

# Myanmar

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## 1. Introduction

Myanmar is currently exporting seafood and is desirous of exporting to European Union (EU), Australia, Japan, U.S.A, Canada, Middle East, ASEAN Countries and China. The international market is becoming more demanding on food safety and quality standards. The role of the department is to ensure the wholesomeness and public health safety of fish and fish products for human consumption as well as to meet health and sanitary requirements of importing countries.

## 2. Objectives And Goals

- To determine the heavy metals in fish and fish products in Myanmar.
- To obtain the baseline level of heavy metals in fish and fish products in Myanmar
- To set up the monitoring programme on heavy metals in fish and fish products in Myanmar
- To provide data for Fish and Fish Products Safety Information Network for seafood safety programme

## 3. Survey Methodologies

### a. Sampling Method, Location, Species, Number of Samples and Sampling Size

Sampling Method: Random sampling (n =7)

#### 1<sup>st</sup> & 2<sup>nd</sup> Quarters

Location: Yangon Division (Kyauk Tan & Twentee Aquaculture zone)  
Ayeyarwaddy Division (Nyaung Done Aquaculture zone Minzarni processing plant)  
Tanintharyi Division (United Myeik, Pyi Phyoo Tun & Vantage Processing Plant in Myeik)  
Rakhine State (Thantwe Marine Processing Plant)

Species & Sampling Size: 1<sup>st</sup> Quarter (Oct 2006 Jan 2007)

Black Tiger Shrimp (31/35 size x1kg)  
Snake Head (0.5-1.0 kg x 7)  
Striped Catfish (2-3 kg x7)  
Squid (Total 1 kg)  
Cuttle Fish (Total 1-kg)

Species & Sampling Size: 2<sup>nd</sup> Quarter (Dec 2007 - April 2008)

Rohu (2-3 kg x 7)  
Grouper (0.5-1.0 kg x 7)  
Sea bass (0.5-1.0 kg x7)  
Squid (Total 1 kg)  
Cuttlefish (Total 1 kg)  
Giant Freshwater Prawn (Total 1 kg)

Number of Samples: 1<sup>st</sup> Quarter = 105  
2<sup>nd</sup> Quarter =126  
Total number = 231

Sample Preparation: Edible portions of fish and fish muscle tissue was used for testing.

### b. Method of Analysis

#### Method References

(1) Total Mercury  
AOAC Official Method 977.15  
GBC AA Hydride System HG 3000 Operation and Services Manual  
ISO/IEC 17025 Accredited Methods, MFRD

(2) Total Cadmium  
AOAC Official Method 973.34  
GBC Graphite System 3000 Methods Manual for Atomic Absorption Spectrometry  
ISO / IEC 17025 Accredited Methods, MFRD

(3) Total Lead  
 AOAC Official Method 973.34  
 GBC Graphite System 3000 Methods Manual for Atomic Absorption Spectrometry  
 ISO / IEC17025 Accredited Methods, MFRD

**Brand of Instrument**

GBC 932 Double Beam Atomic Absorption Spectrometer (Australia)  
 GBC System 3000 Automated Graphite Furnace System  
 GBC HG 3000 Auto Hydride and Vapour Generator

**Limit of Quantification (LOQ)**

(i) Total Mercury = 0.099 ppm  
 (ii) Total Cadmium = 0.0404 ppm  
 (iii) Total Lead = 3.235 ppm

**c. Limit of Detection and Limit of Quantification**

Limit of Detection (LOD)

(i) Total Mercury = 0.199 ppb  
 (ii) Total Cadmium = 0.497 ppb  
 (iii) Total Lead = 0.763 ppb

**d. National Regulatory Limits**

There is no national regulatory limits in Myanmar. The Department of Fisheries (DOF) is complying and adopting mainly the European Union (EU) Standards and the importing countries' regulations.

Table 1. Maximum Permitted Level in Fish & Fish Products, Enforced by EU, USA, Canada and Japan.

Type of Chemical Hazards	Product Types	EU	USA	Canada	Japan
Mercury (Hg)	All Fish & Shell Fish Products	1.0 ppm	1.0 ppm	0.5 ppm	0.4 (total Hg) 0.3 (methyl Hg)
Lead (Pb)		0.4 - 1.0 ppm	1.5 - 1.7 ppm	0.5 ppm	not set
Cadmium (Cd)		0.1 - 1.0 ppm	3.0 - 4.0 ppm	0.5 ppm	not set

**4. Results And Discussion**

**a. Participation in Inter-laboratory Proficiency Testing and Results**

Year of participation	Program Name	Analyte Tested	Reported results	True value	z-score	Remarks
2004	Regional Inter-Laboratory Proficiency Testing For SEAFDEC Key Laboratories Metallic Contaminants Series, Round 0401 Ref no: 07	Total mercury	2.05 ppm	3.37 ppm	-1.288	Passed

**b. Survey Results and Discussion**

Table 2. Result of Total Mercury in Fish and Fish Products Surveyed in 2006.

Year of analysis & Sampling location	Analyte	Fish sample analysed		No. of samples analysed	Min. value of results (ppm) – wet weight basis	Max. value of results (ppm) – wet weight basis	Average value of results (ppm) – wet weight basis	Remarks
		Common name	Scientific name					
2006 (Oct) Kyauk Tan Aquaculture Zone, Yangon Division	Total Mercury (Hg)	Black Tiger Shrimp	<i>Penaeus monodon</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Aquacultured (Fresh/Chilled)
2006 (Nov) Central Fish Market (wholesale market) Kyí Myin Daing Township Yangon, Division		Snake Head	<i>Channa striata</i>	7	Not Detected	Detected but not quantifiable	Detected but not quantifiable	Captured (Fresh/Chilled)
2006 (Nov) Nyaung Done Aquaculture Zone, Ayeyarwaddy Division		Yellowtail Cat Fish	<i>Pangasius pangasius</i>	7	Not Detected	Detected but not quantifiable	Detected but not quantifiable	Aquacultured (Fresh/Chilled)
2006 (Nov) Vantage Processing Plant in Myeik Tanin - Tharyi Division		Squid	<i>Loligo divaueceli</i>	7	0.0597	0.0935	0.0766	Captured (Frozen)
2006 (Nov) Vantage Processing Plant in Myeik, Tanin - Tharyi Division		Cuttlefish	<i>Sepia pharaonis</i>	7	0.0540	0.0794	0.0667	Captured (Frozen)

Table 3. Result of Total Cadmium in Fish and Fish Products Surveyed in 2006.

Year of analysis & Sampling location	Analyte	Fish sample analysed		No. of samples analysed	Min. value of results (ppm) – wet weight basis	Max. value of results (ppm) – wet weight basis	Average value of results (ppm) – wet weight basis	Remarks
		Common name	Scientific name					
2006 (Dec) Kyauk Tan Aquaculture Zone, Yangon Division	Total Cadmium (Cd)	Black Tiger Shrimp	<i>Penaeus monodon</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Aquacultured (Fresh/ Chilled)
2006 (Dec) Central Fish Market (wholesale market) - Kyi Myin Daing Township Yangon , Division		Snake Head	<i>Channa striata</i>	7	Not Detected	Detected but not quantifiable	Detected but not quantifiable	Captured (Fresh/ Chilled)
2006 (Dec) Nyaung Done Aquaculture zone, Ayeyarwaddy Division		Yellowtail Cat Fish	<i>Pangasius pangasius</i>	7	Not Detected	Detected but not quantifiable	Detected but not quantifiable	Aquacultured (Fresh/ Chilled)
2006 (Dec) Vantage Processing Plant in Myeik, Tanin - Tharyi Division		Squid	<i>Loligo duvauceli</i>	7	0.0597	0.0935	0.0766	Captured (Frozen)
2006 (Dec) Vantage Processing Plant in My- eik, Tanin - Tharyi Division		Cuttlefish	<i>Sepia pharaonis</i>	7	0.0540	0.0794	0.0667	Captured (Frozen)

Table 4. Result of Total Lead in Fish and Fish Products Surveyed in 2006.

Year of analysis & Sampling location	Analyte	Fish sample analysed		No. of samples analysed	Min. value of results (ppm) – wet weight basis	Max. value of results (ppm) – wet weight basis	Average value of results (ppm) – wet weight basis	Remarks
		Common name	Scientific name					
2006 (Dec) Kyauk Tan Aquaculture Zone, Yangon, Division	Total Lead (Pb)	Black Tiger Shrimp	<i>Penaeus monodon</i>	7	Not Detected	0.0143	0.0076	Aquacultured (Fresh/Chilled)
2006 (Dec) Central Fish Market (wholesale market) - Kyi Myin Daing Township Yangon, Division		Snake Head	<i>Channa striata</i>	7	0.0322	0.0815	0.0517	Captured (Fresh/Chilled)
2006 (Dec) Nyaung Done Aquaculture Zone, Ayeyarwaddy Division		Yellowtail Cat Fish	<i>Pangasius pangasius</i>	7	0.0033	0.0543	0.0365	Aquacultured (Fresh/Chilled)
2006 (Dec) Vantage Processing Plant in Myeik, Tanin - Tharyi Division		Squid	<i>Loligo duvauceli</i>	7	0.0738	0.1126	0.0937	Captured (Frozen)
2006 (Dec) Vantage Processing Plant in Myeik, Tanin - Tharyi Division		Cuttlefish	<i>Sepia pharaonis</i>	7	0.0831	0.1058	0.0956	Captured (Frozen)

Table 5. Result of Total Mercury in Fish and Fish Products Surveyed in 2007.

Year of analysis & Sampling location	Analyte	Fish sample analysed		No. of samples analysed	Min. value of results (ppm) – wet weight basis	Max. value of results (ppm) – wet weight basis	Average value of results (ppm) – wet weight basis	Remarks
		Common name	Scientific name					
2007 (Dec) Twente Aquaculture Zone, Yangon Division	Total Mercury (Hg)	Rohu	<i>Labeo rohita</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Aquacultured (Fresh/Chilled)
2007 (Dec) Tanintharyi Division (Pyi Phyo Tun processing plant)		Grouper	<i>Epinephelus tauvina</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)
2007 (Dec) Ayeerwaddy Division (Min Zar Ni processing plant)		Sea bass	<i>Lates calcarifer</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)
2008 (Mar) Rakhin State (Thantwe Marine processing plant)		Squid	<i>Loligo duvauceli</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)
2008 (Mar) Rakhin State (Thantwe Marine processing plant)		Cuttlefish	<i>Sepia pharaonis</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)
2008 (Mar) Pantanaw Aquaculture Zone, Ayeerwaddy Division		Giant Fresh-water Prawn	<i>Macrobrachium rosenbergii</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Aquacultured (Fresh/Chilled)

Table 6. Result of Total Cadmium in Fish and Fish Products Surveyed in 2007-2008.

Year of analysis & Sampling location	Analyte	Fish sample analysed		No. of samples analysed	Min. value of results (ppm) – wet weight basis	Max. value of results (ppm) – wet weight basis	Average value of results (ppm) – wet weight basis	Remarks	
		Common name	Scientific name						
2007 (Dec) Twente Aquaculture Zone, Yangon Division	Total Cadmium (Cd)	Rohu	<i>Labeo rohita</i>	7	Detected but not quantifiable	Not Detected	Not Detected	Aquacultured (Fresh/Chilled)	
2007 (Dec) Tanintharyi Division (Pyi Phyoo Tun processing plant)		Grouper	<i>Epinephelus tauvina</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)	
2007 (Dec) Ayeerwaddy Division (Min Zar Ni processing Plant)		Sea bass	<i>Lates calcarifer</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)	
2008 (Mar) Rakhin State (Thantwe Marine processing plant)		Squid	<i>Loligo duvauceli</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)	
2008 (Mar) Rakhin State (Thantwe Marine processing plant)		Cuttlefish	<i>Sepia pharaonis</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)	
2008 (Mar) Pantanaw Aquaculture zone, Ayeerwaddy Division		Giant Fresh-water Prawn	<i>Macrobrachium rosenbergii</i>	7	Not Detected	Detected but not quantifiable	Not Detected	Not Detected	Aquacultured (Fresh/Chilled)

Table 7. Result of Total Lead in Fish and Fish Products Surveyed in 2008.

Year of analysis & Sampling location	Analyte	Fish sample analysed		No. of samples analysed	Min. value of results (ppm) – wet weight basis	Max. value of results (ppm) – wet weight basis	Average value of results (ppm) – wet weight basis	Remarks
		Common name	Scientific name					
2008 (Jan) Twente Aquaculture Zone, Yangon Division	Total Lead (Pb)	Rohu	<i>Labeo rohita</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Aquacultured (Fresh/Chilled)
2008 (Jan) Tanintharyi Division (Pyi Phyo Tun processing plant)		Grouper	<i>Epinephelus tauvina</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)
2008 (Jan) Ayeeyarwaddy Division. Min Zar Ni processing plant)		Seabass	<i>Lates calcarifer</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)
2008 (Mar) Rakhin State (Thantwe Marine processing plant)		Squid	<i>Loligo duvauceli</i>	7	Not Detected	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)
2008 (Mar) Rakhin State (Thantwe Marine processing plant)		Cuttle Fish	<i>Sepia pharaonis</i>	7	Detected but not quantifiable	Detected but not quantifiable	Detected but not quantifiable	Captured (Frozen)
2008 (Mar) Pantanaw Aquaculture zone, Ayeeyarwaddy Division		Giant Fresh-water Prawn	<i>Macrobrachium rosenbergii</i>	7	Not Detected	Detected but not quantifiable	Not Detected	Aquacultured (Fresh/Chilled)



### **c. Corrective Actions**

- Verification of sampling and analytical methods.
- Carry out investigation studies such as traceability to the fishing grounds.
- Intensive monitoring of contaminants such as heavy metals in fish and fish products.

## **5. Problems and Challenges Encountered**

- The budget is limited.
- Standard reference materials were unavailable for method validation.

## **6. Recommendations and Suggestions for Future Follow up Action**

- Need a short training course for all activities.
- Survey of chemical contaminant such as heavy metals under the Japanese Trust Fund (JTF) project is beneficial in supporting Myanmar Fisheries Monitoring Programme and reducing the number of RASFF notifications from EU due to high contents of heavy metals.
- Participate in proficiency testing for SEAFDEC Key Laboratories within the allocated budget.
- To organise Inter-laboratory Proficiency Testing for SEAFDEC Key Laboratories at appropriate time.