



PRESIDENT'S MALARIA INITIATIVE

## INDOOR RESIDUAL SPRAYING FOR MALARIA CONTROL



# Environment Compliance Inspection Report –Ghana 2008

Contract GHN-I-00-06-00002-00

Prepared for: Senegal Mission: United States Agency for International Development

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RTI International is dedicated to conducting research and development that improves the human condition by turning knowledge into practice. With a staff of more than 2,500, RTI offers innovative research and technical solutions to governments and businesses worldwide in the areas of health and pharmaceuticals, education and training, surveys and statistics, democratic governance, economic and social development, advanced technology, energy, and the environment. The second largest independent nonprofit research organization in the United States, RTI maintains nine offices in the U.S., five international offices, and one international subsidiary, as well as project offices around the world.

## **Summary Scope of Work**

### ***Purpose***

Under this assignment, RTI's Environmental Assessment Specialist, Mr. Tito Kodiaga will perform the following activities:

Visit Ghana to observe Indoor Residual Spraying (IRS) activities in progress in Tamale including but not limited to spray operator activities, supervisory capacity and skill, insecticide accounting and storage, and daily cleanup. This is in order to determine and document whether these activities are in full compliance with the Supplementary Environmental Assessment (SEA) for Ghana, and the United States Agency for International Development (USAID's) requirements as included in the approved PERSUAP.

### ***Work Plan & Duties***

Beginning June 5<sup>th</sup> -12<sup>th</sup> 2008, Tito Kodiaga will visit Ghana to observe IRS field operations underway and determine whether they are fully in compliance with the environmental mitigation requirements listed in the approved PERSUAP.

If cases of non-compliance are identified, Mr. Kodiaga will document such gaps and meet with MOH representatives, district health authorities, and the Mission Environmental Officer (MEO) to reach agreement on additional steps that will be taken to ensure full compliance with the SEA. Mr. Kodiaga will present his observations, conclusions and agreed upon actions with the IRS Chief of Party, USAID/Ghana, before departing on December 12<sup>th</sup>, 2008.

Mr. Kodiaga will prepare and submit a draft Trip Report documenting his observations and recommendations.

## **TDY Schedule**

**June 5<sup>th</sup>** - Depart Nairobi, Kenya for Accra, Ghana arrive same day.

**June 6<sup>th</sup>, Friday**— USAID in-briefing

**June 7<sup>th</sup>, Saturday**- Depart Accra for Tamale to undertake IRS Inspection

**June 8, Sunday**- Participate in the IRS planning and weekly briefing meeting with all District Managers together with the RTI staff and NMCP.

**June 9, Monday**- Observe IRS activities in the IRS staging areas

**June 10, Tuesday**- Observe IRS activities in the IRS staging areas

**June 11 Wednesday**- Observe IRS activities in the IRS staging areas

**June 12 Thursday** - Travel back to Accra held debrief session with USAID and NMCP highlighting the findings and recommendations then depart to Washington DC via Nairobi, Kenya.

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## **Acronyms**

COP	Chief of Party
EA	Environmental Assessment
IEC	Information Education and Communication
IRS	Indoor Residual Spraying
MEO	Mission Environment Officer
PERSUAPS	Pesticide Evaluation Reports and Safer Use Action Plans
PPE	Personal Protective Equipment
SEA	Supplemental Environmental Assessment
SOP	Standard Operating Procedures
USAID	United States Agency for International Development

## **Introduction**

Workers and community health and safety remain a crucial component of IRS activities sponsored by PMI and implemented by Ministries of Health and RTI.

The measures RTI must take to ensure the health and safety of individuals, as well as their surrounding environment, have been specified in country-specific Pesticide Evaluation Reports and Safer Use Action Plans (PERSUAPs) and in USAID's *Integrated Vector Management for Malaria Vector Control: Programmatic Environmental Assessment*.

This report assesses (1) the extent to which the PMI Round 1 IRS Program in Ghana has fulfilled the minimum mitigation and monitoring requirements expected of IRS Programs (2) the extent to which the IRS Program has adhered to environmental compliance requirements specified in the PERSUAPs, and (3) various ways in which RTI's mitigation monitoring scheme may be improved for future use.

## **Overview of Findings**

This section highlights in summary areas where compliance and non compliance to the requirements were observed and further analyses the possible reasons for non compliance.

The Environmental Assessment (EA) specialist rates the level of compliance to the mitigation measures proposed as highly SATISFACTORY during the start up of the Ghana spraying process especially the first 1-2 weeks. The EA specialist did not happen to observe the activities during this period, but records and discussions with from USAID Mission, as well as discussions with Chief of Party (COP), indicate that there was a some degree of non compliance albeit not very critical during this period.

However, at the time of visit, the EA specialist observed an impressive and marked improvement in terms of compliance. Therefore, according to the EAs analysis, and judgment, the spraying process at the time of the visit was SATISFACTORY as evidenced and observed by the acceptable level of compliance to the measures specified in the in country-specific Pesticide Evaluation Reports and Safer Use Action Plans (PERSUAPs) and in USAID's *Integrated Vector Management for Malaria Vector Control: Programmatic Environmental Assessment*.

The whole objective of compliance inspection is to monitor RTI's ability to enforce the requirements and measures stated in the SEA and more importantly RTI's resolve and capacity to correct areas of non compliance quickly and efficiently.

### ***Areas of Compliance***

The following bullets indicate areas where the program excelled in environmental compliance. While there may be individual exceptions to note in Figure 1 and findings and recommendations, the following bullets describe where, given an overall view of the program, compliance has been achieved.

- PPE procurement complete; helmets, face shields, dust masks, coveralls, gloves and boots all available and worn in a complete uniform by spray operators and team leaders/supervisors.
- Pregnancy testing completed.
- Commodity storage conditions generally excellent, spacious and ideal for storing the pesticides.
- Commodities have been stored in a thoughtful manner and the warehouse roofing is not susceptible to leaking.

- Soap and water are available at each warehouse.
- All the warehouses are well guarded and well secured by locks apart from one which had its lock taken off but was immediately replaced upon notice.
- Stock records up to date in all of the warehouses at the time of the visit.
- There seems to be good coordination between logistics officers and group leaders/storekeepers.
- All food, household goods, domestic animals and people were evacuated from the households before spray operators' began spraying.
- Progressive rinse and re-use of contaminated rinse-water conducted. At the time of visit this was considered very satisfactory. However, reports from the USAID Mission indicate that the process was somewhat chaotic and wanting before this visit.
- Separation of basins/barrels/buckets used for cleaning spray and PPE equipment from those used for personal washing evident.
- Medical kits readily available in warehouses and in the field.
- Exposure treatment medicines provided in the district hospitals and health posts.
- Drivers transporting insecticides on a day to day basis are trained on the hazard nature of the substances they are handling and provided with PPE in the pick up transport vehicles.

### ***Areas of Non Compliance***

The points below indicate the areas where non compliance was evident. The section entitled "Findings and Recommendations" will provide further details on these and other areas of noncompliance, as well as recommendations to achieve compliance in future spray rounds.

- Health workers (clinicians) during the time of the visit were not trained on the treatment of pesticide exposure symptoms. The general rule is that clinicians need training prior to the spray activities. However, this training was offered on the 18<sup>th</sup>-19<sup>th</sup> June after the departure of the EA specialist.

- The single major incident that can be termed as a catastrophe to have occurred to-date is the vehicle accident during the transport of insecticides from Accra to Tamale by Crown Agents, RTI's sub-contractor.
- Training on pesticide handling and emergency response not provided to long distance truck drivers as well as the normal day to day drivers transporting spray operators. However, the drivers transporting pesticides on a daily basis were given training and are equipped with PPE while transporting the insecticides.

**Table 1: Matrix with check list of objectives, action taken and indicators for success and comments on actual situation in Tamale District**

<b>Fundamental objective</b>	<b>Means objectives</b>	<b>Action taken</b>	<b>Indicator of success</b>	<b>Comments</b>
I. Maximize worker and environmental safety in the product storage	Keep accurate record of insecticide used	All store keepers are trained	Stock record up-to-date	<b>All records up to date</b>
	Secure storage	The storages are locked with one entrance for the majority	Facility locked and guarded day and night	<b>All facilities are secure with padlocks</b>
	Track appropriate insecticide usage	Stock books in place	Sachets collected and accounted	<b>All sachets have been accounted for so far other than those lost from the accident the 4 lost following road accident. See page 20 of the report.</b>
		Train data managers	Record sachets used per spray operator to track proper insecticide usage	<b>All empty sachets are accounted and returned to the storage facilities.</b>
	Ensure adequate supervision of spray operators	Integrate reporting of exposure with pharmacovigilance system	No occurrence of acute poisoning as a result of the program	
			Adequate supervision/team leader ratio	<b>There is good supervision and spray operators are efficient in the all IRS centres</b>
	Enable response to emergency scenario	Train store keepers	Water and soap available in the facility	<b>All IRS storages have water and soap</b>
		Train health workers	Poisoning treatment medicine available at the health facilities	<b>Available in the health facilities</b>
			Health workers trained	<b>Clinicians not trained on exposure treatment at the time of the visit, training occurred later on the 18<sup>th</sup> and 19<sup>th</sup> June</b>

		Train Driver	Lack of accident	<b>Crown Agents trick drivers not trained on basic requirement for contractors transporting pesticides even though RTI staff required that Crown Agents do this sensitisation.</b>
			Lack of major spill during insecticide transport	<b>Accident and spills noted when transporting the 2<sup>nd</sup> consignment of pesticides approximately 94 broken sachets, 6 completely lost sachets and 36 damaged barrels.</b>
		Train supervisor to record symptom		<b>All supervisors have been trained in recording exposure symptoms</b>
2. Maximize worker safety during spray campaign	Ensure protective gear worn during the operation	Train supervisor and spray operators	PPE in good condition	<b>All spray operators wear their PPEs.</b>
			All necessary PPE worn	<b>All the spray operators wear their PPEs</b>
		Personal hygiene	No eating, drinking or smoking witnessed during the spray operation	<b>No cases of eating, drinking or and smoking was noted during the inspection.</b>
	Pregnancy test and others means	Train health workers	No Women in the team or pregnancy testing and women asked about breastfeeding	<b>Pregnancy test conducted before spray activities and monthly testing planned. General physical examination conducted for all the spray operators</b>
	Personal hygiene	Train supervisors and sprays operators	Facility available for daily wash-up	<b>Washing area well prepared and water and soap available.</b>
			All spray operators wash daily	<b>Spray operators wash every day at the end of operations</b>
3. Maximize resident safety during spray campaign	Educate resident on IRS	IEC campaign	Persons out of the house during spray operation	<b>IEC Excellent and residents leave the house before the spray and get back after the 2 hours recommended time frame</b>

			Food and goods outside the house	<b>Houses well prepared before spraying and covering material provided.</b>
		Supervisors and spray operators training	Furniture's covered or removed outside	<b>All furniture covered during the spray</b>
			Resident stay 2 hours outside after spraying	<b>Beneficiaries responded that they respect the 2 hours before re-entering the house</b>
			Resident swept the floor after 2 hours	<b>Procedure followed</b>
	Ensure appropriate dosage of insecticide applied to Walls	Training of supervisors and spray operators	Frequent shaking of spray can	<b>Yes</b>
			SO can look at Gauge while holding sprayer	<b>Done</b>
			Standing parallel and 45 cm to wall	<b>Done</b>
			1m/2.5 sec spray rate	<b>Done</b>
			75 cm swath width and 5 cm overlap	<b>Done</b>
			Nozzles not dripping	<b>Yes</b>
4. Minimize environmental impact during	Ensure rinse-water recycled and disposed	Train supervisors and spray operators	Rinse-water recycled and disposed appropriately	<b>Progressive rinsing well performed in all the IRS sites</b>

the spray campaign	appropriately			
	Ensure appropriate sachet disposal	Train program managers, supervisors and spray operators	Secure storage and return to the manufacturers	<b>All empty sachets are returned to the store.</b>
	Ensure the soak pits are appropriate for disposal of washing water	Prepare soak pit		<b>Well designed soak pits available at all operational sites</b>

## Findings and Recommendations

### Personal Protective Equipment

Boots. The entire spray team has been provided rubber boots and at no time was an observation made to indicate that there was the inadequate of use of boots (except during the initial weeks of the spray).

However, the boot size remains a concern, most of the sprayers did not have the right boot size (in most cases they were oversized). This problem can be an impediment especially if the spray operators were to cover long distances by road while walking, and could also provide reasons for the spray operators to wear their own shoes. However, it should be noted that some spray operators were tucking their overalls inside their boots, which is a common practice observed during spray operations in other countries. This practice exposes the spray operators to possible contamination when spraying. If spillage occurs, it could end up inside their boots or on their feet. The EA specialist corrected this problem whenever noticed.

Gloves. The gloves that were inspected during the compliance visit are made of nitrile rubber, neoprene, PVC or butyl rubber, do not have inside lining, and are long enough to cover the entire forearm. This has significantly reduced the risk of operator skin contact hence minimizing chances of skin irritation and potentially eye irritation (if spray operators were to take the gloves off and wipe their eyes).

#### **Recommendations:**

- During the procurement process, special attention should be paid to sizing of rubber boots so spray operators can wear them comfortably (to encourage consistency wearing of boots).

Team Leaders. It was observed that during the visit, all the team leaders were wearing their complete set of PPE while monitoring spray operators.

Heat and Health. The climate in the spraying sites makes consistent use of PPE unbearable during the hot afternoon hours. While the program wants its staff to be fully protected when using insecticides, it should also take into account potential negative impacts from use of PPE (e.g. heat stroke). It should be noted that although this should be and is a concern of the program, there have thus far not been any reported cases of ill-health due to heat.

An earlier starting time is a potential solution to this problem, as spraying would end before the sun begins to scorch.

Daily Collection of PPE. All PPE should be collected and stored at the warehouses at the end of each working day. During the compliance visit, it was observed that all the PPE was returned and nothing was taken away.

## **Warehouse Management**

Warehouse Records. At the time of visit, warehouse records were up to date in all the warehouses visited except for one facility. In all the warehouses, the spray operators fill in the number of sachets used each day, hand the filled form to the team leaders who also fill in the total sachets and then hand the form to the supervisors. The supervisors log the total number of sachets used by the team before submitting the records of the day to the warehouse manager who automatically calculates the balance.

Thermometers. The Supplemental Environmental Assessment (SEA) stipulates the need for thermometers for measuring temperature in all the warehouses. During the compliance visit, all the warehouses had a functional thermometer with a daily temperature recording chart. The charts for temperature recording were being filled on a daily basis in all the storage facilities.

First Aid Kits. All the warehouses had first aid kits for any emergency situation that could arise.

Pilferage Prevention/Sachet Distribution Procedures. The sachet record document should indicate who was given the sachets, the number given, and the number of empty sachet returned at the end of each day. This procedure was being followed daily and strictly and only one case of delay in recording was observed (in the Kpasenkpe warehouse).

PPE Storage. The compliance visit found that the PPE is stored separately from the insecticide as recommended.

General Conditions of Storage and Security. A summary and comparison of storage facility conditions can be found in the table in Table 1. The summary generally indicates that storage conditions are quite good. The warehouses are orderly, lack evident spills, are separated from food and human habitation, are locked, guarded and physically secure and have soap and water readily available. The insecticide boxes were stored in the down-up direction as indicated in the boxes to avoid spills.



**Figure 1. Warehouse secured under lock and key**

### **Quality of Spraying**

Nozzle Requirements. Nozzle quality and cleanliness is crucial to the quality and therefore, the *effectiveness* of spraying. At the time of the compliance visit, a nozzle check was done by all the spray operators and they were all found to be using the 8001 or 8002E nozzles that are recommended.

Spray Observations. Spraying was observed to be implemented correctly and accurately as taught.



**Figure 2. Spray operator in action**

Preparation of the Household. It is required that before any spraying occurs in a household, the operator must undertake a walk through and inspection to ascertain if the house is well prepared for spraying. All food substances and

other movable things must be removed from the house and all immovable things must be covered. Also, all domestic animals must be tied up and poultry must be restrained.



**Figure 3. Households prepared for IRS**

During the visit, there were no observed cases that indicated lack of household preparation before the spray.

- All the spray operators were provided with a covering sheet (polythene) to cover furniture and other immovable objects that could not be taken outside the house. In one instance, however, the inspector encountered a situation where the operator and supervisor did not carry along the covering material and this was a clear case of negligence.

Negligence during spraying. Observations during the spraying indicated a very minimal degree of negligence in handling the insecticide during the spraying process.

**Recommendations:**

Strict supervision by the Team Leaders and Supervisors is mandatory to reduce cases of negligence.

Mistakes observed during the spray operations by the supervisors and team leaders should be recorded, noted, corrected and pointed out during the debriefing sessions every evening or in the morning before the spray team sets out.

Proper Wearing of PPEs. A couple of the spray operators did not wear their PPE properly during the spraying process. For instance, some operators were seen tucking in their overalls inside the boots instead of having the overalls covering the boots. By tucking their overalls inside their boots, the operators were exposing themselves to possible skin contamination in the event that the insecticide spilled accidentally on their legs and ended up inside the boots.



**Figure 4. Spray operators returning back from spraying notice improper wearing of boots**

**Recommendations:**

Strict supervision by the Team Leaders and Supervisors is mandatory to reduce incidences of negligence in relation to the correct wearing of PPE.

**Daily Clean-Up**

Progressive Rinse. It is worth noting according to communication from USAID and confirmation from the COP and PNL staff on the ground that during the first 2 weeks of the spraying period, the daily clean up process was somewhat chaotic in Walewale, Tolon, and Longbon and was conducted in a crowded and disorganized fashion with the spray operators rinsing and cleaning their equipment without PPE and overly exposing themselves to possible exposure effects.

However, there has been a marked and significant improvement and now the daily clean up occurs in an orderly and well drilled fashion.

Progressive rinsing of spray equipment was discovered to be highly satisfactory and well coordinated at the time of the visit. Progressive rinsing and daily re-use of rinse water is a primary means of conserving water used by the program and of mitigating pollution. All the sites have different barrels as recommended for progressive rinsing. Separate barrels/basins have been designated into the following categories: (1) progressive rinse, (2) overall washing, and (3) personal hygiene.



**Figure 5. Progressive rinsing in progress**

Waste Water Disposal. It is not acceptable to re-use the water that has been used to wash overalls because washing of overalls requires soap/detergent and this water cannot be re-used to fill spray cans the next day. Thus, this water needs to be disposed of in a responsible fashion. Currently, all rinse and wash water is dumped in the constructed soak pits in all the staging areas.



**Figure 6. Soak pits for wash water disposal**

Personal Washing. Personal washing is encouraged in all the spray sites but not highly emphasized. The spray operators, however, dry clean themselves i.e. wash only specific parts of their body parts especially on their hands, feet and head but do not undertake a full body wash.

**Recommendations:**

In future training, place renewed emphasis on daily hygiene and bathing; supervisors and group leaders should remind spray operators of the importance of washing (at least head and hands) after each day's work.

## Contaminated Product Disposal

Empty Sachets. At the time of the visit, empty insecticide sachets were stored in the main warehouse in Tamale in sealed drums until a viable disposal method is agreed upon. There is an on-going discussion with the Ministry of Environment and RTI on the best method for disposal of these empty sachets and face masks.

Lost Sachets: There is no recorded evidence of lost sachets in this program to date in relation to spraying operations. However, during the transport of the insecticides from Accra to Tamale, following a road accident 6 sachets containing the insecticides were lost and efforts to recover are underway. So far, 2 sachets have been recovered and the programme is working with the local authority to recover the rest.

The empty sachets are for now stored in sealed drums with the dust masks and are periodically transported back to the central warehouse in Tamale where they shall remain until a viable disposal option is decided upon.



**Figure 7. Insecticide spill from the road accident**

### Dust Masks, Ruined and Unusable PPE.

At the time of the visit, used dust masks were as indicated above being returned to the warehouse and kept awaiting further disposal instructions.

## Training for Emergency Situations

Health Worker Training. The program trained all the spray teams on how to handle worker and resident exposure.

The program did not train health workers (clinicians) on how to handle worker and resident exposure to the insecticide at the time of the visit. However, this issue was raised and a date had already been set aside to offer this training. It can now be confirmed that it was offered on 18<sup>th</sup>-19<sup>th</sup> June after my departure.

### **Recommendations:**

The health workers (clinicians) must be trained in all IRS programs and this delay was a serious oversight on the IEC component of this IRS program.

Driver Training. Long distance truck drivers responsible for transporting the pesticides to Tamale from Accra were not trained on response to emergencies and safe operation of a vehicle when carrying hazardous materials, as required.

This is because the responsibility for selecting the company lies with Crown Agents. However, the COP and Task Manager held discussions with Crown Agent staff and informed them of the dangerous nature of the chemicals and the USAID and Ghana EPA requirement to train the driver(s) of the company that would eventually be selected to do the assignment.

This lack of training caused great concern in the program when the truck transporting the insecticide to Tamale was involved in an accident. During this accident, the Fendona was spilled and caused exposure to the environment and local residents who were hired to reload the insecticide into another truck without PPE.

The day-to-day drivers were trained on emergency response in case of a spill including the need to drive slowly and carefully.

**Recommendations:**

Following this accident, RTI is developing a Standard Operating Procedure (SOP) for transportation of insecticides which will require that all the companies contracted by Crown Agents to transport the insecticides must be trained before the assignment and a proof of the same provided to RTI. At a minimum the SOP will contain;

- Restrictions on time of day to drive, prohibiting any transportation of insecticides after 6pm.
- Requiring that all trucks used in transporting the insecticides be containerized.
- Requiring that all the trucks be provided an escort throughout the journey by a different vehicle.
- Requiring all trucks to have sand, shovel and extra PPE for use in recovering and containing spills following an accident.
- Training in emergency exposure and spill containment measures for all drivers.

**Drug Availability**

First-Aid Kits. First-aid kits were procured and distributed to all the warehouses and spray team transport vehicles. The overall quantity of kits was sufficient and present in all the storage facilities.

Treatment Medicines. As is required and stated in the SEA, the health centers in the spraying area should be equipped with the right medication for insecticide exposure whether ingested or through skin and eye contact. Discussions with the health staff and RTI staff indicated that this requirement had been fulfilled. The following medicines are required in the health facilities as indicated in the SEA

- Promethazine
- Panadol
- Hydrocortisone cream
- Lorazepam
- Salbutamol Tablets
- Activated Charcoal

Through the SEA, RTI had provided a list of medicines recommended for treatment of insecticide exposure.

### **Exposure Incidents**

Spray Operators. Spray operators who were interviewed by the EA specialist during the compliance visit reported to have experienced mild itching on their necks during the initial stages of the spray. They attribute this to the inadequate helmets lacking a back neck cover.

This issue was noted and towels were procured and given to each spray operator and used to improvise as covers for the back of the neck. At the time of inspection and to date, no exposure incidents with spray operators were noted or reported.

At the time of the compliance visit no negative impact related to exposure had been registered within the target population; this is attributed to IEC activities emphasizing staying outside the house for two hours.

Accidental Spill. The second and last shipment of insecticide transported to Tamale from Accra by Crown Agents was involved in a road accident leading to a spill into the external environment at the scene of the accident.

A nearby stream was possibly contaminated following this spill but the magnitude and impact is fairly insignificant due to the small quantity of the insecticide that ended up into the stream. Still, RTI took water and soil samples from the scene for testing and the results provided do not indicate any serious level of contamination.



**Figure 8. Insecticide spill following accident near stream**

However, there was human exposure to the insecticide experienced by the local residents who were hired by Crown Agents to reload the drums back into a rescue truck. The local residents, six in number, were paid to load the drums without any PPE and immediately afterwards complained about eye and skin itching and sensational burning.

RTI tracked these individuals and immediately took them to hospital for exposure treatment.

**Recommendation(s):**

- The recommendations highlighted above as part of the SOP should be followed in cases of any future accidents.

**IEC, Mobilization and Community Interaction**

This section describes field observations and results of discussions related to IEC, community mobilization and spray operators' interactions with community members. These activities can have an impact on human health and environmental compliance, so it is important that community education is conducted in a timely and comprehensive fashion.

Community awareness on actions to take before and after spraying- Discussions with villagers indicated that IEC was completed. Villagers were aware that they had to take everything out of their houses before spraying commenced. They were further aware that after spraying, they would only return to the house after 2 hours upon which they were to open the windows and doors leave them open for half an hour then sweep the room clean and move back in only after this process.

The villagers were also very much aware that they would have to dispose of dead insects in latrine pits.

Community refusal to spray. None reported.

## **Non-Target Organisms**

Department of Environment staff suggested that entomologists not only examine effects of the insecticide on mosquitoes, but that they also collect non-target insects from the household to determine impacts on non-target organisms, including but not limited to insects, amphibians and reptiles.

### **Recommendations:**

Work with CDC, Noguchi entomologists and Ministry of Environment staff (as well as RTI environmental monitoring staff, as needed) to develop a feasible low-cost scheme for determining impact on non-target organisms that enter the household.

## **In-Country Capacity Building**

The Ministry of Environment, specifically staff from the Environmental Protection Agency (EPA), participated in ToTs or spray operator training. Such inclusion in this training is essential for staff that will monitor the spray program and provide recommendations. Additionally, these staff can provide clarification on issues regarding environmental health and safety and local environmental regulations.

## **Conclusion**

The EA specialist concludes by attesting that the level of compliance demonstrated in the Ghana IRS programme is highly satisfactory save from the accidental spill of insecticides by Crown Agents. The issues identified as non-compliant are not critical to warrant any anxious concern and can be easily remedied and this has actually been done already.

## **Persons Met**

- Dr. Paul Psychas-USAID PMI Ghana Mission
- Mr. John Pwamang –EPA Pesticides Registrar
- Mr. Napoleon Graham-RTI COP Ghana
- Mr. Edward Garbrah-M &E officer/Environmental Specialist RTI Ghana
- Mr. John Mullinax-USAID Agriculture
- Dr. Constance Barte-Plange-NMCP Programme Manager
- Mr. Kwame Gakpey-NMCP Officer Tamale
- Mr. Sylvester Segbaya-NMCP Manger Tamale Region