



PACIFIC ISLANDS APPLIED GEOSCIENCE COMMISSION

## TONGA MISSION REPORT

### Water Safety Plans Programme Scoping Mission & Training on H<sub>2</sub>S Paper Strip Test

14 – 21 March 2006

**Tasleem Hasan**

*Community Lifelines Programme*

*February 2007*

*SOPAC Trip Report 403*

#### **Purpose/Objective:**

To be part of the Water Safety Plans (WSP) Team in scoping for relevant partners for the Water Safety Pilot Project in Tonga.

&

To train the Tonga Community Development Trust (TCDT) staff and other relevant stakeholders on the use of the H<sub>2</sub>S paper strip test for water quality monitoring of rainwater tanks.

#### **Mission Itinerary:**

*Tuesday 14<sup>th</sup> March*

am Travel from Nadi to Nuku'alofa

pm Visited Tonga Water Board Laboratory

*Wednesday 15<sup>th</sup> March*

Meetings of WSP team with relevant stakeholders

Meeting Winston Halapua (Central Planning Department)

*Thursday 16<sup>th</sup> March*

am Travel from Nuku'alofa to Vava'u

Meeting Emily Esau (TCDT)

pm Preparation for H<sub>2</sub>S training

*Friday 17<sup>th</sup> March*

Conducted H<sub>2</sub>S training in Vava'u

*Saturday 18<sup>th</sup> March*

Travel from Vava'u to Nuku'alofa

*Monday 20<sup>th</sup> March*

Visiting Tonga Water Lab and meeting chemists  
 WSP Roundtable wrap-up meeting  
 H<sub>2</sub>S training at TCDT office in Nuku'alofa  
 Meeting Gabriel Mafi (AusAID)

*Tuesday 21<sup>st</sup> March*

Travel from Nuku'alofa to Nausori

**Water Safety Plans Programme Scoping Mission***Background*

Four countries have been short listed to host the potential pilot sites for the Water Safety Plans Programme funded by AusAID. Tonga is among one of the four short-listed countries. The reason for the WSP scoping mission was to consult with relevant stakeholders to determine the scope/interest and secure commitment of key counterparts.

*The WSP Team:*

Davendra Nath, SOPAC  
 Steve Iddings, WHO  
 Mitesh Mudiliar, WHO  
 Tasleem Hasan, SOPAC

*Outcomes*

The WSP team met with the relevant stakeholders as per the programme scheduled by the Tonga Water Board. I was part of the team for majority of the sessions except for the times and dates specified above in the mission itinerary.

The detailed WSP scoping mission report has been prepared by the WHO staff.

**Contacts Made***15 March 2006*

**Winston Halapua**, Head of the Regional and Rural Division and the Officer In charge of the Japanese Grassroots Programme (GGP) in Tonga.

The Japanese Government offers a financial assistance programme for development projects designed to meet the diverse needs of developing countries. Known as the "Grant Assistance for Grassroots Human Security Projects" (GGP), this scheme supports NGOs and local government authorities. The Central Planning Department (CPD) of Tonga is one of the recipients of the grant.

Currently the CPD is involved in installing new water supply systems in six communities in Tonga of which four are in Vava'u and two in Nuku'alofa. Basically the design is to construct in each community a big tank which will have a bore as its water source. The water from the tank will then be reticulated to the communities. The water supply will be metered and the money recovered is to be used for maintenance of the system. So far the CPD has constructed the tanks and are now in the process of laying pipes for reticulation.

After the system is in place and functioning, CPD will monitor it for maintenance purposes. However, they lack the capacity to test for the quality of their water supply. Mention was made of the simple H<sub>2</sub>S test kit that could be employed to monitor the quality of water and an invite was extended to Winston for attending the H<sub>2</sub>S training workshop that would be held on 20<sup>th</sup> March in Nuku'alofa. Winston accepted the invitation with enthusiasm and requested if his counter-part in Vava'u could be included in the H<sub>2</sub>S training during the Vava'u workshop scheduled on the 17<sup>th</sup> of

March. Winston also requested for some basic designs on village water reticulation systems. **Mathias** to follow up and provide necessary assistance.

Suggestion to meet Miss Konosu, Deputy High Commissioner, Japanese Embassy in Suva was proposed by Winston to enable SOPACs possible assistance in GGP for water related projects. **Tasleem** to discuss with Marc before proceeding.

Materials provided to Winston:

Rainwater Harvesting Guidelines and Manual

Brief report on H<sub>2</sub>S test kit.

Handbook on Water Quality Monitoring in Pacific Island Countries.

*17 March 2006*

**Leopino Faevalo** – Public Health Inspector, Ministry of Health, Vava'u

Leopino was a participant at the Vava'u training on H<sub>2</sub>S paper strip test. After the training, I accompanied him to his office at the Prince Ngu Hospital where his role in water quality monitoring was discussed. He mentioned that he sends 3-4 samples from around the rural areas of Vava'u for faecal testing once a month to the Vailoa Hospital Lab in Nuku'alofa. The sampling points vary from tanks to the distribution system. The Vailoa Lab calls Leopino and advises him if the samples show faecal counts of unsatisfactory levels. Following this Leopino often attends to the contaminated tanks and chlorinates the water. However, there is no proper notification system/schedule in place and often there is no feedback from Vailoa lab. At the time of visit, there was no chlorine stock at hand for the past two months.

**Recommendation:** The chlorinating of tanks will only get rid of the problem temporarily and after the effect of chlorine has faded away, the contamination will return. Proper sanitary surveying should be done to actually determine the source of contamination to minimise and/or eliminate it.

**Action:** This would be incorporated as part of the rural WSP pilot project in Tonga.

*20 March 2006*

**Gabriel (Kapelieli) Mafi**, Programme Manager (Development Cooperation), AusAID

Discussed about rainwater tank projects in Ha'apai. AusAID has been a major donor for rainwater projects in Ha'apai for almost 3-4 years now. Their major implementing agency is the Central Planning Office and they handle the construction of the rainwater tanks. The arrangement is one where AusAID provides 90% of support to the community and the community in turn has to come up with the remaining 10%.

Currently there is no standard for rainwater tank design in Tonga. CPD hires contractors for building the tanks and observations during the mission revealed that most of the tanks lack the basic design for its maintenance and cleaning. Information was provided on the draft minimum standard for rainwater tank design that was prepared by Steve Iddings for Ministry of Health during the mission. Gabriel requested for the draft standard stating that it would be very useful. **Steve** to provide Gabriel with the draft.

The manual and guideline on rainwater harvesting was provided to Gabriel. He was pleased to see a document of such nature, which was in fact produced in Tonga.

**Recommendation:** There should be more circulation of the Rainwater Harvesting Guidelines and Manuals around the region, especially to implementing agencies and donors who support rainwater tank projects. In the case of Tonga, neither the CPD nor AusAID was aware of the publication of these documents.

### **H<sub>2</sub>S Paper Strip Test and Sanitary Survey Training**

The training was conducted upon the request of the TCDT at two venues. The first was in Vava'u on the 17<sup>th</sup> of March while the other was in Nuku'alofa on the 20<sup>th</sup> of March.

### *Vava'u Training – 17 March 2006*

Participants list:

Melehifo Latuila – OIC, Water/Development Division, Ministry of Agriculture and Food  
 Petsitoni Havea – Plumber, Tonga Water Board  
 Alaipuke Esau – President, Vava'u Youth Congress  
 Ofa Halaifonua – Manager, Tonga Water Board  
 Sipefilaiti Fusi – Central Planning Department  
 Salote Finau – Central Planning Department  
 Leopino Faevalo – Public Health Inspector, Ministry of Health  
 Emily Esau – Project Officer, Tonga Community Development Trust  
 L'aie Tonga – Governor's Office

The participants for this training especially convened to translate the rainwater harvesting guidelines into Tongan. This is one of the activities to be completed by TCDT under a new contract it signed with SOPAC. It was therefore timely that I was joining the WSP team for their scoping mission, a request by TCDT to conduct training on the use of H<sub>2</sub>S test kits and sanitary survey forms was proposed.

A power point presentation on the importance and use of H<sub>2</sub>S tests in water quality monitoring was delivered. Examples on how to fill in the sanitary survey forms on rainwater systems and its correspondence to the H<sub>2</sub>S results were also shown. Following these theoretical aspects a field trip to 'Utungake Village on the practical use of the H<sub>2</sub>S tests and sanitary survey forms was carried out.

Due to a funeral in the village, only a small number of tanks at the far end of the village were surveyed and tested. At the end of the day, the participants took their respective H<sub>2</sub>S kits, the H<sub>2</sub>S result form and sanitary survey sheets for observing and recording of results over the required 3-day period for the H<sub>2</sub>S test. The participants gained a better and clearer picture on the use of the H<sub>2</sub>S kits and sanitary survey forms whilst out doing the practical work in the village. Emily assured that she would visit each participant on Tuesday (21<sup>st</sup> March) to recover the results. **Tasleem** to follow up with Emily and help her collate the results of the H<sub>2</sub>S tests and the sanitary survey.

An additional one-day workshop for the participants to discuss the contents of the translated version of the rainwater harvesting manual is proposed to be held in 2-3 weeks. **Emily** is to discuss the interpretation of results and in particular make correlation of the H<sub>2</sub>S results with sanitary survey done during this training. **Tasleem** to follow up with Emily.

### *Nuku'alofa Training – 20 March 2006*

Participants List:

Viliame Soakai – TCDT  
 Alfred Vaka – TCDT  
 Kalolaine Kavaefiate – TCDT  
 Matavai Mafoa'aeata – TCDT  
 'Ofa Fakalata – TCDT  
 Una Taumoepeau – TCDT  
 Martin Pritchard – TCDT

Lopeti Senituli, the director of TCDT requested training on H<sub>2</sub>S test kit in Nuku'alofa as was done in Vava'u for the benefit of his staff based in the main office. The basic structure of the training was the same as for the Vava'u training. However, the staff did not have hands-on training on the use of the H<sub>2</sub>S kit. The practical aspect of the training was not covered due to rainy weather. It was assuring to learn from the participants that they would each take a kit and a sanitary survey form home to do water quality testing and share their results and experiences at one of their regular staff meetings.

Winston Halapua of the Central Planning Department sent his apologies for not attending the H<sub>2</sub>S training. Some materials were left with 'Ofa Fakalata for him and these included:

- Report on using H<sub>2</sub>S test kit (SOPAC Technical Report 373);
- 15 H<sub>2</sub>S paper test kits;
- H<sub>2</sub>S test result recording sheets; and
- Sanitary survey forms for small piped systems.

## Status of Tonga Water Board Laboratory

### Staffing

The TWB lab employs two full-time staff. They are Timote Fakatava (Head Chemist) and Timote Kaufusi (Lab Assistant).

### Sample Testing

Currently, the water quality tests performed by the TWB include faecal coliform (FC), electrical conductivity and residual chlorine. These tests are performed **once a month** on samples from the 4 island groups of Nuku'alofa, Vava'u, Ha'apai and 'Eua. The analysis of FC is performed in the lab while the other tests are done on site. Timote Fakatava and Timote Kaufusi are responsible for the sampling around Nukualofa. For the outer island groups, the TWB staff based there send over the FC samples to the TWB lab and perform the rest of the analysis on site. Table 1 below summarises the number of samples taken for testing from the 4 island groups mentioned. It should be noted that:

- for a particular parameter all the sampling locations are visited on the same day for each island. For example, all FC testing in Nuku'alofa is done on the same day.
- the dates vary for the different island groups.
- Residual chlorine and EC are tested from the same location and on the same day. However, some additional sites are tested for EC.
- FC is analysed on a separate day to EC and residual chlorine.

Table 1: Number of samples tested for each island group per month

Test performed - parameters	Number of sample for each island group			
	Nuku'alofa	Vava'u	Ha'apai	'Eua
Faecal coliform	18	6	7	6
Electrical conductivity	6 tanks 16 distribution 20 wells	3 tanks 9 distribution 9 wells	3 tanks 11 distribution 3 wells 5 galleries 3 private wells	-
Residual chlorine	18	10	11	6

The population served by the TWB in Nuku'alofa is around 30,000. According to the *Municipal Drinking Water Guidelines (EPB 202, edn 2) 2004*, the minimum number of samples taken for bacteriological testing of groundwater drinking source for a population range from 15,000 to 50,000 should be 1 per 8,000 population/week which is the case of Nuku'alofa should be **3 - 4 samples per week**.

Surveillance of treated water for chlorine residual for all communities, regardless of population size, is necessary to properly regulate the chlorination process. Both free and total chlorine residual monitoring is necessary to get a complete picture. The minimum basic monitoring for residual chlorine according to the *Municipal Drinking Water Guidelines* is:

- **once per day** from treated water at the treatment site, and

- **two per week** from the distribution system, which can be the same locations used for bacteriological sampling.

As such the stated number and frequency of analysis is far short of the guidelines.

It is also short of the WHO (2004) guidelines which states that the minimum number of samples that should be taken for drinking water testing for a population over 10,000 is 7 samples +1 extra sample per 5,000 population – at works outlet, 1 at storage tank and the rest in the network. One set of monitoring samples for every 5,000 people should be taken each month. Therefore, in the case of Nuku'alofa 6 sets of monitoring samples should be taken per month.

**Recommendation:** A proper drinking water quality monitoring programme should be drafted for the TWB. The **WSP team** could do this as part of the WSP pilot project in Tonga.

### **Pasteur Institute Support**

The TWB lab exhibited new equipment received with support from the Institute of Pasteur, Noumea. The new equipment adds capacity for the TWB laboratory that did not exist previously. The new capacity could be very useful for increasing the range and quality of analyses. However, discussions with the lab staff exposed some of the following about the equipment supplied by IP:

- The spectrophotometer does not have the operational manual or the reagents for testing.
- The water purification system is not functional at the moment. The lab has to get their distilled water from the hospital lab. This is a free service provided by the hospital lab to TWB.
- No training was given to the lab staff on the Perimatic media operator, only the manual was provided. The media operator automatically distributes the media on the agar plate. The agar plates are still prepared by the analysts manually, as was the case before.
- Some equipment like the laminar flow cabinet and the filtration manifold did not arrive during the period Ann Marie from IP was there (last week of February 2006). She came to install the IP supplied equipment and to provide some basic training on the use of the equipment. The remaining equipment has still not reached TWB lab.

#### *Other concerns expressed by the lab staff were:*

- The \$10,000 euro support provided by IP has been exhausted, hence the consumables for the spectrophotometer may not arrive and with the already tight budget of the TWB to meet the needs of the regular lab reagents, it may take even longer.
- The training provided by IP to Timote Kaufusi was on the operation of similar but different equipment to the one supplied to TWB.

#### *Need expressed by lab staff:*

The lab staffs feel that training on quality control and quality assurance procedures would be useful and I strongly agree with that. **Tasleem** to explore the possibility of training the lab staff under the proposed NZAID programme.

#### *Other details:*

The lab staff do not have a proper logbook to record the results at the time of analysis. They record the results on paper and transfer it to an excel spreadsheet on a computer outside the lab building. Whilst out in the field in Nuku'alofa, Timote Kaufusi records the results in his diary and later transfers it to the excel spreadsheet. It was mentioned that some of the data was unavailable due to loss of a flash drive containing the results. Kaufusi's diary seems to be the only hard copy of the result data. Some results sheets containing analysis data for outer islands were seen but it was not properly organised and filed.

**Recommendation:** Training on the proper recording, storage and retrieval of data is required by the lab staff. **Tasleem** to explore the possibility of training the lab staff under the proposed NZAID programme.

## Photo Gallery



*The spectrophotometer provided by IP lacks the manual & consumables.*



*The membrane filtration used by TWB lab – that not a very clean space for bacto analysis.*



*The sterilizer provided by IP – in working condition.*



*The water purification system – currently not functional.*



*The perimatic media operator – lab staff not trained on its operation.*

## Contact Details

1. **Winston Halapua**  
Head of the Regional and Rural Division  
Central Planning Department  
Tonga  
E-mail: [winstonh@cpd.gov.to](mailto:winstonh@cpd.gov.to)
  
2. **Gabriel (Kapelieli) Mafi**  
Programme Manager (Development Cooperation)  
Australian Agency for International Development  
Australian High Commission  
Tonga  
Telephone: (676) 23244  
E-mail: [mafi@dfat.gov.au](mailto:mafi@dfat.gov.au)