

REPORT

**PACIFIC WATER SAFETY PLANS PROGRAMME
NATIONAL TRAINING AND PLANNING WORKSHOP
REPUBLIC OF PALAU**

Convened By:

**WORLD HEALTH ORGANIZATION
SOUTH PACIFIC OFFICE**

AND

SOUTH PACIFIC APPLIED GEOSCIENCE COMMISSION

Koror, Republic of Palau
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SUMMARY

The Pacific Water Safety Plan Programme National Training and Planning Workshop for Republic of Palau was conducted at the Koror State Building, Koror from 9 to 13 October 2006.

The objectives of the workshop were as follows:

- (1) To improve participants' understanding of the water safety planning process, through practice.
- (2) To prepare draft water safety plans for pilot urban (Koror-Airai) and rural water supplies.
- (3) To prepare a draft National Plan for implementation of Water Safety Plans in Palau.
- (4) To engage all relevant government agencies, NGOs and other potential partners in preparation of draft Water Safety Plans as well as the draft National Plan.

Twenty-five participants representing five key government agencies attended the workshop. The agencies include Bureau of Public Works, Bureau of Lands and Survey, Division of Environmental Health (MoH), Environmental Quality Protection Board (EQPB) and National Emergency Management Office (NEMO).

The workshop comprised group work supported by technical sessions led by invited experts from the New Zealand Ministry of Health and USEPA. A field trip to the Koror-Airai and Ngehesar water supplies provided opportunities to practice the development of Water Safety Plans. In their group work, participants identified key actions needed for the development and implementation of WSPs in Palau. These actions and recommendations are a major component of the draft National Plan.

The Samoa Commitment, the Regional Framework (Nadi, 2005) and the Regional Action Plan on Sustainable Water Management (Sigatoka, 2002) provide the overall policy framework for improving drinking water quality in Palau. These policy documents provided the basis for the draft National Plan, the main outcome of the workshop.

1. INTRODUCTION

1.1 Background

Drinking-water quality control is a key issue in public health policies. From 1950 to 1970 the World Health Organization (WHO) published standards for drinking-water quality that served as a scientific basis for monitoring the quality of the water produced and delivered by water suppliers. Later on, other legislative and regulatory approaches were published by the WHO and the European Union (EU): WHO Guidelines for Drinking Water (1st edition, 1984, and 2nd edition, 1993), and EU Directives 80/778/EC, and 98/83/EC (EC, 1998). This legislation was strongly focused on standards for treated drinking water and on compliance monitoring. Water quality was guaranteed by the so-called end product testing, based on spot sampling of the water produced.

Over the years, several shortcomings and limitations of the end-product testing methodology has been identified. Some of them are related to the following aspects:

- a) There is a multitude of water-borne pathogens that cannot be detected or they can be detected insecurely with the classical indicators *E. coli* Coliforms and *Enterococci*, particularly viruses and protozoa. There are examples of water-borne disease outbreaks (*e.g.*, Milwaukee - U.S.A., in 1993) that occurred through water supply systems that met the standard for absence of indicator microorganisms.
- b) Often, monitoring results are available out of time of intervention needed to maintain the safety of a supply system. End product testing only allows checking if the water delivered was good and safe (or unsafe) after distributed and consumed.
- c) End-product testing hardly can be considered a sound method for representative water quality *status*. A very small fraction of the total volume of water produced and delivered is subject to microbiological and chemical analysis. Moreover, the monitoring frequency does not guarantee representative results in time and space, as well.
- d) End-product testing does not provide safety in itself. Rather is a mean of verification that all the supply system components and installed control measures are working properly.

In recognition of these limitations, primary reliance on end-product testing is presently considered not to be sufficient to provide confidence in good and safe drinking-water, moving towards to process monitoring by introducing a management framework for safe water (Bartram *et al.*, 2001). The 3rd edition of the WHO Guidelines for Drinking-water Quality, (GDWQ) proposes a more effective risk assessment and risk management approach for drinking-water quality control. The *Guidelines* emphasize the multi-barrier principle, establishing a systematic process for hazard identification and effective management procedures for their control through the application of a preventive Water Safety Plan (WSP) that comprises all steps in water protection, from catchments to the consumer.

Three important regional initiatives form the background for the workshop's objectives. The first is the Samoa commitment, issued by Minister of Health of Pacific Island Countries in March 2005, calling *inter alia* for the establishment of Water Safety Plans to ensure safe quality drinking water for Pacific communities. The second is the Regional Action Framework on Drinking Water Quality Monitoring (Nadi, 2005), which was endorsed by Health Ministers of PICs in the Samoa Commitment. The third is the Regional Action Plan for Sustainable Water Management in the Pacific (Sigatoka, 2002), which was developed by the South Pacific Applied Geo-science Commission with support from the Asian Development Bank. The Regional Action Plan was endorsed by 18 countries and signed by 16 Head of States.

1.2 Water Safety Plans

The delivery of safe drinking water is vital for protecting public health and promoting more secure livelihoods of the Pacific communities. Very often, however, assessment of water safety is limited to occasional tests of water quality and insufficient attention is paid to proactive management of water safety.

Growing segments of the population in the Pacific are continuously at risk from water-borne diseases through polluted drinking water sources. This is compounded by the lack of information needed for resource development and protection as well as a lack of awareness of the problems associated with contaminated water.

The importance of safe drinking water for health and development has been reflected in the outcomes of many international forums. Under the millennium development goals countries have committed themselves to achieving inter-related targets for sustainable access to safe drinking water. Pacific island countries through the Regional Action Plan (Sigatoka, Fiji 2002) outlined actions needed to achieve sustainable water management through a collaborative effort. The regional *Framework for drinking water quality* (Nadi, 2005) recognized the need to introduce Water safety Plans in the Pacific Island Countries as a tool to ensure safe quality drinking water for Pacific communities.

A Water Safety Plan (WSP) is an improved risk assessment and management tool designed to ensure the delivery of safe drinking water to consumers. It draws on many of the principles and concepts from other risk management approaches, in particular the multiple barrier approach and HACCP as used in the food industry. By developing a Water Safety Plan, the water supply managers and operators will gain thorough understanding of their system and the risks that must be managed.

Water safety plans place an emphasis on ensuring that processes used to produce safe water is controlled and function in such a way that hazards are excluded from water before delivery to consumers. They are catchment to consumer approach, with actions taken from source protection through treatment, storage and distribution

The development of a WSP involves a systematic approach for:

- preventing the contamination of source waters
- treating water to reduce or remove contaminants; and
- preventing re-contamination during storage, distribution and handling of treated water

In order to do this, the water authority or supplier needs to:

- assemble a team that understands the system;
- identify risks, hazards and hazardous events;
- identify means for controlling these risks, hazards and hazardous events;
- establish a monitoring system to ensure consistent supply of safe drinking water; and
- periodically review the Water Safety Plan.

To develop and establish a WSP, some essential prerequisites are required such as getting commitment from Government, water supply managers and operators.

Once commitment is achieved, a WSP steering committee is established (consisting of relevant stakeholders such as health and environment professionals as well as the water supplier), the water supply system is described and risks identified, control measures are identified and monitoring systems developed.

1.3 Objectives.

The objectives of the workshop were that at the end of the workshop, the participants would have:

1. an improved understanding of the water safety planning process;
2. prepared draft water safety plan for the Koror-Arai and Ngehesar water supplies;
3. prepared a draft National Plan for implementation of Water Safety Plans in Palau;

1.4 Participants

Twenty-five participants from key government institutions attended the workshop. The participants were mainly technical officers and water supply operators (urban and rural) from various government and non-government agencies including Bureau of Public Works, Bureau of Lands and Survey, Division of Environmental Health (MoH), Environmental Quality Protection Board (EQPB) and National Emergency Management Office (NEMO).

A list of participants is provided as Annex 1.

1.5 Organization

The workshop programme is attached as Annex 2. The officers for the workshop were:

Chairperson: Mr. Techur Rengulbai, Bureau of Public Works, Palau.

Facilitators: Ms. Jan Gregor and Mr. Murray Lowe, Ministry of Health, New Zealand.

Technical Expert: Mr. Christopher Bergin, Ministry of Health, New Zealand.

Rapporteurs, Coordination and Logistics: Mr. Mitesh Mudaliar, World Health Organization (WHO) South Pacific Office, Fiji and Mr. Jerome Sakurai, EQPB, Palau.

The workshop comprised group work supported by technical sessions led by invited experts from the New Zealand Ministry of Health. A field trip to the Koror-Airai and Ngehesar supplies provided opportunities to practice the development of Water Safety Plan. Participants were divided into four groups of 6 people. Group work featured prominently throughout the workshop.

On Friday, the outcomes of the workshop were presented back to the Director, Division of Environmental Health, Director, Bureau of Foreign Affairs, Governor of Peleliu State and the National Steering Committee for their endorsement.

1.6 Opening Remarks

Hon. Mr. Victor Yano, Minister for Health, gave the opening address. The Minister's address emphasized the importance of safe quality water for Palau communities and the need for Water Safety Plans to ensure that safe quality drinking water is available for communities in Palau, especially in rural areas.

On behalf of WHO and SOPAC, Mr. Mitesh Mudaliar introduced the Pacific Water Safety Plan Programme.

Ms. Jan Gregor introduced the concept of Water Safety Plans and outlined the objectives of the workshop.

1.7 Technical Inputs

The Ministry of Health, New Zealand provided three experts to facilitate the workshop and provide technical input for training on Water Safety Plan development.

Dr. Jan Gregor, Senior Scientist at Environment and Scientific Research Center, Christchurch, New Zealand is an expert in developing Water Safety Plans for community-based small water supplies as well as large water supplies. Her expertise and experience in working with small-scale water supplies in New Zealand provided valuable information for the participants. Dr. Gregor is also an expert and experienced facilitator a major reason her contribution was secured for the workshop.

Mr. Murray Lowe is a Drinking Water Assessor with the Taranaki District Health Board, New Plymouth, New Zealand. Through his expertise in developing water safety plans and experience in working with small-scale water supplies he provided valuable technical inputs during workshop sessions. Mr. Lowe also assisted Dr. Gregor in facilitating sessions during the workshop.

Mr. Christopher Bergin is a Drinking Water Assessor. Through his expertise in developing water safety plans and experience in working with small-scale water supplies he provided valuable technical inputs during workshop sessions.

2. PROCEEDINGS

2.1 Introduction to Palau Water Supplies

During this session, facilitated by Ms. Jan Gregor the participants gave a presentation describing the Koro/Airai Water Supply. The main source of water in Palau is surface water and very few communities rely on other sources such as groundwater and/or rain water catchment.

The Koror-Airai water supply is the main urban water supply in Palau and supplies about 4 million gallons of water per day to a population of just over 12,000. There are 2 main intakes for this system: Ngerikiil River (1 million gallons per day) and Ngerimel Dam (3 million gallons per day). The capacity of the Ngerimel Dam is just over 20 million gallons, however, it is seriously affected during drought periods and has a history of drying up during serious drought events such as the one in 1998 and 2004.

Water is fed into the Koror-Airai water treatment plant via pumps (Ngerikiil River) and gravity (Ngerimel Dam). Water from both intakes is mixed in a chamber called the 'wet well'. Alum, activated carbon and lime are added to facilitate flocculation and clarification. From the clarifiers, water is gravity fed into a series of five (5) AGV filters, while the sludge is diverted to a series of drying beds. From the filter, water is chlorinated and distributed.

The rural water supplies are similar in design but with less sophisticated technology. Generally, water is pumped from a river or stream, filtered (mainly using an automatic gravity valve-less (AGV) filter), stored, chlorinated and distributed.

In addition to the reticulated water supplies, some of the households have installed rainwater catchment systems as a supplement.

2.2 Introduction to Water Safety Planning

Mr. Christopher Bergin presented on Water Safety Planning. As recommended in the WHO Guidelines for Drinking Water Quality (Third Edition, 2004), water Safety Planning is a comprehensive risk management approach to ensure safe quality drinking water for communities. Water Safety Plans encourage process quality control and ensure that the processes involved in delivering safe drinking-water are operated properly and under full control at all times.

A Water Safety Plan identifies the following:

- the hazards that the water supply is exposed to and the level of risk associated with each;
- how each hazard will be controlled;
- how the means of control will be monitored;
- how the operator can tell if control has been lost;
- what actions are required to restore control; and
- how the effectiveness of the whole system can be verified.

The advantages of having a Water Safety Plan are:

- *More time* spent in the field inspecting the system and undertaking physio-chemical analysis;
- *Reduced* reliance on analysing samples of water for micro-organisms in a laboratory;
- *Operators get to know their system more effectively* as they spend more time identifying and controlling risks rather than just analysing them; and
- Quality processes that provide *feedback loops* and remedial action minimised likelihood of hazard occurring.

2.3 Introduction to the Water Safety Planning Process

Mr. Murray Lowe introduced the processes involved in developing a Water Safety Plan. Each group was given a set of hexagonal shapes with phrases that describe key steps in the water safety planning process, and a set of key questions used in water safety planning. In each group, participants discussed and arranged the shapes and questions in a logical order. The results of each group were presented and discussed.

2.4 Introduction to the National Plan

Mr. Mitesh Mudaliar introduced the concept of preparing a National Plan for implementation of a Water Safety Plan programme for Palau and received feedback from participants on how the National Plan should be drafted. A draft contents page was developed.

2.5 Field Trip

A field trip to the Koror-Airai and Ngehesar water supplies, storage reservoirs and distribution network took place during the morning of the second day. The purpose of the field trip was to put the Water Safety Planning processes especially *system description* and *risk identification* into practice. All workshop participants and resource personnel joined the field trip.

2.6 First round of group work – Preparing Water Safety Plans

After the field trip, the participants began working in four groups of six people to describe the water supplies visited. Each group sketched a diagrammatic layout of the two (2) supplies.

The four groups then proceeded to identify and list risks and hazards that were observed at each intake during the fieldtrip. This was followed by a risk ranking exercise where the participants prioritized the risks or hazards according to their likelihood and seriousness to decide which risks and hazards needed urgent action or improvement.

Based on the results from the risk ranking exercise, the groups identified a list of improvements or actions (Improvement Schedule) that were needed.

At the conclusion of the first round of group work, the participants were able to develop two (2) draft Water Safety Plans, one each for the two supplies visited.

2.7 Second round of group work – Preparing the National Plan

In the second round of group work the participants were required to identify departmental, national and regional level actions that were needed to ensure effective preparation, implementation and evaluation of Water Safety Plans in Palau. The themes from the RAP (Sigatoka, 2002) and the Regional Framework (Nadi, 2005) were used again as themes for the National Plan and actions identified by the participants were accordingly grouped under corresponding themes. The actions, grouped under these five (5) themes constituted the draft National Plan, the main outcome of the workshop.

2.8 Presentation to the National Steering Committee

Early on Friday morning, a special Steering Committee meeting was convened by the secretariat, EQPB. All member agencies were represented. Mr. Mitesh Mudaliar and Ms. Jan Gregor briefed the committee on the draft national plan prepared by the participants. The draft national plan was discussed by the Steering Committee who endorsed it, acknowledging the efforts of the participants and facilitators, however, they also agreed that the plan is a working document and would evolve into a national policy in the near future. The Steering Committee set a deadline of completing the National Plan for submission into the National Congress by February 2007.

2.9 Closing Ceremony

On behalf of the participants Mr. Techur Rengulbai thanked the resource people and urged the participants and the National Steering Committee members to endorse the National Plan and continue the process that began during the workshop. He stressed that WSP programme was too important to leave incomplete.

Mr. Techur Rengulbai then presented the Draft National Plan to the Dignitaries on behalf of the participants.

All participants were thanked for their contribution and were awarded with a certificate of participation. With a vote of thanks from Ms. Portia Franz of EQPB the workshop concluded at 1.00 pm.

3. CONCLUSION

In their group work, participants identified the national and regional level actions needed to establish a Water Safety Plan programme in Palau.

The Regional Action Plan (RAP) for Sustainable Water Management in the Pacific provides the overall policy framework for improving drinking water quality in PICs. The RAP is widely accepted and endorsed by leaders of Pacific Island States as well as regional and international organizations and donor agencies. The Framework for action on Drinking Water Quality Monitoring recommends regional and national efforts towards use of preventative, 'risk management' approaches such as the Water Safety Plan to ensure safe quality drinking water for Pacific communities, as promoted in the WHO Guidelines for Drinking Water Quality, third edition. The Samoa Commitment further endorses this recommendation. Collectively, these regional policy documents provided the basis for the development of the draft National Plan, the main outcome of the workshop.

Representatives of different government agencies contributed significantly towards the development of the draft National Plan during the workshop. These agencies will need to strengthen their relationships to improve multi-agency collaboration and consolidate their efforts in the coming months and years to complete and implement the National Plan.

The following specific recommendations were made in workshop discussions and outcomes:

1. The steering committee should complete the national plan by February 2007 for submission to the National Congress.
2. High level endorsement e.g. from the National Congress should be sought to implement the National Plan;
3. Previous plans on water supply, water resource management, sanitation etc be incorporated into the draft national plan;
4. Donor support will need to be secured to assist with improvements that would require substantial capital works or infrastructure development as well as for capacity building and training of local staff on development and implementation of Water Safety Plans
5. Lessons learnt from similar programmes in neighboring PICs including New Zealand, should be shared
6. The National Steering Committee should solicit continuous support from regional and international organizations including the USEPA and secure expertise to help complete and implement the National Plan as well as prepare and implement Water safety Plans for urban and rural water supplies in the Palau.
7. Community Education and Awareness programmes should be established by government and non-government agencies to inform people about the risks to drinking water and the links with health and hygiene.

8. Water Quality Monitoring and Health Surveillance programmes will need to be strengthened and sharing of information among key agencies should be improved.

4. ANNEXES

ANNEX 1	Workshop Programme
ANNEX 2	Participant List
ANNEX 3	Draft National Plan
ANNEX 4	Draft Water Safety Plan for Koror-Airai water supply
ANNEX 5	Draft Water Safety Plan for Ngehesar water supply

ANNEX 1

WORKSHOP PROGRAMME

Time	Monday 9 October	Time	Tuesday 10 October	Time	Wednesday 11 October
8.30am	Registration	8.30am	Field Trip	8.30am	Planning to Manage Risks
9.00am	Opening of Workshop				
9.30am	Introduction to workshop objectives		Koror Airai system		<i>Group Work</i>
	Group Photograph				
<i>10.30am</i>	<i>Morning Tea</i>		Ngehesar system	<i>10.30am</i>	<i>Morning Tea</i>
11.00am	Introduction to Palau Water Supplies				Planning to Manage Risks (cont..)
<i>12.30pm</i>	<i>Lunch</i>	<i>12.30pm</i>	<i>Lunch</i>	<i>12.30pm</i>	<i>Lunch</i>
1.30pm	Introduction to Water Safety Planning	1.30pm	System Description and Analysis		Developing Activity Matrix for Water Safety Plan Programme Preparation
2.30	Introduction to Water safety Planning Process	3.00pm	Risk identification and ranking		
<i>3.30pm</i>	<i>Afternoon Tea</i>	<i>3.30pm</i>	<i>Afternoon Tea</i>	<i>3.30pm</i>	<i>Afternoon Tea</i>
4.00pm	Introduction to the National Plan	4.00pm	Risk identification and ranking (cont..)		Developing Activity Matrix for Water Safety Plan Programme Preparation (cont..)
4.30pm	End of day	4.30pm	End of day	4.30pm	End of day
Time	Thursday 12 October	Time	Friday 13 October		
8.30am	Developing Activity Matrix for Water Safety Plan Programme Implementation	8.30am	Preparation for Presentation to Steering Committee Screening of the 'PHRMP' Video		
<i>10.30am</i>	<i>Morning Tea</i>	<i>10.30am</i>	<i>Morning Tea</i>		
11.00am	Developing Activity Matrix for Water Safety Plan Programme Implementation		Presentation to the National Steering Committee		
<i>12.30pm</i>	<i>Lunch</i>	11.00am	Workshop Closing		
	Developing Activity Matrix for Water Safety Plan Programme Review and Evaluation	<i>12.30pm</i>	<i>Lunch</i>		
		2.00pm	End of Day		
<i>3.30pm</i>	<i>Afternoon Tea</i>				
4.00pm	Developing Activity Matrix for Water Safety Plan Programme Review and Evaluation (cont)				
4.30pm	End of Day				

ANNEX 2

PARTICIPANT LIST

1	Mr. Techur Rengulbai	Bureau of Public Works
2	Mr. Dalter Takawo	Bureau of Public Works
3	Mr. Kennedy Kotako	Bureau of Public Works
4	Mr. Aderiano Noah	Bureau of Public Works
5	Mr. Kloulubak Towai	Bureau of Public Works
6	Mr. Gino Kamacho	Bureau of Public Works
7	Mr. Micheal Andrew	Bureau of Public Works
8	Mr. Hidencio Kintaro	Bureau of Public Works
9	Mr. Jeremaiah Merep	Bureau of Public Works
10	Mr. Wilson Unbos	Bureau of Public Works
11	Mr. Ignatio Morei	Bureau of Public Works
12	Mr. Lawrence K. Mechecheu	Bureau of Public Works
13	Mr. Petrus Schalboy	Bureau of Public Works
14	Mr. Akira Higuchi	Bureau of Public Works
15	Ms. Bethwel Emul	Koror State, Sanitation
16	Mr. Wilson Takada	Belau National Hospital
17	Ms. Rosalita L. Tadao	Division of Environmental Health
18	Ms. Dorcas Aqiruchelbad	Division of Environmental Health
19	Mr. Nixon Augustine	Division of Environmental Health
20	Mr. Bernard Sikyang	Division of Environmental Health
21	Mr. Terry Mellan	Manager, Majuro Water Supply Co., Marshall Islands

22	Mr. Kurban Samuel Jr.	EPA, Majuro, Marshall Islands
23	Mr. Alonzo Kyota	Director, National Emergency Management Office (NEMO)
24	Mr. Gilbert Demei	Director, Bureau of Lands and Survey
25	Jerome Sakurai	EQPB
26	Mr. Galbraith Gabriel	PALARIS

MEMBERS AT THE NATIONAL STEERING COMMITTEE MEETING

1	Mr. Isaac Soaladaob	Chair and Director, Foreign Affairs
2	Mr. Gilbert Demei	Vice Chair and Director, Lands and Survey
3	Mr. Alonzo Kyota	Vice Chair and Director, NEMO
4	Ms. Portia Franz	Director, EQPB
5	Ms. Eden Uchel	Deputy head, Division of Environmental Health
6	Mr. Gustav Aitaro	Director, BITTA (Representing Director, Bureau of Public Works Mr. John Reklai)
7	Mr. Techur Rengulbai	Head, Division of Utilities
8	Mr. Galbaith Gabriel	PALARIS (Representing Vernice Stefano, Head of PALARIS)
9	Mr. Mitesh Mudaliar	WSP Programme Assistant, WHO (SP)
10	Ms. Jan Gregor	Senior Scientist, ESR, New Zealand
11	Mr. Barry Pollock	Programme Manager, US EPA region 9

