No.

HOLDING COMPANY FOR WATER AND WASTEWATER
(HCWW)
SHARKIA POTABLE WATER AND SANITATION COMPANY
(SHAPWASCO)

THE PROJECT
FOR
IMPROVEMENT OF MANAGEMENT CAPACITY
OF
OPERATION AND MAINTENANCE FOR SHAPWASCO
IN THE ARAB REPUBLIC OF EGYPT

PROJECT FINAL REPORT
(SUPPORTING REPORT)

NOVEMBER 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

YACHIYO ENGINEERING CO., LTD.

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Project Final Report (Supporting Report)

1. General

1.1 Material for Open Seminar

1st Open Seminar

The Project for Improvement of Management Capacity of Operation and Maintenance for SHAPWASCO

مشروع تحسين القدرة الادارية للتشغيل والصيانة بشركة مياه الشرب والصرف الصحى بالشرقية

Introduction of the Project

نبذة عن المشروع

10th June 2007

JICA & SHAPWASCO Teams

Contents

المحتويات

Background and History of the Project

خلفية عن المشروع

Background of the Project

SHAPWASCO has been faced with the following issues.

Upgrading Water Supply Facilities

Self-effort by SHAPWASCO

Strengthening of Management Capacity

NOPWASD Contribution

Japan's Grant Aid

Improvement of SHAPWASCO in Facilities and Management

HCWW Support

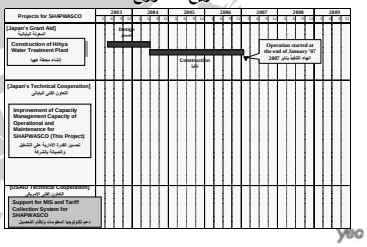
Japan's Technical Cooperation (This Project)

USAID Support (WWSPR)

Better Service to the Citizens of Sharkia Governorate

History of the Project

تاريخ المشروع

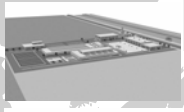


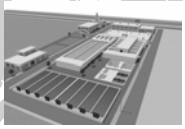
Hihya Water Treatment Plant

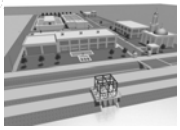
constructed under the Japan's Grant Aid

Capacity : 35,000m3/day

Operation started from January 2007.





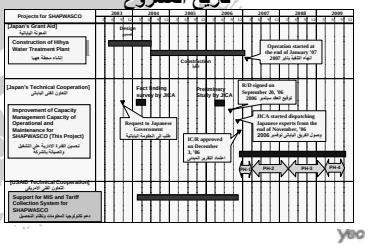


Opening Ceremony

16th May 2007

History of the Project

تاريخ المشروع



Outline of the Project

الاطار العام لمشروع

Improvement of Management Capacity of Operation & Maintenance for SHAPWASCO

تحسين القدرة الإدارية للتشغيل والصيانة بشركة مياه الشرب والصرف الصحي بالشرقية

OVERALL GOAL OF THE PROJECT

Improvement of Management capacity of operation and maintenance of water supply facilities in Sharkia Governorate

الهدف العام من المشروع

تحسين القدرة الادارية لتشغيل وصيانة مرافق امداد المياه فى محافظة الشرقية

PROJECT PURPOSE

Management capacity of operation and maintenance of water supply facilities is improved in target areas(1).

Note (1) Target Areas :

For UFW: Target areas are six (6) pilot project areas in Zagazig City, Zagazig Markaz, Hihya Markaz, Ibrahimiya Markaz and Diarb Nigm Markaz.

For SOP: WTP, booster pump station, Fe/Mn removal plant and well station.

الغرض من المشروع

الغرض من المشروع هو تحسين قدرة التشغيل والصيانة فى مرافق امداد المياه فى المناطق المختارة(1)

(1)المناطق المختارة

فى حالة نشاط تقليل "المياه غير المحاسب عليها" : المناطق المختارة هى مدينة ومركز الزقازيق، مركز هيا، مركز الابراهيمية، مركز ديرب نجم

فى حالة نشاط توحيد التشغيل القياسى: محطات المياه السطحية، محطات الرفع، محطات ازالة الحديد والمنجنيز ومحطات الآبار.

PROJECT OUTPUTS

Output 1
Unaccounted-for water (UFW) ratio is reduced in the pilot project areas.

Output 2
Operation and maintenance capacity of water supply facilities is strengthened.

For Output-1 : UFW reduction activity
For Output-2 : SOP activity
(SOP : Standard Operational Procedures)

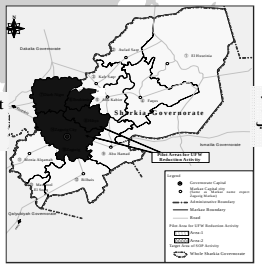
نتائج المشروع

النتيجة الاولى
تقليل نسبة المياه غير المحاسب عليها فى مناطق المشروع التجريبية

النتيجة الثانية
زيادة قدرة الشركة على تشغيل وصيانة مرافق امداد المياه

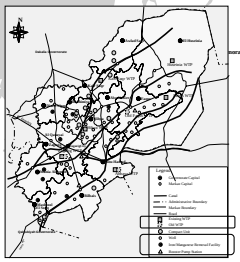
النتيجة الاولى بواسطة نشاط تقليل الفاقد (UFW)
النتيجة الثانية بواسطة نشاط توحيد التشغيل القياسى (SOP)

UFW Pilot Project Areas



نطاق نشاط تقليل المياه غير المحاسب عليها

SOP Target Area



نطاق نشاط توحيد التشغيل القياسى

Actions for UFW Reduction

اجراءات تقليل المياه غير المحاسب عليها

Actions for UFW Reduction

- Training staff for leakage survey and detection in Japan and Egypt
  تدريب العاملين على كشف التسرب فى اليابان ومصر
- Exchanging experiences of UFW reduction activities in Egypt and Jordan
  تبادل الخبرات عن نشاط تقليل الفاقد بين مصر و الاردن
- Preparing GIS drawings
  تجهيز خرائط المعلومات الجغرافية
- Conducting Minimum Night Flow and metering error surveys
  تحديد الاقل تصرف ليلى واخطاء العدادات
- Conducting leakage detection and repairing the leaking parts
  تحديد اماكن التسرب واصلاحها
- Conducting water balance analysis before and after the repair works
  دراسة الاتزان المائى بالشبكة قبل وبعد الاصلاح

Current situation of UFW in the Pilot Project Areas is clarified.	Leakages are detected &repaired.	Techniques for leakage survey and detection are transferred to SHAPW/ASCO
توضيح الموقف الحالى لفاقد الشبكة	اكتشاف واصلاح التسرب	نقل خبرة اكتشاف التسرب الى الشركة

Output-1
النتيجة 1

UFW ratio is reduced in the Pilot Project Areas.
تقليل نسبة الفاقد فى مناطق المشروع التجريبية

Actions for SOP

اجراءات التشغيل القياسى

Actions for SOP

- Preparing basic drawings and O&M/WQC records — اعداد الرسومات الاساسية وسجلات التشغيل والصيانة
- Conducting flow measurements — قياس التصرفات
- Developing SOP in O&M/WQC for model facilities — انشاء خطوات التشغيل القياسى للمرافق التجريبية
- Examining water distribution control practices in the network — فحص اساليب التحكم فى توزيع المياه بالشبكات
- Applying SOPs and developing SOPs for other facilities — تطبيق التشغيل القياسى على التشغيل والصيانة وانشاء خطوات التشغيل القياسى بالمرافق الاخرى
- Formulating O&M plans — اعداد خطط التشغيل والصيانة
- Developing water quality control program — تطوير برامج مراقبة جودة المياه
- Developing well inventory forms and monitoring wells — تطوير نظام حصر مكونات ومراقبة الابار

PI related to measured water production is improved.	SOPs are developed & applied to water supply facilities.	Water quality control & well monitoring are improved.
تحسين مؤشرات الاداء فى قياس المياه المنتجة	تطوير وتطبيق التشغيل القياسى بالشركة	تحسين مراقبة جودة المياه ومراقبة الابار

Output-2
النتيجة 2

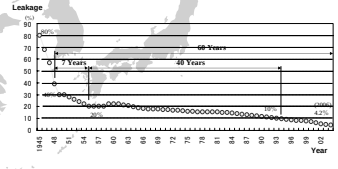
Operation and maintenance capacity of water supply facilities is strengthened.
تدعيم قدرة التشغيل والصيانة لمهمات الامداد بالمياه

General Information on Water Losses (mainly in Japan)
معلومات عامة عن فاقد المياه (من اليابان)

Water Losses in the World

Country	City	Served Population (x 1,000)	UFW	Apparent Loss (Commercial)	Real Loss (Physical)	Year
Japan	Tokyo	12,000	5.8	1.6	4.2	2006
	Yokohama	3,600	8.0	3.6	5.4	2004
	Osaka	2,630	12.2	5.7	6.5	2004
UK	London	7,200			26.5	2000
Russia	Moscow	8,400			10.0	2000
Spain	Madrid	3,100			10.0	2000
Mexico	Mexico City	14,000			35.0	2004
Brazil	Sao Paulo	18,600	45.0	26.0	19.0	2005
Jordan	Amman	1,200	45.0			2004
South Africa	Johannesburg	2,800	19.0	10.0	9.0	2004
Iran	Tehran	8,000	27.6			2004
Malaysia	Sandakan	450	54.0	12.0	42.0	2002
Indonesia	Jakarta	11,000	51.0			2001

Example of Leakage Reduction (Tokyo, Japan)
مثال لتقليل الفاقد من التسرب فى طوكيو، اليابان



Tokyo achieved such low ratio. How?
كيف وصلت طوكيو الى هذه القيمة؟

- ◆ Conducting periodical leakage survey, leak detection and repair (leakage survey once a year for all the zones)

  اجراء مسح دورى للكشف عن التسرب والإصلاح مرة سنويا.
- ◆ Replacing aged pipes steadily with high quality piping materials according to the long-term renewal plan.

  احلال المواسير القديمة بمواسير ذات جودة عالية طبقا لخطة احلال وتجديد طويلة الاجل

Stages of UFW Reduction Activity in Japan

Countermeasures for UFW reduction activities are divided into three works.
يمكن تقسيم نشاط تقليل الفاقد الى ثلاث اعمال رئيسية

① Preliminary works : making survey and analysis of UFW
اعمال تمهيدية: عمل مسح وتحليل لنسبة الفاقد

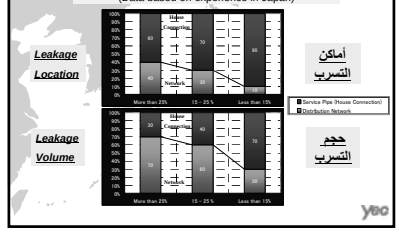
② On-site works : repairing visible and invisible leakage
اعمال موقعية: اصلاح التسرب المرئى والغير مرئى

③ Preventive works : replacing aged pipes
اعمال وقائية: احلال المواسير القديمة

Stage	1st Stage (Decrease Stage)	2nd Stage (Moderate Decrease Stage)	3rd Stage (Recurrence Stage)	4th Stage (Gradual Decrease Stage)	5th Stage (Steady Decrease Stage)	6th Stage (Saturated Stage)
Leakage Ratio	~30%	30%~28%	25%~28%	28%~15%	15%~9%	8%~4%

For Tokyo: 7 Years (Mainly ① & ②) — 40 Years — 13 Years (Mainly ③)

Leakage Occurrence and Volume by Leakage Ratio
تصنيف اماكن التسرب وحجمه طبقا لنسبة للتسرب
(Data based on experience in Japan)



بسم الله

الرحمن الرحيم

Seminar on the project for improvement of management capacity of operation and maintenance for Sharkia Potable Water and Sanitation Company,
10 June 2007, Cairo, Egypt

Introduction of the Third Edition of the WHO Guidelines for Drinking Water Quality

Houssain ABOUZAID
Coordinator, Healthy Environment Programme
WHO/EMRO

Water and Health

- **Water is one of the earth's most**
  - √ **precious and**
  - √ **threatened resources**
- **Health is:**
  - √ **precious to all of us and**
  - √ **equally vulnerable**
- **Water is essential for**
  - √ **maintaining the vital functions**
  - √ **Health protection thru hygiene practices**
  - √ **Well being thru its role in**
    - recreational activities
    - creating pleasant environment
- **Before being a vehicle of health risk**

Water and child nutrition

- **For children already suffering form**
  - √ **severe malnutrition or diarrhea**
- **Clean water is needed**
  - √ **for mixing with**
    - protein powders,
    - therapeutic milk, and
    - oral rehydration salts
  - √ **in feeding centers, clinics, and hospitals**

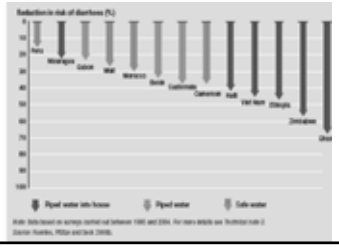
A heavy toll

- **2.2 million deaths per year**
  - √ **due to water supply, sanitation and hygiene related diseases**
- **17 million cases of typhoid:**
  - √ **600,000 deaths per year**
- **Cholera is still a menace**
  - √ **Reintroduction to Latin America, 1991**
- **In 2004, more than 4000 patients with severe diarrhea were hospitalized at Hyderabad, Pakistan**
  - √ **because of consumption of contaminated water**

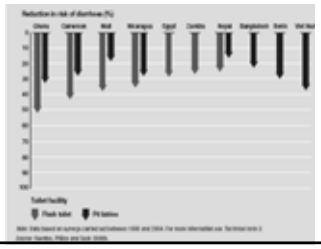
Diarrheas

- **Each year**
  - √ **1,8 million de people, 90% being children under 5**
    - Die of diarrhea
      Including typhoid et and cholera«
  - √ **Most of them in developing countries**
- **88% of diarrhoeal diseases are attributable to**
  - √ **unsafe drinking water**
  - √ **Insufficient sanitation**
  - √ **bad hygiene**

Clean water reduces the risk of diarrhoea.



and so does access to sanitation



Effect of improved water supply, sanitation and hygiene practices

- **Improved drinking water quality :**
  - √ **- 21% of morbidity**
- **Improved sanitation:**
  - √ **- 37,5% of morbidity**
- **Hand washing at given moments during the day:**
  - √ **- 35% in number of cases**

This does not apply only to developing countries

Trachoma

- 500 million cases
  - √ 146 millions are at risk of becoming blind
- For 6 million people
  - √ trachoma causes visual deficiency
- The disease is strongly linked to lack of face washing
  - √ Because people do not have access to a water source
- Access to an improved water source and better hygiene practices
  - √ reduce by 27% the morbidity

Hepatitis

- 1, 5 million hepatitis A cases per year
- Hepatitis E caused major problem
  - √ among vulnerable populations in Darfour, Sudan
  - √ and among refugees in Chad

WHO Core activities in Water Sanitation and Health

- evidence base for policy and strategy
- normative guidelines
- monitoring global status and trends
- tools for good practice
- technical cooperation
- partnerships and information dissemination
- research, development, testing

WHO normative work in environmental health

- WHO normative work has considerable influence on
  - √ *environmental health quality inside countries.*
- this is the case, for:
  - √ *guidelines for drinking water quality,*
  - √ *Guidelines for air quality,*
  - √ *the joint WHO/FAO codex alimentarius standards*
    - *Related to mineral water*

Other WHO Guidelines Concerned with Water, Sanitation and Health

- Guidelines for Safe Use of Wastewater and Excreta in Agriculture
- Guidelines for Safe Use of Wastewater and Excreta in Aquaculture
- Guidelines for Safe Recreational Water Environments
  - √ Coastal and freshwaters
  - √ Swimming pools and spas
- Guide to Ship Sanitation
- Guide to Sanitation in Aviation

WHO Water Guidelines

- Aim
  - Protection of human health
- Features
  - Advisory in nature
  - Support national standard-setting
  - Social, cultural, economic & environmental context
  - Risk-benefit philosophy-
  - Local adaptation to priorities for health gain
- Approach
  - Best available evidence - science and practice
  - Scientific consensus
  - Exploit global information and experience

History of the Guidelines

- 1958, 1963, 1971
  - √ International Standards
- 1984 First edition of "Guidelines"
  - √ basis for setting standards
    - but standards responsibility of states
- 1993 Second edition
  - √ increase in number of chemicals
- 2003 Third edition
  - √ systematic safety approach

WHO Guidelines for Drinking-water Quality

First edition

- 1984 Vol 1
  - Recommendations
- 1986 Vol 2
  - Health Criteria and other supporting information
- 1987 Vol 3
  - Guidelines for drinking-water quality control for small-community supplies

WHO Guidelines for Drinking-water Quality

Second edition

- 1993 Vol 1: Recommendations
- 1996 Vol 2: Health Criteria and other supporting information
- 1997 Vol 3: Surveillance and control of community supplies
- 1998 Addendum to Vol 1 (selected chemicals)
- 1999 Addendum to Vol 2 (selected chemicals)
- 2001 Microbiological Addendum (selected pathogens)

WHO Guidelines for Drinking-water Quality First and Second Editions

Chemical Aspects

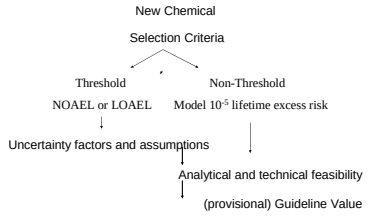
- *Guideline Values*
  - *NOAEL based approach*
    - *for threshold chemicals*
  - *Tolerable risk approach*
    - *for non-threshold chemicals*
- *Provisional GVs*

Radiological Aspects

Organo-leptic Aspects

World Health Organization

Derivation Guideline For Chemicals



Guidelines for Drinking-water Quality The Process

- **Plan of work from IG meetings and proposals**
- **Individuals/teams draft documents**
- **Working groups initial review (and improvement)**
- **Public domain review (and improvement)**
- **"Final Task Force"**
  - **√ meeting of government-nominated experts**

World Health Organization

Guidelines for Drinking-water Quality Contributors

Expert input

> 60 countries

> 600 contributors

World Health Organization

WHO Guidelines for Drinking-water Quality Third Edition *Procedures*

Transparent, more opportunity for comment and participation:

- *Drafting*
- *Peer review*
- *Public domain review*
- *Finalisation*
- *Adoption*

World Health Organization

WHO Guidelines for Drinking-water Quality Third Edition

Microbial Aspects

Substantiation

- ***Groundwater***
- ***Treatment***
- ***Distribution***
- ***Household management***
- ***Indicators and testing***
- ***Hazard characterisation and risk assessment***

World Health Organization

WHO Guidelines for Drinking-water Quality Third Edition

Chemical Aspects

Still approximately 100 chemicals

With consideration of:

- ***Chemical Monitoring Protocol***
- ***Additives***
- ***Pesticides used in public health***
- ***Guidance on good practice***

World Health Organization

WHO Guidelines for Drinking-water Quality Third Edition

Aspects of Protection and Control

- ***Toxic Cyanobacteria***
- ***Legionella***
- ***Arsenic***
- ***Fluoride***
- ***Nitrate and nitrite***
- ***Disinfection practice***
- ***'Additives'***
- ***Safe plumbing***
- ***Bottled water***
- ***Water for travellers***

World Health Organization

WHO Guidelines for Drinking-water Quality Third Edition

Aspects of Protection and Control (continued)

- *Desalination*
- *Indirect re-use of wastewater*
- *Water in emergencies*
- *Small community monitoring*
- *Monitoring urban water supply*

World Health Organization

Additional considerations

- Protocol on risk assessment and monitoring for chemicals.
- Consideration of need for short-term emergency guidance.
- Incorporation of guidance on applications in specific environments (buildings, travelers, ships …)
- Legionella included, specific guidance
- Continuing to evolve
- Receptive to information on concerns

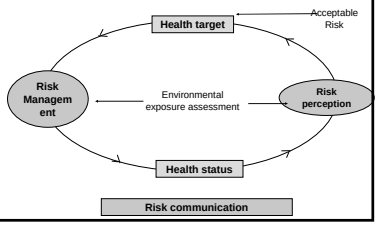
Hazard, Hazardous Events and Risks

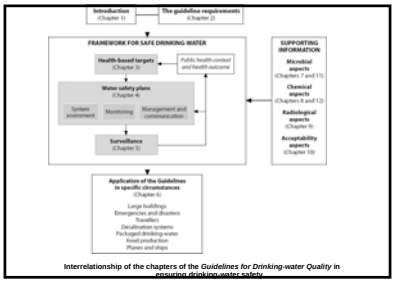
- **Effective risk management requires the identification**
  - √ **of potential hazards**
  - √ **their sources**
  - √ **potential hazardous events**
  - √ **an assessment of the level of risk**
    - presented by each

Hazard, Hazardous Events and Risks
Definitions

- **a hazard is a biological, chemical, physical or radiological agent**
  - √ **that has the potential to cause harm**
- **a hazardous event is an incident or situation**
  - √ **that can lead to the presence of a hazard**
    - what can happen and how
- **risk is the likelihood of identified hazards causing harm**
  - √ **in exposed populations**
  - √ **in a specified time frame**
    - including the magnitude of that harm
    - and/or the consequences

Analysis of health risk





Interrelationship of the chapters of the *Guidelines for Drinking-water Quality* in ensuring drinking-water safety

Microbiological Fact Sheets

17 for bacterial pathogens
7 for viral pathogens
10 for protozoan pathogens
2 for Helminth pathogens
1 for Cyanobacteria
8 for Indicator and index organisms

Microbiological Fact Sheets - 11.1.3 Bacillus

General description

Bacillus **spp. are large (4 - 10mm), Gram-positive, strictly aerobic or facultatively anaerobic encapsulated bacilli. They have the important feature of producing spores that are exceptionally resistant to unfavourable conditions. *Bacillus* spp. are classified into the subgroups *B. polymyxa*, *B. subtilis* (which includes *B. cereus* and *B. licheniformis*), *B. brevis* and *B. anthracis*.**

Human health effects

Although most *Bacillus* spp. are harmless, a few are pathogenic to humans and animals. *Bacillus cereus* causes food poisoning similar to staphylococcal food poisoning. Some strains produce heat-stable toxin in food that is associated with spore germination and gives rise to a syndrome of vomiting within 1 - 5 h of ingestion. Other strains produce a heat-labile enterotoxin after ingestion that causes diarrhoea within 10 - 15 h. *Bacillus cereus* is known to cause bacteraemia in immunocompromised patients as well as symptoms such as vomiting and diarrhoea. *Bacillus anthracis* causes anthrax in humans and animals.

Source and occurrence

Bacillus **spp. commonly occur in a wide range of natural environments, such as soil and water. They form part of the HPC bacteria, which are readily detected in most drinking-water supplies.**

Routes of exposure

Infection with *Bacillus* spp. is associated with the consumption of a variety of foods, especially rice, pastas and vegetables, as well as raw milk and meat products. Disease may result from the ingestion of the organisms or toxins produced by the organisms. Drinking-water has not been identified as a source of infection of pathogenic *Bacillus* spp., including *Bacillus cereus*. Waterborne transmission of *Bacillus* gastroenteritis has not been confirmed.

Significance in drinking-water

Bacillus **spp. are often detected in drinking-water supplies, even supplies treated and disinfected by acceptable procedures. This is largely due to the resistance of spores to disinfection processes. Owing to a lack of evidence that waterborne *Bacillus* spp. are clinically significant, specific management strategies are not required.**

Selected bibliography

Bartram J et al., eds. (2003) *Heterotrophic plate counts and drinking-water safety: the significance of HPCs for water quality and human health*. WHO Emerging Issues in Water and Infectious Disease Series. London, IWA Publishing.

Chemical Fact Sheets

- For 124 products
  - √or group of products

Microbiological Fact Sheets - 12.1 Acrylamide

Source Residual acrylamide monomer occurs in polyacrylamide coagulants used in the treatment of drinking-water. In general, the maximum authorized dose of polymer is 1mg/litre. At a monomer content of 0.05%, this corresponds to a maximum theoretical concentration of 0.5mg/litre of the monomer in water. Practical concentrations may be lower by a factor of 2 - 3. This applies to the anionic and non-ionic polyacrylamides, but residual levels from cationic polyacrylamides may be higher. Polyacrylamides are also used as grouting agents in the consfruction of drinking-water reservoirs and wells. Additional human exposure might result from food, owing to the use of polyacrylamide in food processing and the potential formation of acrylamide in foods cooked at high temperatures.

Guideline value 0.0005 mg/litre (0.5 µg/litre)

Occurrence Concentrations of a few micrograms per litre have been detected in tap water.

Basis of guideline derivation Combined mammary, thyroid and uterine tumours observed in female rats in a drinking-water study, and using the linearized multistage model

Limit of detection 0.032 µg/litre by GC; 0.2 µg/litre by HPLC; 10 µg/litre by HPLC with UV detection

Treatment achievability Conventional treatment processes do not remove acrylamide. Acrylamide concentrations in drinking-water are controlled by limiting either the acrylamide content of polyacrylamide flocculants or the dose used, or both.

Additional comments Although the practical quantification level for acrylamide in most laboratories is above the guideline value (generally in the order of 1 mg/litre), concentrations in drinking-water can be controlled by product and dose specification

Toxicological review

Following ingestion, acrylamide is readily absorbed from the gastrointestinal tract and widely distributed in body fluids. Acrylamide can cross the placenta. It is neurotoxic, affects germ cells and impairs reproductive function. In mutagenicity assays, acrylamide was negative in the Ames test but induced gene mutations in mammalian cells and chromosomal aberrations *in vitro* and *in vivo*. In a long-term carcinogenicity study in rats exposed via drinking-water, acrylamide induced scrotal, thyroid and adrenal tumours in males and mammary, thyroid and uterine tumours in females. IARC has placed acrylamide in Group 2A. Recent data have shown that exposure to acrylamide from cooked food is much higher than previously thought. The significance of this new information for the risk assessment has not yet been determined.

History of guideline development

The 1958, 1963 and 1971 WHO *International Standards for Drinking-water* and the first edition of the *Guidelines for Drinking-water Quality*, published in 1984, did not refer to acrylamide. The 1993 Guidelines established a guideline value of 0.0005 mg/litre associated with an upper-bound excess lifetime cancer risk of 10-5, noting that although the practical quantification level for acrylamide is generally in the order of 0.001 mg/litre, concentrations in drinking-water can be controlled by product and dose specification.

Assessment date

The risk assessment was conducted in 2003.

Principal reference

WHO (2003) *Acrylamide in drinking-water. Background document for preparation of WHO Guidelines for drinking-water quality*. Geneva, World Health Organization (WHO/SDE/WSH/03.04/71).

WHO Guidelines for Drinking-water Quality

- Microbes (infectious agents)
- Chemicals
- Radiological aspects
- Acceptability aspects
- Application 'settings'

World Health Organization

Use of WHO Guidelines

- Scientific basis for national and supra national norms and standards
  - √ e.g. Japan, EU, Australia
- Active participant-users
  - √ e.g. USA, Canada
- Transposition
  - √ e.g. some developing countries
- Used in absence of national standards/GL
- Incorporate practical knowledge
- Used world-wide

World Health Organization

World Health Organization

WHO Guidelines for Drinking-water Quality Third Edition

WHO GDWQ 3rd edition

- Reduced reliance on *output* monitoring
  - √ measuring parameters in final water
- More *input* monitoring
  - √ measuring parameters that show that the system is working
- Short-term quality changes
- Catchment-to-consumer
- Needs transparency openness, inter-sectoral
- Risk-based

World Health Organization

WHO GDWQ 3rd edition Supporting Documents

- Surface water quality protection
- Groundwater quality protection
- Treatment - problem of variability
- Distribution through piped systems
- Non-piped systems, small local systems
- Indicators (in conjunction with OECD)
- Water Safety Plans
- Risk assessment of key pathogens
- Protocol on priority for chemicals
- More than 100 chemical reviews
- Hazard characterization

World Health Organization

Conclusions

- Increasingly holistic approach
- catchment to consumer
  - √ legal/institutional
  - √ Applications
  - √ Risk assessment – risk management
- Microbial contaminants remain top priority
- Limited number of high priority chemicals
- Supporting series of documents
- Rolling revision to be more responsive
- Improved communication

World Health Organization

Where to find the WHO GDWQ?

- **Only the English version of Volume1 of the Third Edition of the WHO Guidelines for Drinking-water quality has been published to date**
- **This is freely available at the following website:**
- http://www.who.int/water_sanitation_health/dwq/gdwq3/en/
- It may also be downloaded from the same site
- **Arabic and French versions are due to follow**
- **You may also find it on the**
  - √**WHO Water Library CD**
  - √**Let us see that!**

THANK YOU!

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