance on other requirements, see 4.3.2.2). An organization may wish to establish a separate process for conducting such evaluations or it may choose to combine these evaluations with its evaluations of compliance with legal requirements (see above), its management review process (see 4.6) or other evaluation processes. Records of these periodic evaluations should be maintained.

4.5.3 Nonconformity, corrective action and preventive action

For an environmental management system to be effective on an ongoing basis, an organization should have a systematic method for identifying actual and potential nonconformity (-ies), making corrections and taking corrective and preventive action, preferably preventing problems before they occur. Nonconformity is non-fulfilment of a requirement. A requirement may be stated in relation to the management system or in terms of environmental performance. Situations may occur where part of the system may not function as intended or environmental performance requirements are not met.

Examples of such situations can include

a) system performance:

   1) failure to establish environmental objectives and targets;

   2) failure to define responsibilities required by an environmental management system, such as responsibilities for achieving objectives and targets or for emergency preparedness and response; and

   3) failure to periodically evaluate compliance with legal requirements.

b) environmental performance:

   1) energy reduction targets are not achieved;

   2) maintenance requirements are not performed as scheduled; and

   3) operating criteria (e.g. permitted limits) are not met.

The internal audit process of an environmental management system, described in 4.5.5, is one way of periodically identifying nonconformities. Identification of nonconformities can also be made part of routine responsibilities, with individuals closest to the work noting potential or actual problems.

Once a nonconformity is identified, it should be investigated to determine the cause, so that corrective action can be focused on the appropriate part of the system. In developing a plan for addressing a nonconformity, an organization should consider what actions need to be taken to address (mitigate) the problem, what changes need to be made to correct the situation [to restore normal operation(s)], and what should be done to prevent the problem from recurring [to eliminate the cause(s)]. The character and timing of such actions should be appropriate to the nature and scale of the nonconformity and the environmental impact.

If a potential problem is identified but no actual nonconformity exists, preventive action should be taken using a similar approach. Potential problems can be identified using methods such as extrapolating corrective action of actual nonconformities to other applicable areas where similar activities occur, trend analysis, or hazard operability studies.

Management should ensure that corrective and preventive actions have been implemented, and that there is systematic follow-up to ensure their effectiveness.

Establishing procedures for addressing actual and potential nonconformities and for taking corrective and preventive actions helps to ensure consistency in this process. Such procedures should define responsibilities, authority and steps to be taken in planning and carrying out corrective and preventive actions. When the actions taken result in changes to the environmental management system, the process should ensure that all related documentation, training and records are updated and approved, and that changes are communicated to all who need to know.

30

4.5.4 Control of records

Records provide evidence of the ongoing operation and results of the environmental management system. A key characteristic of records is that they are permanent and are, typically, not revised. An organization should determine which records are required to manage its environmental matters effectively. Records should include

a) information on compliance with applicable legal requirements and other requirements to which the organization subscribes,

b) details of nonconformities and corrective and preventive actions,

c) results of environmental management system audits and management reviews,

d) information on environmental attributes of products (e.g. chemical composition and properties),

e) evidence of fulfilment of objectives/targets,

f) information on participation in training,

g) permits, licences or other forms of legal authorization,

h) results of inspection and calibration activity, and

i) results of operational controls (maintenance, design, manufacture).

The effective control of these records is essential to the successful implementation of an environmental management system. The key features of environmental record control include means of identification, collection, indexing, filing, storage, maintenance, retrieval and retention.

4.5.5 Internal audit

Internal audits of an organization's environmental management system should be conducted at planned intervals to determine and provide information to management on whether the system conforms to planned arrangements and has been properly implemented and maintained. They can also be performed to identify opportunities for improvement in an organization's environmental management system.

An organization should establish an audit programme to direct the planning and conduct of audits and to identify the audits needed to meet the programme objectives. The programme should be based on the nature of an organization's operations, in terms of its environmental aspects and potential impacts, the results of past audits, and other relevant factors.

Each internal audit need not cover the entire system, so long as the audit programme ensures that all organizational units and functions, system elements and the full scope of the environmental management system are audited periodically.

The audits should be planned and conducted by an objective and impartial auditor(s), aided by technical expert(s), where appropriate, selected from within the organization or from external sources. Their collective competence should be sufficient to meet the objectives and scope of the particular audit and provide confidence as to the degree of reliability that can be placed on the results.

The results of an internal environmental management system audit can be provided in the form of a report and used to correct or prevent specific nonconformities, fulfil one or more objectives of the audit programme, and provide input to the conduct of the management review.

NOTE   See ISO 19011 for guidance on environmental management system auditing.

31

4.6 Management review

General guidance — Management review

An organization should periodically review and continually improve its environmental management system, with the objective of improving its overall environmental performance.

4.6.1 Review of the environmental management system

An organization's top management should, at intervals that it determines, conduct a review of its environmental management system to evaluate the system's continuing suitability, adequacy and effectiveness. This review should cover the environmental aspects of activities, products and services that are within the scope of the environmental management system.

Inputs to the management review may include

a) results of internal audits and evaluations of compliance with applicable legal requirements and with other requirements to which the organization subscribes,

b) communication from external interested parties, including complaints,

c) the environmental performance of the organization,

d) the extent to which objectives and targets have been met,

e) status of corrective and preventive actions,

f) follow-up actions from previous management reviews,

g) changing circumstances, including

    1) changes in the organization's products, activities and services,

    2) results of the evaluation of environmental aspects from planned or new developments,

    3) changes in applicable legal requirements and other requirements to which the organization subscribes,

    4) the views of interested parties,

    5) advances in science and technology, and

    6) lessons learned from emergency situations and accidents,

h) recommendations for improvement.

Outputs from the review of the environmental management system may include decisions on

— the system's suitability, adequacy and effectiveness,

— changes to physical, human and financial resources, and

— actions related to possible changes to environmental policy, objectives, targets and other elements of the environmental management system.

Records of management review can include copies of meeting agenda items, lists of attendees, presentation materials or handouts, and management decisions recorded in a memo to file, reports, minutes, or tracking system.

Each organization can decide for itself those who will participate in the management review. Typically, this includes environmental staff (who compile and present the information), managers of key units (whose operations include significant environmental aspects or who are responsible for key environmental management system elements, such as training, records, etc.), and top managers (who evaluate the performance of the environmental management system, identify improvement priorities, provide resources, and ensure that follow-up is effective).

32

4.6.2 Continual improvement

General guidance — Continual improvement

Continual improvement is a key attribute of an effective environmental management system.

Continual improvement is accomplished through the achievement of environmental objectives and targets and the overall enhancement of the environmental management system or any of its components.

4.6.2.1 Opportunities for improvement

An organization should continually evaluate its environmental performance and the performance of its environmental management system processes to identify opportunities for improvement. Top management should be involved directly in this evaluation through the management review process.

The identification of environmental management system deficiencies (including actual or potential nonconformities) also provides significant opportunities for improvement. To realize such improvements, an organization should not only know what deficiencies exist, but understand why they exist. This can be achieved by analyzing the root causes(s) of environmental management system deficiencies.

Some useful sources of information for continual improvement include

a) experience gained from corrective and preventive actions,

b) external benchmarking against best practices,

c) intended or proposed changes applicable to legal requirements and other requirements to which the organization subscribes,

d) results of environmental management system and compliance audits,

e) results of monitoring of key characteristics of operations,

f) results of progress towards achieving objectives and targets, and

g) views of interested parties, including employees, customers and suppliers.

4.6.2.2 Implementation of continual improvement

When opportunities for improvement are identified, they should be evaluated to determine what actions should be taken. The actions for improvement should be planned, and changes to the environmental management system should be implemented in accordance with those plans. Improvements need not take place in all areas simultaneously.

Practical help — Examples of improvement

Improvements can be made either within or outside the process of setting and reviewing environmental objectives and targets. Some examples of improvement include

a) establishing a process for evaluating new materials to promote the use of less harmful materials,

b) improving an organization's process for identifying applicable legal requirements so that new compliance requirements are identified in a more timely fashion,

c) improving employee training on materials and handling to reduce an organization's generation of waste,

d) introducing waste water treatment processes to allow water reuse,

e) implementing changes in default settings on reproduction equipment to print two-sided copies at a printing office,

f) redesigning delivery routes to reduce fossil fuel consumption by transportation company(ies), and

g) setting objectives and targets to implement fuel substitution in boiler operations and reduce particulate emissions.

33

Annex A
(informative)

Examples of correspondence between environmental management system elements

Examples provided in this annex are intended to illustrate the correspondence between various elements of an environmental management system. These examples are not intended to represent the only possibilities nor are they necessarily suitable for every region, country or organization.

Table A.1 provides examples showing the relationships between an organization's activities, products, and services, environmental aspects and actual and potential impacts. These are intended to illustrate a variety of scenarios, operating conditions and possible types of impact.

Table A.2 uses some of the same activities, products and services from Table A.1 to show how they can be reflected through an organization's environmental management system. Table A.2 shows a number of possible examples of linkages between environmental aspects, objectives and targets, programmes, performance indicators, operational controls and monitoring and measurement processes.

34

Table A.1 — Examples of activities, products and services and their associated environmental aspects and impacts

Activity/Product/ Service	Aspects	Actual and potential impacts
Activity: Road construction		
Mechanical compaction	Emission of particulate matter to air (dust)	Pollution of air
Construction during heavy rain[a]	Discharge of soil and gravel to land and water	Additional depletion of non-renewable natural resources (replacement of gravel-small stones) Degradation of localized land Erosion of soil Pollution of water Degradation of wetland habitat
Activity: Boiler design (consideration of operational aspects)		
Fuel efficiency	Consumption of fuel	Conservation of non-renewable energy sources (fossil fuels)
Low emissions	Discharges to air	Achievement of air quality objectives
Non hazardous materials	Disposal at end of life	Avoidance of hazardous waste
Activity: Fossil-fuel-based boiler operations		
Operation of boiler	Consumption of heating oil	Depletion of non-renewable natural resources
	Emission of sulfur dioxide (SO_2), nitrous oxide (N_2O) and carbon dioxide (CO_2) (i.e. greenhouse gases)	Pollution of air Respiratory impacts on local residents Acid rain impacts on surface water Global warming and climate change
	Discharge of heated water	Changes to water quality (e.g. temperature)
Storage of boiler fuel in underground tanks	Discharge of oil to land[a]	Pollution of soil Pollution of groundwater
Delivery and transfer of heating oil	Uncontrolled release of heating oil to surface water drain[b]	Pollution of surface water Bioaccumulation of toxic substances in fauna
Activity: Agriculture — Grain cultivation		
In field operations during growth stage/phase	Consumption of water	Depletion of groundwater supply
	Use of pesticides	Pollution of soil Bioaccumulation of toxic substances in fauna resulting in chronic adverse health effects or species loss
	Emission of methane (i.e. greenhouse gas)	Global warming and climate change
Activity: Wastewater management		
Agro food industry wastewater treatment	Generation of sludge (which is applied in agriculture)	Soil correction through the addition of nutrients[d]
Product: Printer toner cartridge		
Refillable toner cartridge	Use of raw materials	Conservation of resources
End of life — disposal	Generation of solid waste[c]	Land use
	Recovery and reuse of components	Conservation of natural resources

35

Table A.1 — Examples of activities, products and services and their associated environmental aspects and impacts (*continued*)

Activity/Product/ Service	Aspects	Actual and potential impacts
Product: Air conditioner		
Consumer operation of unit	Use of electricity[c]	Depletion of non-renewable natural resources
End of life – disposal	Generation of solid waste[c]	Land use
	Recovery and reuse of components	Conservation of natural resources
Service: Maintenance and repair service		
Chemical handling and use	Uncontrolled release during emergency[b]	Pollution of air
		Pollution of soil
		Injury to humans
Subcontracted air conditioner repair	Release of ozone-depleting substances (i.e. refrigerant)[a]	Ozone depletion
Service: Transportation and distribution of goods and products		
Fleet operation	Consumption of fuel	Depletion of non-renewable fossil fuels
	Emission of oxides of nitrogen (NO_x)	Pollution of air – ozone production – smog
		Global warming and climate change
	Generation of noise	Discomfort or inconvenience to local residents
Routine fleet maintenance (including oil changes)	Emission of oxides of nitrogen (NO_x)	Achievement of air quality objectives
	Generation of waste oil	Pollution of soil
[a] Abnormal conditions.		
[b] Emergency conditions.		
[c] Organization may be able to "influence" aspect.		
[d] Beneficial impact.		

36

Table A.2 — Examples of activities, products and services and their associated environmental aspects, objectives, targets, programmes, indicators, operational control, and monitoring and measurement

Aspects	Objectives	Targets	Programmes	Indicators	Operational control	Monitoring and measurement
Activity: Operation of fossil fuel-based boiler						
Consumption of heating oil	Reduce the consumption of non-renewable resources	Reduction of the consumption of heating oil (based on current year consumption) by 20 % within 1 year	Installation of more efficient fuel burners	• Project plan milestones • Consumption of heating oil per working hour of the boiler	• Procedures for installation of modified burners • Procedures for documenting and recording oil consumption	• Quarterly evaluation of progress on project plan • Monthly tracking of oil consumption rates
Discharge of heated water	Minimize the negative impacts to watershed quality from elevated effluent temperature	Reduce mean daily temperature of discharge water by 1 °C by 2008	Facility and design engineers re-engineer operations to extract and re-use heat from wastewater (i.e. co-generation)	• Daily mean temperature of water discharge • Watershed water quality parameters • Number and diversity of marine organisms	• Water quality sampling and analysis procedures • Sampling plan of marine organisms • Co-generation operational procedures • Engineering controls	• Continuous monitoring of temperature of discharge water • Quarterly monitoring of watershed water quality
Product: Air conditioner (consumer operation of unit and end of life — Disposal)						
Use of electricity	Encourage the consumer to use less energy	Reduce the operating temperature by 5 % based on last year's operating temperature by end of current year	Educate consumer on impacts of excessive energy use through distribution of energy-efficienct materials with product (e.g. cost savings, reduced environmental impacts)	• Increased customer interest in energy use • Increased customer interest in new energy efficient products	• Design of effective product material • Use of electrical energy • Consideration of customer energy efficiency requests in new product design	Survey of users
Generation of solid waste	Reduce consumer solid waste generation from disposal of packaging by reducing quantity of packaging materials used	Achieve 35 % reduction in packaging material for current product line by 2008	• Redesign product packaging (Engineering Dept., 6 months) • Implement production changes (6 months) • Test run and full production	• Quantity of packaging material per unit • % reduction in packaging material used for product line • Estimated reduction in consumer solid waste generation volume/unit	• Design control procedures • Product packaging procedures	• Quarterly monitoring of quantity of packaging material used (purchased minus scrap) • Product units shipped in product line

37

Table A.2 — Examples of activities, products and services and their associated environmental aspects, objectives, targets, programmes, indicators, operational control, and monitoring and measurement (*continued*)

Aspects	Objectives	Targets	Programmes	Indicators	Operational control	Monitoring and measurement
Service: Transportation and distribution of goods and products (fleet maintenance)						
Emission of oxides of nitrogen (NO_x)	Increase positive impact on air quality by improving effectiveness of fleet maintenance	Achieve 25 % reduction of NO_x emissions by 2008	• Identify key maintenance parameters for NO_x reduction • Revise maintenance programme to incorporate key NO_x reduction tasks • Optimize fleet maintenance schedule through computer program	• % on-time maintenance • NO_x emissions/km	• Maintenance procedures • Training of maintenance technicians • Computerized notification of scheduled maintenance	• Tracking of maintenance frequency versus schedule • Monitoring of vehicle fuel efficiency • Quarterly testing of vehicle NO_x emissions • Annual assessment of NO_x reductions achieved
Generation of waste oil	Manage oily wastes in conformity with requirements	Achieve 100 % conformity with oily waste disposal requirements at service centres within one year	Develop and implement waste management training programme at service centres	• % of service centre employees trained • Number of waste disposal nonconformities • % of oily waste disposed per requirements	• Waste management procedures • Training programme for service centre employees	• Monitoring of service-centre employee training conducted • Tracking of oily waste disposal quantities and disposal methods • Quarterly assessments of oily waste management practices

38

Bibliography

[1]   ISO 14001:2004, *Environmental management systems — Requirements with guidance for use*

[2]   ISO 9000:2000, *Quality management systems — Fundamentals and vocabulary*

[3]   ISO 9001, *Quality management systems — Requirements*

[4]   ISO 9004, *Quality management systems — Guidelines for performance improvements*

[5]   ISO/TR 10013, *Guidelines for quality management system documentation*

[6]   ISO 14020, *Environmental labels and declarations — General principles*

[7]   ISO 14021, *Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling)*

[8]   ISO 14024, *Environmental labels and declarations — Type I environmental labelling — Principles and procedures*

[9]   ISO/TR 14025, *Environmental labels and declarations — Type III environmental declarations*

[10]   ISO 14031:1999, *Environmental management — Environmental performance evaluation — Guidelines*

[11]   ISO/TR 14032, *Environmental management — Examples of environmental performance evaluation (EPE)*

[12]   ISO 14040, *Environmental management — Life cycle assessment — Principles and framework*

[13]   ISO 14041, *Environmental management — Life cycle assessment — Goal and scope definition and inventory analysis*

[14]   ISO 14042, *Environmental management — Life cycle assessment — Life cycle impact assessment*

[15]   ISO 14043, *Environmental management — Life cycle assessment — Life cycle interpretation*

[16]   ISO/TR 14047, *Environmental management — Life cycle impact assessment — Examples of application of ISO 14042*

[17]   ISO/TS 14048, *Environmental management — Life cycle assessment — Data documentation format*

[18]   ISO/TR 14049, *Environmental management — Life cycle assessment — Examples of application of ISO 14041 to goal and scope definition and inventory analysis*

[19]   ISO/TR 14062, *Environmental management — Integrating environmental aspects into product design and development*

[20]   ISO 19011, *Guidelines for quality and/or environmental management systems auditing*

[21]   *The ISO 14000 Family of International Standards*, International Organization for Standardization, Geneva, 2002

39