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Secretariat of ACP Group
of States

LTI010GHA
**Official Laboratories assessment under the scope of ISO
accreditation**

March 2009

NR International



Strengthening Fishery Products Health Conditions in ACP/OCT Countries



52 AVENUE HERRMANN DEBROUX – 1160 BRUXELLES.
TELEPHONE: +32 (0)2 6791865/66/68, FAX: +32 (0)2 6791873
E-MAIL: cpa@sfp-acp.eu



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John R Cox

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The contents of this report do not necessarily reflect the policy or official position of the Secretariat of the ACP Group of States or the European Commission.

The picture on the cover shows a common W. African fish, the Lesser African Threadfin (*Galeoides decadactylus*)

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ABBREVIATIONS

AAS	: Atomic Absorption Spectrometry
ACP	: African, Caribbean and Pacific States (Lomé Convention IV)
AIDCO	: EuropeAid Office of Cooperation
CA	: Competent Authority
CRM	: Certified Reference Material
DACH	: Deutsche Akkreditierungstalle Chemie
ELISA	: Enzyme Linked Immunosorbent Assay
FVO	: Food and Veterinary Office
GSB	: Ghana Standards Board
HPLC	: High Performance Liquid Chromatograph
ICP	: Inductively Coupled Plasma Spectrometry
ISO	: International Standards Organisation
KEBS	: Kenya Bureau of Standards
PAH	: Poly Aromatic Hydrocarbon
PCBs	: Poly Chlorinated Biphenyls
PMU	: Project Management Unit
SANCO	: DG Health and Consumer Protection
SFP	: Strengthening Fisheries Programme
TOR	: Terms of Reference
TVBN	: Total Volatile Base Nitrogen
UNIDO	: United Nations Industrial Development Organisation

EXECUTIVE SUMMARY

The Testing Division of the Ghana Standards Board (GSB) conducts the testing of fish, fishery products and water/ice from processing establishments on behalf of the Competent Authority which is itself a Division of the GSB.

In reality, only a limited range of tests are actually conducted by GSB, reflecting microbiological parameters in fish tissue and in water/ice and heavy metals in fish and in water. None of these tests are presently accredited to ISO 17025 although the microbiology group is submitting some tests for accreditation assessment in June 2009. The testing of fish tissue for heavy metals has been restricted because of instrumental problems and after primary processing at GSB, sample extracts were analysed, for a period, at the laboratories of the Kenyan Bureau of Standards (KEBS) in Nairobi. No tests for pesticides, PCBs, Dioxins and Furans or TVBN are conducted; testing for histamine is limited to the use of an ELISA commercial test kit. Physico – chemical testing of potable water from processing plants is not undertaken by GSB but is contracted out to the Water Utility body which provides the municipal supply. Some testing for sulphur dioxide from the use of metabisulphite on crustaceans is undertaken by GSB. Samples from smoked fish producers are tested for Poly Aromatic Hydrocarbon (PAH), under contract, by a German laboratory.

The Environmental and contaminants monitoring plan drafted by the SFP Regional project (2005 – 2007) has never been implemented and no background information on the identified contaminants has been produced.

The Regional project, covering Gambia, Ghana, Liberia and Sierra Leone, recommended that the GSB laboratories should be adopted as a regional reference laboratory, although noting that the Laboratories would need further assistance towards ISO accreditation. That support is yet to be provided and the need to ascertain the current situation determined the need for the visit reported here. However, despite the relatively slow pace towards accreditation and the limited scope of the testing schedule underpinning the fisheries programme, the recommendations in this report (section 6) confirm this proposal and further recommend project inputs, including equipment procurement, to support a broadening of the range of tests undertaken and to have these tests accredited. The range of tests which GSB could be expected to offer are considered in section 5 of this report, together with a likely timescale for the availability of these tests. Tests for Dioxins and Furans could not be undertaken and would need contracting through a recognised commercial testing service.

An extension of the testing capabilities is essential if Ghana is to fulfil the requirements of a regional reference laboratory and of the European Union (EU) with regard to the testing of fisheries products for export. The alternative is to contract the testing to a commercial testing laboratory which can deliver all of the tests required to the necessary standard.

RESUME EXECUTIF

La division d'analyses de la «Ghana Standards Board» (Commission des Normes du Ghana) (GSB) dirige - au nom de l'Autorité Compétente qui est elle-même une division du GSB - les analyses sur les poissons, les produits de pêche et l'eau/la glace des établissements de traitement.

En réalité, seul un éventail limité d'analyses est actuellement effectué par le GSB, mesurant des paramètres microbiologiques dans les tissus du poisson et dans l'eau/la glace et des métaux lourds dans le poisson et l'eau.

Actuellement aucun de ces tests n'est accrédité à ISO 17025 bien que le groupe de microbiologie soumette certaines des analyses afin de recevoir une accréditation en juin 2009.

L'analyse sur la chair des poissons pour les métaux lourds a été restreinte dû à des problèmes instrumentaux et après traitement primaire à GSB, des extraits d'échantillons ont été analysés, pendant une période, aux Laboratoires du «Kenyan Bureau of Standards» (**KEBS**) à Nairobi. Aucun test pour les pesticides, PCB, Dioxines et Furanes ou TVBN n'est réalisé; analyser pour l'histamine est limité à l'utilisation d'un test kit commercial ELISA.

L'analyse physique et chimique de l'eau potable des usines de traitement n'est pas entreprise par le GSB mais est sous-traité par le «Water Utility Body» qui fournit l'approvisionnement municipal. Dû à l'utilisation de métabi sulfite sur les crustacés certains tests pour contrôler le dioxyde de soufre sont entrepris par le GSB. Des échantillons provenant des producteurs de poisson fumé sont quant à eux testés – sous contrat par un laboratoire allemand - pour le Poly Aromatic Hydrocarbon (PAH) - Hydrocarbures aromatiques Polycycliques.

Le plan de contrôle pour l'Environnement et les contaminants élaboré par le projet régional SFP (2005-2007) n'a jamais été exécuté et aucune information contextuelle sur les contaminants identifiés n'a été produite.

Le projet régional, qui couvre la Gambie, le Ghana, le Liberia et le Sierra Leone, a recommandé que les laboratoires GSB soient adoptés comme un laboratoire de référence régional, bien que nous notons que ces Laboratoires auront besoin d'assistance supplémentaire envers leur accréditation ISO. Ce support doit encore être fourni et le besoin de s'assurer de la situation courante a déterminé le besoin de la visite dont nous faisons le rapport ici.

Néanmoins, malgré une certaine lenteur pour l'accréditation et l'envergure limitée du programme d'analyses, qui étaye le programme des Fisheries ; les recommandations de ce rapport (section 6) confirment cette proposition et recommandent davantage d'apport de projets, englobant l'obtention d'équipement pour permettre l'élargissement de la gamme des tests effectués et pour que ces tests puissent être accrédités. La gamme des analyses qui pourraient être proposés par GSB est donnée dans la section 5 de ce rapport, en même temps qu'une perspective réaliste quant à la disponibilité de ces tests. Les analyses pour les Dioxines et les Furanes n'ont pas pu être entreprises et devront être sous-traitées via un service commercial reconnu comme SGS.

En vue d'analyser les produits de pêche pour l'exportation, une augmentation des capacités d'analyses est essentielle si le Ghana veut satisfaire aux exigences d'un laboratoire de référence régional et de l'Union Européenne (UE).

L'alternative serait de sous-traiter l'analyse à un laboratoire commercial qui peut livrer toutes les analyses demandées via des laboratoires accrédités.

1 INTRODUCTION

As a laboratory specialist with skills in environmental monitoring and surveillance plan development, the consultant was in charge of reviewing the situation at GSB with regard to their testing programme, the proposal that they should become a regional reference laboratory (for Gambia, Ghana, Liberia and Sierra Leone) and the current status of the environmental and contaminants monitoring programme drafted by the SFP regional project (2005 – 2007).

2 CONTEXT OF THE ASSIGNMENT

2.1 Work environment

The Ghana Standards Board lies within the Ministry for Trade. Apart from its testing, training and inspection services, it also manages the role of Competent Authority for the control of the export of fish and fishery products on behalf of the Government of Ghana. There is a separate fisheries Division within the Ministry of Food and Agriculture.

2.2 In relation to other TA and development initiatives

The GSB receives substantial support from bilateral aid programmes and through International programmes such as UNIDO. It will be critical to maintain good project liaison such that no overlap of inputs occurs and that any joint programmes are complementary. The management structure at GSB is well defined and transparent, facilitating liaison and effective management of resources.

3 METHODOLOGY

Information was initially collected from Mr Eugene Adwarke Addae, Head of the CA and from one of his senior Inspectors, Ms Jessica Nkansah, regarding the operation of the sampling programme and on the frequency and range of tests undertaken on their behalf. Discussions were subsequently held with the Director of the Testing Division, the Head of the Food Chemistry Department and with the Heads of each of the laboratories involved. Each laboratory was then visited to observe facilities and for additional discussions. Round up discussions on the last day of the visit also included Mr Clifford Frimpong, deputy head of the CA, who had been away from the office earlier in the week.

4 PERFORMANCE IN RELATION TO TERMS OF REFERENCE

4.1 Response to opening paragraphs in the Terms of Reference

This mission predominantly required the intervention of a laboratory specialist and competent communicator/manager. The background to the mission was well detailed and its positioning within a broader framework of interventions and assistance was clear enough.

4.2 Response to each of the specific duties

4.2.1 Status regarding accreditation of testing at the Ghana Standards Board

Progress in introducing testing services to the ISO 17025 standard at the Ghana Standards Board (GSB) has been an extended affair but it is now expected that the first tests will be submitted for assessment in June 2009. GSB has appointed a senior-level quality assurance manager, has put in place procedures for internal audits and has nearly completed preparation of the necessary documentation. Logistical support to the accreditation programme is being provided by UNIDO. The German accreditation body Deutsche Akkreditierungstalle Chemie (DACH) has been contracted to undertake the laboratory assessments.

The application for accreditation will cover some microbiological tests (see 4.2.2 (a)) and the analysis of pesticide residues in fruits and vegetables. If successful, this will provide a major platform on which to build, through the subsequent addition of other tests once the key documentation and procedures have been accepted.

4.2.2 Status of Testing in Support of the Competent Authority

(a) *Microbiological testing*

The microbiological testing facility managed by Ms Regina Vowocor, is a well staffed unit in recently renovated accommodation, allowing testing to an acceptable standard. The renovation has allowed for effective separation of activities with a reasonable amount of work space. The group has received support from UNIDO in re-equipping the laboratory and has everything that it needs for the range of current tests.

In support of the fisheries programme, the following tests are routinely conducted:

Fish: Total viable count, *E. coli*.

Water: Total viable count at 22⁰C and 37⁰C, *Pseudomonas*, *E. coli*; Additionally, tuna loins are tested for salmonella and smoked fish for faecal coliforms.

All test procedures used reflect ISO standard methods.

The group is pressing for a number of test procedures to be accredited:

- Total Viable Count in water and in foodstuffs,
- total coliforms in water and in foodstuffs,
- faecal coliforms in water and in foodstuffs,
- *E. coli* in water and in foodstuffs,
- *Staphylococcus aureus* in foodstuffs,
- salmonella in foodstuffs,
- yeasts and moulds in foodstuffs.

All the necessary documentation has been completed and an internal audit conducted. On the down side, the group has not been regularly involved in proficiency testing but does expect to be involved in a scheme in April 2009; UNIDO is making the arrangements and the organisers of the scheme are as yet unknown to GSB. Ms Vowocor is also being sponsored by UNIDO for a study tour to Sri Lanka for practical experience of the issues faced by an accredited microbiology laboratory.

The accreditation pre-assessment is expected in June 2009.

(b) *Heavy Metals*

Heavy metal testing is split between two groups in GSB, one group looking at residues in fish tissue, the other at residues in water.

The water group are equipped with AAS and ICP and routinely analyse for Arsenic, Cadmium, Lead and Mercury using Ghanaian Standard procedures (GS method 175 (III)). Routine checks are made against commercial standard reference solutions. Limits of detection are adequate for the standards in operation. The group has not recently participated in any proficiency testing schemes.

The food chemistry group which undertakes the testing of fish samples is currently in temporary accommodation whilst their laboratories are undergoing renovation. The temporary accommodation is adequate although for a while, the group has suffered problems with the instrumentation. The hydride generator and flame AAS were out of service and the staff were reportedly inadequately trained in the use of the available graphite furnace system. As a consequence, since 2008, samples have been processed in Ghana, using a modified AOAC acid – digestion procedure with sample solutions being sent to the Kenyan Bureau of Standards (KEBS) for measurement of residues. The effectiveness of this procedure is unknown. A working hydride generator is now available, however, and system evaluation is presently underway. GSB will then take back full control of the fish testing.

The group is receiving support from the German metrology organisation Physikalisch – Technische Bundesanstalt (PTB) who are providing a new AAS system (make/model unknown) and hydride generator. They are additionally going to provide training for staff in the use of the graphite furnace system. Correspondence from PTB refers to testing using the new equipment being appropriate for FVO standards and this will require clarification, by correspondence, once the new system is in place. Delivery is to be arranged to coincide with completion of laboratory renovation, expected June 2009.

It is suggested that accreditation for heavy metal testing is unlikely until early/mid 2010.

(c) *Pesticides, PCBs, Dioxins and Furans*

Tests for these substances are not conducted, either by GSB or by any other laboratory on behalf of the CA. GSB has experience of pesticide testing for residues in fruits and vegetables and has been supported in the development of this work through the EU-funded COLEACP Pesticides Initiative Programme. The pesticide group also conducts testing of cocoa destined for export on behalf of the Ghana Cocoa Board.

The procedure for the analysis of samples of fruits and vegetables has been validated for accreditation, the group is participating in FAPAS proficiency testing schemes with acceptable z scores, and, as with the Microbiology group, the accreditation pre-assessment is in June 2009.

With a relatively simple change of testing procedure and in view of their developing expertise, this group could undertake testing for pesticides in fish and, later, for PCBs. The procedures would need practising and then the development of the appropriate validation data but, assuming the success of the current application for accreditation, accreditation of at least one of the additional procedures could be foreseen within 12 months.

(d) *Histamines*

Histamine testing is limited to the use of a commercial test kit (ELISA Histamarine) with the testing conducted by the microbiology group. It is proposed that in the future this testing will be moved to the Food Chemistry group and that HPLC analysis be considered. The HPLC would be used for both mycotoxins and histamine testing. The existing machine is rather old and does not have the cryogenic automatic sample injector used by the EU recommended test procedure although would be appropriate for the alternative room temperature dansyl chloride derivatisation method. The fluorometric method is a further alternative.

(e) *TVBN*

This test is not conducted either by GSB or by any other laboratory on behalf of the CA although one fish processor has acquired the necessary apparatus and materials.

(f) *Physico chemical parameters*

No testing is conducted for physico chemical parameters in water at GSB; this test is sub-contracted to the Water Utility provider who performs the same tests as for the water it provides for municipal use. The Chemistry group of GSB say that they could undertake the work providing that they had access to the necessary equipment (turbidity and conductivity meters etc) in good working condition.

(g) *Poly Aromatic Hydrocarbons (PAH)*

Samples of smoked fish are tested for PAH under contract to the German contract testing laboratory of Eurofins with Benzo A pyrene as the indicator chemical.

4.2.3 Alternative Sources of Testing

Other Governmental and commercial laboratories exist in Ghana although their remits and nature of operations are quite different. Members of the team appointed to prepare the AWA technical assistance regional report (June 2007) visited the laboratories and considered their relative skills and core activities before recommending that GSB should be considered as the regional reference laboratory for the testing of chemical parameters in fish and fishery products. The consultant has similarly visited these laboratories in the past and agrees with the decision taken. The situation has not changed sufficiently to warrant any re-appraisal and the interests of Ghana would be best served by supporting GSB in achieving the necessary status rather than re-visiting the subject which would inevitably cause further delay.

4.2.4 Environmental and Contaminants Monitoring Programme

A comprehensive sampling programme for the monitoring of environmental contamination around the coastal regions of Ghana was developed by the Regional project, based on a detailed assessment of potential sources of contamination including industrial production and discharge, agricultural inputs (pesticides, fertilisers etc), waste disposal sites and human waste.

This programme was structured to allow a detailed first year assessment and then a more targeted approach in later years, reflecting the findings of the initial assessment.

This monitoring programme is still to be launched; no background information exists apart from heavy metal residue data from samples collected from producers by CA inspectors as part of their normal audit programme.

5 DISCUSSION

The Government of Ghana has made arrangements for the same organisation to manage both the CA and be the provider of testing services and with respect, yet it is doubtful whether this arrangement is correct and in the best interests of the fisheries sector in Ghana. The testing programme is fragmented, limited in scope and does not fully reflect the requirements of the Fishery Products Regulations 2006 which is a subsidiary legislation of the Laws of Ghana Standards Decree of 1973.

The CA does not have access to all of the test data required by the Regulations; where the GSB cannot provide the testing services, only some have been commissioned from other sources. To procure these services would be expensive and it would seem that funding is an issue.

Both the current situation at GSB, with the progress that has been made; and the limitations and options for the future have been investigated. Despite the current limitations of GSB, it would seem that the best interests of Ghana would not be served by alternative sourcing of testing services, except where these cannot be provided, and this conclusion, reinforced below, is the basis for the recommendations made. What became very evident, however, was that there was inadequate and ineffective consultation between the CA and the Testing Division of GSB as to what tests could be made available. As a result some tests agreed with the EU and listed in the Fishery Products Regulation are not undertaken.

At the round – up meeting chaired by Mrs Biritwum, Deputy Executive Officer Commercial Services and attended by Mr Acheampong, Director of the Testing Division, Mrs Adam (Head of the Food Chemistry Laboratory) and Clifford Frimpong (Deputy Head of Competent Authority), these issues were reviewed and the need for improved dialogue agreed. The potential exists for GSB to provide the necessary services for the analysis of all of the microbiological parameters, heavy metal testing for fish and water, Histamine determination, TVBN determination and testing for pesticides and PCBs in fish. The CA must officially request and commission these services.

If the SFP project can provide some additional equipment, all of these tests could be running within eighteen months and some much sooner. Equipment supplied through the EU will take at least 9 months to be procured and delivered, possibly longer, and that will inevitably affect the rate at which the additional tests could be introduced unless alternative equipment is available.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 The Delivery of Testing Services

The methodology used for testing at GSB is not always appropriate nor does it reflect EU guidance or the guidance provided by the Fishery Product Regulations. The exception is with regard to microbiological testing where ISO methods are practiced. Information regarding which specific methods are recommended by the EU is not readily available at GSB and details were provided for Mrs Adam. Formalisation of the test procedures to all given guidelines must be adopted as a matter of urgency. A list of the recommended test procedures is given, for reference, at Annex 7.3 of this report.

To introduce the tests currently not being undertaken and to allow existing tests to follow EU recommended procedures will require additional equipment and it is recommended that this is procured through the SFP programme. The required items are listed at Annex 7.4 together with the necessary technical specifications (Annex 7.5). It is further recommended that a chemist visits GSB on delivery of the equipment to ensure that it has all been received and properly installed and then assists with the introduction of the histamine and TVBN test procedures. The timing of this intervention is difficult to predict as it is dependant upon the procurement exercise and could be anytime between November 2009 and February 2010. ToRs for this mission are attached at Annex 7.6.

Another conclusion is that the CA should consider the use of an external, ISO 17025 accredited commercial to immediately cover the identified gaps in the testing programme and allow appropriate data development. This would be a costly exercise but would enable rapid progress to be made whilst other measures to strengthen the testing services at GSB are put into place. In making this recommendation, it is reiterated that the interests of Ghana would be best served through a strengthening of the GSB service rather than seeking an alternative source of services.

6.2 Implementation of the Environmental and Contaminants Monitoring Programme

The data sought through this programme, proposed through the regional project 2005 – 2007, has never been developed and is urgently needed to provide evidence of the type/significance of any environmental contamination and to provide the necessary baseline on which to develop this element of the future sampling programme. It is recommended that an external commercial contract laboratory be contracted to analyse the defined samples and to generate this data such that the programme can be reviewed and refined for when GSB is ready to undertake this work.

7 ANNEXES

7.1 Terms of Reference

TERMS OF REFERENCE

.....

ID: LTI 010 GHA

 SFP ACP/OCT Programme 8ACPTPS137 	
Assignment Name	Official Laboratories assessment under the scope of ISO accreditation
Mission Schedule Number	LTI 010 GHA
Coordinator	Module 2 Coordinator
Technical Verifier	<i>Oscar do Porto – Food safety Expert - PMU</i>
Background assignment to	<p>The regional SFP project 20/06/04 AWA , provided technical assistance to Gambia, Ghana, Liberia and Sierra Leone, from 2005 to 2007. The project recommended that the Ghana Standard Board Laboratories being adopted as regional reference laboratory for the four countries and indicated the need of a further assistance to support the Laboratories in their accreditation process.</p> <p>The SFP capacity is being reinforced by the introduction of four modules of intervention. The programme is now in the position to propose a consistent follow up to the work done by the regional project and to supply equipment eventually necessary to satisfy the laboratories requirements.</p> <p>Following the recommendations of the regional project, it is now proposed the assessment of the actual situation of the Ghana Standard Board Laboratories, to draft a follow up action plan and to identify the equipment that could be necessary to enable a positive move towards accreditation under ISO 17025 standards. The mission will be at the same time verifying the application of the environmental and contaminants surveillance plan drafted by the regional project.</p>
Issues to be Addressed	<p>The evolution of the Standard Board Laboratory performance</p> <p>Any new development in terms of laboratorial capacity</p> <p>The adoption and application of the contaminants and residues surveillance plan</p> <p>The actual needs in terms of laboratory equipment and complementary logistics for official sampling.</p>
Activities of the Consultant	<p>The Expert will produce up dated assessment on:</p> <ul style="list-style-type: none"> - The performance of the Standard Board Laboratories and any other entity able to provide food testing services under the conditions of the ISO 17025 norms. - The formal adoption and putting in place of the contaminants and residues monitoring plan provided by the regional SFP project - The actual need in terms of laboratory equipment and other materials to enable the sampling and testing to proceed as planned, providing a list of items and its specifications. - He will provide TORs for further actions identified as necessary to support the official laboratories in the accreditation process

Expected outputs	<p>The Expert shall produce a report containing his findings and recommendations Including terms of reference for eventual complementary inputs form the SFP Programme.</p> <p>The report to be produced using MS Word (and other MS Office software if necessary) and be available in hard copy and electronic form, both in Word (and other MS Office Programmes as appropriate) and all the elements together in single file pdf format. Al training materials should form part of the report</p>																									
Format of each report	<p>MS Word Styles for SFP Programme Reports and Technical Papers</p> <p>Structure</p> <p>Title pages in model format as per other Programme Reports</p> <p>Table of contents, to three levels, formal format</p> <p>List of annexes</p> <p>Tables of tables, figures and pictures all formal format</p> <p>Abbreviations and acronyms</p> <p>Executive Summary (1 to 2 pages), in English and Portuguese or French or Spanish where appropriate</p> <p>Introduction</p> <p>Main body of report divided into different sections as appropriate (up to 20 pages)</p> <p>Conclusions and recommendations (each recommendation must be preceded by a conclusion, that refers to a discussion in the main body of the report)</p> <p>Annex 1 Terms of reference (if appropriate)</p> <p>Annex 2 Schedule and people met (with contacts)</p> <p>Any other annex(es) as appropriate</p> <p>Format as per PMU indications.</p>																									
Report to be reviewed by	Carlos Palin, Programme Manager																									
Duration	<table border="1" data-bbox="395 1218 1209 1675"> <thead> <tr> <th>Action</th> <th>Working days</th> </tr> </thead> <tbody> <tr> <td>Briefing at PMU in Brussels</td> <td>1</td> </tr> <tr> <td>Travel to Ghana</td> <td>1</td> </tr> <tr> <td>Inception, briefing (CA & Delegation)</td> <td>0,5</td> </tr> <tr> <td>Laboratories performance assessment</td> <td>3</td> </tr> <tr> <td>The putting in place of CRMP evaluation</td> <td>1</td> </tr> <tr> <td>Production of list of items required</td> <td>2</td> </tr> <tr> <td>Debriefing to Authorities & Delegation</td> <td>0,5</td> </tr> <tr> <td>Travel to Europe</td> <td>1</td> </tr> <tr> <td>Debriefing of PMU in Brussels</td> <td>1</td> </tr> <tr> <td>Writing of report</td> <td>2</td> </tr> <tr> <td>Total</td> <td>13</td> </tr> </tbody> </table> <p>Total working days will equal 13 calendar days.</p>		Action	Working days	Briefing at PMU in Brussels	1	Travel to Ghana	1	Inception, briefing (CA & Delegation)	0,5	Laboratories performance assessment	3	The putting in place of CRMP evaluation	1	Production of list of items required	2	Debriefing to Authorities & Delegation	0,5	Travel to Europe	1	Debriefing of PMU in Brussels	1	Writing of report	2	Total	13
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Total	13																									
Start date	22 March 2009																									
Completion dates for Reports and fee payment schedule	<p><i>to be completed by the proposer</i></p> <p>Draft report 3 working days after the return to Europe</p> <p>Comments Within 2 weeks after reception</p> <p>Final report 5 working days after reception of comments by SFP/PMU including comments of authorities</p>																									

Final report bases for relevant payments	
Experience and qualification	<p>Expert of category II (at least 10 years of experience)</p> <p>Key expert 3: Expert in aquatic environment surveillance and residues monitoring and control in food and fish as food</p> <p>- <i>Qualifications and skills</i> University degree in Chemistry, biochemistry, environmental issues or equivalent, with specialisation on food testing, , with particular emphasis in environment monitoring. Fluent and able to work and report in French and English. To know the Portuguese would be a positive element.</p> <p>- <i>General professional experience</i> Experience in the design of contaminants and residues monitoring in the aquatic environment and in fish, in particular to detect and quantify traces of heavy metals, pesticides and other complex toxic compounds is relevant to the position. Experience in designing , upgrading , and assessment of laboratories would be an advantage.</p> <p>- <i>Specific professional experience</i> To know and have experience in testing fish, fish products and water and having work in developing countries and specifically ACP countries is an advantage.</p> <p>Knowledge of English language is essential. The applicant must be of EU or ACP member states nationality</p>
Locations and travel	Based in UK, 1 travel to Ghana, 1 travel to Brussels and up to 10 days' per diem

7.2 Programme and people met

Date	Location	People Met	Objective
22 March 2009			Travel to Ghana
23 March 2009	Accra	<p>Mrs Kistina Biritwum, Deputy Executive Director, Commercial Services (kistinab@yahoo.com)</p> <p>Mr Eugene Adarkwa-Addae, Director of Quality Assurance and Head of Competent Authority (eadarkwaaddae@yahoo.co.uk)</p> <p>Mr Kwabena Acheampong, Director, testing Division (kacheampong@ghanastandards.org)</p> <p>Ms Jessica Nkansah, Fisheries Inspector</p> <p>Tel: 00 231 500065</p>	<p>Introductory discussions</p> <p>Discussions on CA and the fisheries testing programme.</p>
24 March 2009	Accra	<p>Ms Felicia Adam, Head of Food and Drinks Department (fal@ghanastandards.org)</p> <p>Ms Regina Vowocor, Head of Microbiology Laboratory (Ryvowotor2002@yahoo.com)</p> <p>Mr Paul Osei Fosu, Head of Pesticides Residue Laboratory (posei_fosu@yahoo.co.uk)</p> <p>Mr Samuel Nortey, Chemistry group, water testing</p> <p>Tel: 00 231 500065</p>	Discussions on laboratory status and fisheries testing programme
25 March 2009	Accra	GSB staff	Information collection
26 March 2009	Accra	<p>Mrs Kistinina Biritwum, Mr Kwabena Acheampong, Ms Felicia Adam, Mr Clifford Frimpong (Deputy Head of Competent Authority) (frimcliff@yahoo.co.uk)</p>	<p>De-briefing and wrap-up meeting</p> <p>Travel to UK</p>
27 March 2009	Accra		Arrive UK

1 April 2009	UK		Preparation of equipment specifications
2 April 2009	UK		Preparation of equipment specifications

7.3 EU Analytical Requirements for the Chemical Analysis of Fish and Fish Products

Analysis	EU Regulation	Fish	MRL	Recommended/Suggested Analytical Method
Histamine	05/2073/EC	<i>Scombridae</i> , <i>Clupeidae</i> , <i>Engraulidae</i> , <i>Coryfenidae</i> , <i>Pomatomidae</i> , <i>Scombrosidae</i>	- Mean value <100mg/kg - 2 samples >100 mg/kg but <200mg/kg - All samples <200mg/kg	EU recommended HPLC method: 1. Malle, P., Valle, M., Bouquelet, S. Assay of biogenic amines involved in fish decomposition. <i>JAOAC International</i> , 79 , 43-49 (1996). 2. Duflos, G., Dervin, C., Malle, P., Bouquelet, S. Relevance of matrix effect in determination of biogenic amines in plaice (<i>Pleuronectes plates</i>) and whiting (<i>Merlangus merlangus</i>). <i>JAOAC International</i> , 82 , 1097-1101, (1999).
TVB-N	05/2074/EC	A. <i>Sebastes</i> spp. <i>Helicolenus dactylopterus</i> <i>Sebastichthys capensis</i> B. <i>Pleuronectidae</i> family (except <i>Hippoglossus</i> spp.) C. <i>Salmo salar</i> , species belonging: <i>Merlucciidae</i> family <i>Gadidae</i> family	A. 25mg nitrogen/100 gms of flesh B. 25mg nitrogen/100 gms of flesh C. 25mg nitrogen/100 gms of flesh	EU Reference methods: - Steam distillation (Annex III, 05/2074/EC). Confirmation methods - Microdiffusion method (Comway and Byrne, 1933) - Direct distillation method (Antonacopoulos, 1968) - Distillation of an extract deproteinized by trichloroacetic acid (Codex Alimentarius Committee on Fish and Fish Products, 1968)
TMA-N	91/493/EEC			Trimethylamine Nitrogen in seafood, AOAC Method 971.14. In: <i>Official Methods of Analysis of AOAC International</i>
Mercury	05/78/EC	Muscle meat Selected fish species	0.5mg/kg 1.0mg/kg	- BS EN 13804:2002: performance criteria, general considerations and sample preparation - BS EN 13806:2002: Determination of mercury by cold vapour atomic absorption spectrometry
Lead	05/78/EC	Muscle meat Selected fish species	0.2mg/kg 0.4mg/kg	- BS EN 13804:2002: performance criteria, general considerations and sample preparation
Cadmium	05/78/EC	Muscle meat Selected fish species Muscle meat of swordfish	0.05mg/kg 0.10mg/kg 0.30mg/kg	- BS EN 14084-2003: determination of lead, cadmium, zinc, copper and iron by atomic absorption spectrometry after microwave digestion.

Analysis	EU Regulation	Fish	MRL	Recommended/Suggested Analytical Method
Organochlorine contaminants (pesticides, PCBs)	91/493/EEC	Edible parts of fisheries products	No set MRLs	<ul style="list-style-type: none"> - Organochlorine pesticide and polychlorinated biphenyl residues in fish: Gas chromatographic method. AOAC method 983.21. In: <i>Official methods of AOAC International</i>. - Fatty food. Determination of pesticides and polychlorinated biphenyls (PCBs). BS EN 1528:1997
Sodium metabisulphite	95/2/EC	Dried salted fish of the Gadidae species Crustaceans and cephalopods: Fresh and deep frozen crustaceans, <i>panaeldae</i> , <i>solenceridae</i> , <i>aristeidae</i> family - up to 80 units - between 80 and 120 units - over 120 units - cooked	200mg/kg expressed as SO ₂ 150mg/kg expressed as SO ₂ 150mg/kg 200mg/kg 300mg/kg 50mg/kg	No methodologies officially approved by the EU: Devries et al., 1986, <i>JAOC</i> , 69 (5), 827-830, 1986 - AOAC Official method 990.28. Sulfites in Foods, optimised Monier-Williams Method. In: AOAC Official Methods of Analysis (2000) 47.3.43 - BS EN 1988-1:1998. Foodstuffs – Determination of sulphite – Part

Tests for products of aquaculture not included.

7.4 Equipment Required to Support the Extension of Testing at the Ghana Standards Board: Summary of Requirements

7.4.1 Heavy Metal Testing

- (i) Microwave digestion system with accessories

7.4.2 Pesticide Residue Analysis

- (i) Capillary Gas Liquid Chromatograph with Electron Capture Detector and Autosampler

7.4.3 Histamine Analysis

- (i) High Performance Liquid Chromatograph with appropriate column
- (ii) Cryostat (<-20⁰C)
- (iii) Ultra Turrax – type blender
- (iv) Waring type blender
- (v) Water Bath
- (vi) Centrifuge
- (vii) Hypodermic syringes, 100, 250, 500µl
- (viii) Histamine dihydrochloride standard

7.4.4 TVBN Analysis

- (i) Steam distillation apparatus
- (ii) Blender
- (iii) Homogeniser
- (iv) Vacuum pump
- (v) Vacuum filter holder
- (vi) Start up reagents and reference standard

7.5 Equipment Specification

7.5.1 Heavy Metal Testing

Microwave digestion system with accessories

System for the digestion of fish tissue:

Stainless steel construction

Even Heat distribution

Microprocessor temperature control

Capacity for minimum of 10 teflon-type digestion vessels

Capacity for minimum 5g and 10g tissue sample

Vessels with automatic pressure release

All vessels to be provided

All vessel components including adapters where necessary

One set of manufacturers recommended spares (replaceable items etc)

Power supply: 220-240v, 50Hz

7.5.2 Pesticide Residue Analysis

Capillary Gas Liquid Chromatograph with Electron Capture Detector and Autosampler

Column oven:

Operating temperature: 10°C above ambient temperature to 400°C

Temperature setpoint resolution: 1°C

Cooling rate: 400 to 50°C in 6 min.

Heat-up rate: up to 120°/min.

6 Independent zones

Minimum 5 temperature programming ramps

Injection port:

Capillary split/splitless injector with:

Electronic temperature and pressure control

Real time ambient temperature and pressure compensation

Maximum operating temperature at least 400°C

Total flow range of up to 0-1000ml/min

Pressure set range of 0 to 100 psi or similar

Detector:

Electron capture detector with electronic temperature and gas pressure/flow control

Real time ambient temperature and pressure compensation

Maximum operating temperature of at least 400°C

Linear dynamic range of 10⁴ or better

Minimum detectable amount to be better than 10fg/s lindane

Columns:

RTx®-CLPesticides, 30m, 0.32mm i.d., 0.32µm – 1 piece
RTx®-CLPesticides2, 30m, 0.25mm i.d., 0.32µm – 1 piece
RTx®-PCB, 60m, 0.25mm i.d., 0.25µm – 1 piece

Autosampler:

Minimum 100 sample capacity with tray for 1.5 – 2.0ml vials
Sample injection volume of 0.1 to 50µl
Solvent rinse with minimum two solvents and controllable flush sequence
Syringes, 5µl (2), 10µl (2) and 50µl (1)
With programmable injection speed
To be fully compatible with gas chromatograph with all parameters to be controlled via the GC software or controlling PC

System software:

Software to control all operating parameters and data generation and manipulation.

PC system:

PC with connection to GC and software to control the equipment, screen and printer
CPU, Intel Pentium 4 or equivalent, 1.8GHz, 512Kb
Ram 512Mb
120Gb Hard drive
Display – 17 inch colour flat screen
Video – 4 x AGP, 3D accelerator with min 32Mb DDR shared memory
16 bit stereo sound, speakers and micro-jacks
4 USB ports
DVD-CD/RW reader/writer
Modem 56K
Windows XP, Vista or equivalent operating system
PS-2 Keyboard
PS-2 Mouse, Optical with scroll; touchpad or equivalent
Laser printer, colour
MS office (Word, excel, powerpoint)
Internet explorer
Antivirus software
To come complete with all necessary leads and connectors

System specification to be checked with GLC supplier/manufacturer to ensure that all necessary requirements have been met in the specification.

Training:

A two day training course for two people in the safe and proper use of the system and in basic preventive maintenance is to be provided by the representative of the manufacturer on site after completion of installation.

Accessories:

- (i) Where required, five glass injection liners suitable for use for pesticide analysis
- (ii) High purity, low bleed, high temperature injection septa (25)
- (iii) Glass sample vials for autosampler, 1-5 – 2.0ml capacity with screw caps (1000)
- (iv) Equipment installation kit
- (v) Replacement toner cartridge for Laser jet printer

Power Supply:

All electrical components to work on 220-240v, 50 HZ

7.5.3 Histamine Analysis**7.5.3.1 High Performance Liquid Chromatograph***(i) Pump:*

High performance quaternary pump with operating range of - - 6000psi, or similar
Flow, 0.001ml to 5.0ml with incremental setpoints
Composition accuracy, <0.5% absolute
Overpressure and low pressure cut out
Electrical; overload protection

(ii) Heated column oven

Capacity for two columns
Operating temperature range ambient – 60⁰C, or similar

(iii) Detector

UV variable wavelength detector
Double beam, with deuterium lamp
Wavelength range 185 – 600nm, or similar with a wavelength accuracy of ± nm
Linearity, >2.5AU
Flow cell with 10m path length

(iv) Injector

Automatic sample injector with facility to allow cooling of sample tray to -20⁰C

Injection range 0.1 – 1000µl

Precision <1% RSD

Sample tray capacity – minimum 50, maximum 100 samples

(v) *Instrument Control and Data Handling*

PC based system to provide all necessary instrument control, data generation and capture. To include flat screen and minimum 4GB hard drive. PC system to at least match the minimum required specification of the HPLC system manufacturer.

(vi) *Columns*

Kromasil C18 column, 25cm x 4.6mm, 5µm – 2 units

Brownlee C18, 5µm guard columns – 5 units

(vii) *Accessories*

(a) All necessary manufacturers recommended instrument spares for a period of one year.

(b) Vials for autosampler, 1000. Screw capped or if crimp capped, crimping tool to be provided

(viii) *Training*

A two day training course for two people in the safe and proper use of the system and in basic preventive maintenance is to be provided by the representative of the manufacturer on site after completion of installation.

(ix) *Power Supply:*

All electrical components to work on 220-240v, 50 HZ

7.5.3.2 Cryostat (<-20⁰C)

Refrigerated circulator

<-25⁰C – 100⁰C

LCD Display of actual and set temperatures

Bath capacity approx. 10 – 15 litres

7.5.3.3 Ultra Turrax – type blender

Application: homogenisation of samples

Disperser with variable speed motor and dispersing tool

Telescopic stand with accessories (clamps etc)

Maximal operating volume: 2500 ml

Speed range: to at least 22000 rpm

3 autoclavable dispersing tools for aqueous, middle-viscous and viscous solutions (coarse and fine grinding)

All parts in contact with the products will be in stainless steel and PTFE

Power supply: 220 - 240V, 50Hz

7.5.3.4 Blender

Two-speed blender (approx 18000 and 2000 rpm) with 60 second timer
One container, stainless steel 1 litre with lid
One container, stainless steel 500 ml with lid
One container, glass 250 ml with lid
All cutting blades of stainless steel
Similar to Waring blender but EU or candidate country origin
Power supply: 220 - 240v, 50Hz

7.5.3.5 Water Bath

Insulated stainless steel tank
Cover
Capacity at least 20 litres
Temperature range: from ambient to 99.9°C in 0.1°C steps
Temperature stability: $\pm 0.05^\circ\text{C}$
Equipped with circulation pump
Microprocessor temperature control with low water level automatic cut-out
Digital display of the temperature
Power supply: 220 - 240v, 50Hz

7.5.3.6 Centrifuge

Variable speed and time control
Refrigerated, range 0 – 35°C or similar (0°C maximum lowest temperature)
Timer 0-60 min and setting for continuous operation
Digital display
Maximum speed: at least 5000 rpm
Safety device preventing the opening of the lid during centrifugation
Imbalance detector
1 angle rotor for 10 tubes of 20 ml capacity
1 set of adapters for tubes of 10 ml
20ml centrifuge tubes, screw capped – 10 pieces
10ml centrifuge tubes, screw capped – 10 pieces
Power supply: 220 - 240v, 50Hz

7.5.3.7 Hypodermic syringes

Glass with Teflon plunger
Luer lock fitting
Needles, length approx.50mm - 15 units
Capacity - 100µl – 2 units
- 250µl – 1 unit
- 500µl – 1 unit

7.5.3.8 Start – up Reagents

Histamine dihydrochloride standard – 1gm

Dansyl chloride, Analar, 25g

1,3-diaminopropane dihydrochloride, Analar – 5g

L-Proline, Analar – 5g

7.5.4 TVBN testing

7.5.4.1 Steam Distillation Unit for TVB-N (Total volatile Base Nitrogen) to EU Reference method (Based on the method of Antonocopoulos, described in Chapter III of Commission Regulation No 2074/2005)

Steam generator (1)
Distillation tubes of 100ml capacity (5)
Condensing apparatus (1)
Power supply: 220 - 240v, 50Hz

7.5.4.2 Blender

Two-speed blender (approx 18000 and 20000 rpm) with push button controls and 60 second timer that allows automatic shut-off . -
One container, stainless steel 1 litre capacity with lid
One container, stainless steel 500 ml capacity with lid
One container, glass 1 litre capacity with lid
One container, glass 250 ml capacity with lid
Similar to Waring blender but of EU or candidate country origin
Power supply: 220 - 240V, 50Hz

7.5.4.3 Homogenizer

Application: homogenisation of samples
Disperser with variable speed motor and dispersing tool
Telescopic stand with accessories (clamps etc)
Maximal operating volume: 2500 ml
Speed range: to at least 22000 rpm
3 autoclavable dispersing tools for aqueous, middle-viscous and viscous solutions (coarse and fine grinding)
All parts in contact with the products will be in stainless steel and PTFE
Power supply: 220 - 240V, 50Hz

7.5.4.4 Vacuum Filter Holder, 1-Branch

Filter holder in stainless steel,
1 place for materials +/-150 mm
Connector for a vacuum pump

7.5.4.5 Vacuum Pump

Capacity: Vacuum, 22 l, or similar
Final vacuum 100 mbar,
Neoprene membrane pump
Low noise level,
Oil- and maintenance-free;

suitable for filtration equipment
Power supply: 220 - 240v, 50Hz

7.5.4.6 Burettes Graduated 5 ml

0 – 5ml with 0.02 ml graduations
glass, single bore,
0.01ml accuracy,
PTFE stopcock,
BS846,
Class A

7.5.4.7 Reagents to start up

Perchloric acid at a concentration of 6 mg/100 ml - 500ml
Sodium hydroxide solution at 20 mg/100 ml - 500ml
Standard HCL 0.05 N or 0.01 N (if an automatic distillation apparatus is used) -
Boric acid solution at 3 g/100 ml - 500ml
Silicon-based anti-foaming agent – 100ml
Tashiro indicator solution (methyl red, methylene blue, 95% ethanol) – 100ml
Phenolphthalein, 1% in 95% ethanol

7.6 Terms of Reference for expert visit to Assist with the Introduction of Histamine and TVBN Testing

TERMS OF REFERENCE

.....

ID: LTI () GHA

 SFP ACP/OCT Programme 8ACPTPS137 	
Assignment Name	Assistance to Introduction of Histamine and TVBN Testing
Mission Schedule Number	LTI () GHA
Coordinator	Module 2 Coordinator
Technical Verifier	<i>Oscar do Porto – Food safety Expert - PMU</i>
Background assignment to	<p>The regional SFP project 20/06/04 AWA , provided technical assistance to Gambia, Ghana, Liberia and Sierra Leone, from 2005 to 2007. The project recommended that the Ghana Standard Board Laboratories being adopted as regional reference laboratory for the four countries and indicated the need for further assistance to support the Laboratories in their accreditation process.</p> <p>The SFP capacity has since been reinforced by the introduction of four modules of intervention allowing a consistent follow up to the work done by the regional project.</p> <p>Following the recommendations of the regional project, and a subsequent visit to the Ghana Standard Board Laboratories (Cox, March 2009), a follow up action plan was prepared including for the provision of equipment necessary to enable the introduction of a wider range of tests and reflecting a positive move towards accreditation under ISO 17025 standards. The provision of expert help to assist with the introduction of the additional tests was included in the recommendations made.</p>
Issues to be addressed	To further determine the evolution of the Standard Board Laboratory performance and to assist with the introduction of recommended procedures for histamines and of TVBN.
Activities of the Consultant	<p>The expert will ensure the safe delivery and installation of all equipment procured through the SFP project and introduce an HPLC procedure for the determination of histamine in fish and a steam distillation/titration procedure for TVBN.</p> <p>The Expert will also produce an up dated assessment on:</p> <ul style="list-style-type: none"> - The performance of the Standard Board Laboratories under the conditions of the ISO 17025 norms. - The formal adoption and putting in place of the contaminants and residues monitoring plan provided by the regional SFP project.

Expected outputs	<p>The Expert shall produce a report containing his findings and recommendations including terms of reference for eventual complementary inputs from the SFP Programme.</p> <p>The report to be produced using MS Word (and other MS Office software if necessary) and be available in hard copy and electronic form, both in Word (and other MS Office Programmes as appropriate) and all the elements together in single file pdf format. All training materials should form part of the report.</p>																									
Format of each report	<p>MS Word Styles for SFP Programme Reports and Technical Papers</p> <p>Structure</p> <p>Title pages in model format as per other Programme Reports</p> <p>Table of contents, to three levels, formal format</p> <p>List of annexes</p> <p>Tables of tables, figures and pictures all formal format</p> <p>Abbreviations and acronyms</p> <p>Executive Summary (1 to 2 pages), in English and Portuguese or French or Spanish where appropriate</p> <p>Introduction</p> <p>Main body of report divided into different sections as appropriate (up to 20 pages)</p> <p>Conclusions and recommendations (each recommendation must be preceded by a conclusion, that refers to a discussion in the main body of the report)</p> <p>Annex 1 Terms of reference (if appropriate)</p> <p>Annex 2 Schedule and people met (with contacts)</p> <p>Any other annex(es) as appropriate</p> <p>Format as per PMU indications.</p>																									
Report to be reviewed by	Carlos Palin, Programme Manager																									
Duration	<table border="1"> <thead> <tr> <th>Action</th> <th>Working days</th> </tr> </thead> <tbody> <tr> <td>Briefing at PMU in Brussels</td> <td>1</td> </tr> <tr> <td>Travel to Ghana</td> <td>1</td> </tr> <tr> <td>Inception, briefing (CA & Delegation)</td> <td>0,5</td> </tr> <tr> <td>Equipment assessment</td> <td>1</td> </tr> <tr> <td>Establishment of histamine procedure</td> <td>8</td> </tr> <tr> <td>Establishment of TVBN procedure</td> <td>5</td> </tr> <tr> <td>Debriefing to Authorities & Delegation</td> <td>0,5</td> </tr> <tr> <td>Travel to Europe</td> <td>1</td> </tr> <tr> <td>Debriefing of PMU in Brussels</td> <td>1</td> </tr> <tr> <td>Writing of report</td> <td>2</td> </tr> <tr> <td>Total</td> <td>21</td> </tr> </tbody> </table>	Action	Working days	Briefing at PMU in Brussels	1	Travel to Ghana	1	Inception, briefing (CA & Delegation)	0,5	Equipment assessment	1	Establishment of histamine procedure	8	Establishment of TVBN procedure	5	Debriefing to Authorities & Delegation	0,5	Travel to Europe	1	Debriefing of PMU in Brussels	1	Writing of report	2	Total	21	Total working days will equal 21 calendar days.
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Start date	[insert expected start date here]																									
Completion dates for Reports and fee payment schedule	<p><i>to be completed by the proposer</i></p> <p>Draft report 5 working days after the return to Europe</p> <p>Comments Within 2 weeks after reception</p> <p>Final report 5 working days after reception of comments by SFP/PMU including comments of authorities</p> <p>Final report bases for relevant payments</p>																									
Experience and qualification	<p>Expert of category II (at least 10 years of experience)</p> <p>Competent analytical chemist</p>																									

	<ul style="list-style-type: none"> - <i>Qualifications and skills</i> University degree in Chemistry, or equivalent, with specialisation on food testing. - <i>General professional experience</i> Experience in laboratory testing and knowledge of the requirements for the detection and quantification of traces of heavy metals, pesticides and other complex toxic compounds is relevant to the position. Experience of the requirements for ISO 17025 accreditation would be an advantage. - <i>Specific professional experience</i> To know and have experience in testing fish, fish products and water and having worked in developing countries and specifically ACP countries is an advantage. <p>Knowledge of English language is essential. The applicant must be of EU or ACP member states nationality</p>
Locations and travel	Based in xx, 1 travel to Ghana and up to 16 days' per diem