



# SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT AMENDMENT 2012

## ZAMBIA INDOOR RESIDUAL SPRAY (IRS2) FOR MALARIA CONTROL

INDEFINITE QUANTITY CONTRACT (IQC) TASK ORDER 4  
CONTRACT GHN-I-00-09-00013

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**Submitted to:** Teresa Bernhard, GH Bureau Environmental Officer

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# PROPOSED SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT (SEA) AMENDMENT

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It is proposed to amend the November 2011 Zambia IRS SEA to allow for the use of all WHO-recommended insecticides of the pyrethroids, carbamates, and organophosphates classes for IRS in all districts of Zambia for five years (2010-2015).

The analysis required for a country-wide SEA was performed for the June 2010 SEA Amendment. From that analysis, an Environmental Mitigation and Monitoring Plan (EMMP) was developed, in order to summarize potential environmental impacts, and to document how these potential impacts would be mitigated, through the use of operational procedures, provision of extensive training, establishment of physical structures for storage of pesticide and waste disposal, and the use of protective personal equipment by all staff potentially exposed to pesticides. An updated version of that EMMP is attached to this amendment in Annex C, and will be implemented during the spray program.

Signature approval of this SEA amendment will indicate authorization to proceed with IRS operations in all districts of Zambia, using pyrethroids, carbamates, and organophosphates as needed, for a period of five years (2010-2015). The SEA will be updated every five years for the duration of the PMI IRS program in Zambia.

**AMENDMENT TO THE SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT FOR PRESIDENT'S  
MALARIA INITIATIVE - INDOOR RESIDUAL SPRAYING (IRS) FOR MALARIA CONTROL IN  
ZAMBIA**

**APPROVAL OF ENVIRONMENTAL ACTION RECOMMENDED:**

The United States Agency for International Development, Global Health Bureau, has determined that the proposed indoor residual spraying work responds to the needs of the community and country. This work is described in the Supplemental Environmental Assessment: Indoor Residual Spraying for Malaria Control in Zambia dated November 2011, and its amendments. This Supplemental Environmental Assessment Amendment relates to managing malaria in Zambia and conforms to the requirements established in 22 CFR 216.

This document does not mandate the execution of the proposed IRS. Rather, it documents the environmental planning and impact analysis executed by the IRS team in preparation for the proposed action. The design and standards of operation of the IRS program are established to avoid and reduce any potential impact. USAID has concluded that the proposed action, when executed as described in the Supplemental Environmental Assessment and the Programmatic Environmental Assessment, is consistent with USAID's goal of reducing malaria incidence in Zambia while minimizing the negative impact on environmental and human health.

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# ACRONYMS

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<b>AIRS</b>	Africa IRS Project
<b>ECO</b>	Environmental Compliance Officer
<b>EMMP</b>	Environmental Mitigation and Monitoring Plan
<b>GHI</b>	Global Health Initiative
<b>IRS</b>	Indoor Residual Spraying
<b>LOE</b>	Level of Effort
<b>MOH</b>	Ministry of Health
<b>NMCC</b>	National Malaria Control Centre
<b>NMSP</b>	National Malaria Strategic Plan
<b>OP</b>	Organophosphates
<b>PMI</b>	President's Malaria Initiative
<b>PPE</b>	Personal Protective Equipment
<b>RTI</b>	Research Triangle Institute
<b>RTT</b>	RTT Group, Ltd
<b>SEA</b>	Supplementary Environmental Assessment
<b>STTA</b>	Short-term Technical Assistance
<b>USAID</b>	United States Agency for International Development
<b>WHO</b>	World Health Organization
<b>ZEMA</b>	Zambia Environmental Management Agency
<b>ZISSP</b>	Zambia Integrated Systems Strengthening Project

# EXECUTIVE SUMMARY

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Zambia's National Malaria Strategic Plan 2011-2015 is guided by the Ministry of Health Strategic Plan 2011-2015 which in turn is anchored on the 6<sup>th</sup> National Development Plan and the Vision 2030. Its goal is to reduce the incidence of malaria by at least two thirds of the 2010 baseline, to reduce malaria deaths to near zero and to begin to develop malaria free zones in the country to contribute, ultimately, to the vision of a malaria free country by 2015.

The 2011-2015 Malaria Strategic Plan is the product of multi-disciplinary, multi-sector stakeholder consultative processes with input from different levels of the health care system. It builds on the substantial best practices learned and achievements made during the implementation of the previous strategic plan (2006-2010). The delivery of the previous strategic plan contributed to achievement of more than 60% reduction in malaria morbidity and mortality following successful mobilization of technical and financial support from malaria partners.

The year 2012 will mark the first year that Abt Associates has assumed responsibilities for certain aspects of the IRS program in Zambia. These responsibilities include environmental assessment and implementation assistance, and purchase of commodities and supplies.

Abt Associates Africa Indoor Residual Spray Program in Zambia employs a full-time Environmental Compliance Officer, Jacob Chishiba, who has primary responsibility for the environmental compliance aspects of the above responsibilities. In addition, Peter Chandonait, the Environment Compliance Manager for overall AIRS project provides indirect technical supervision and provides technical assistance as necessary for the environmental compliance aspects of the Zambia AIRS program.

Although the total number of districts being supported by PMI has decreased this year to twenty, there are seven new districts that have not previously been sprayed by PMI. These districts were included in the 2010 SEA Amendment that authorized all WHO recommended pesticides to be used in all districts of Zambia, but the most recent amendment in 2011 was limited to 53 districts which did not include the seven districts which are new to the PMI IRS program. Therefore, this amendment will serve to clarify authorization to spray in all districts in Zambia using pyrethroids, carbamates, and/or organophosphates.

Pre-spray inspections of operational sites are in process, and reveal the strengths and opportunities for improvement of the infrastructure currently available to

support the 2012 IRS campaign. Based on these results, recommendations for improvements are being made to NMCP, the implementing agency for IRS in Zambia. In addition, technical consultations have and will continue to contribute to the overall environmental compliance effort. All required commodities and supplies have been ordered, nearly all have been received, and the remainder are due to be delivered prior to the initiation of spray activities.

# I. BACKGROUND

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In August 2011, Abt Associates was awarded a three-year, Africa-wide IRS project (IQC IRS2, Task Order 4) which is funded by USAID under the President's Malaria Initiative. The objective of the project, named the Africa IRS (AIRS) project, is to limit exposure to malaria and reduce incidence and prevalence of malaria in up to 17 countries in sub-Saharan Africa. During year one, the project will be implemented in 14 countries including Angola, Benin, Burkina Faso, Ethiopia, Ghana, Liberia, Madagascar, Mali, Mozambique, Nigeria, Rwanda, Senegal, Zambia, and Zimbabwe. Abt will work closely with Ministries of Health, and National Malaria Control Programs, district health offices, local NGOs, and community and business leaders, to ensure that governments, the private sector, and communities are able to lead future IRS and malaria control programs.

## I.1 HISTORY AND SCOPE OF IRS IN ZAMBIA

Zambia is implementing IRS for malaria control as part of an integrated malaria vector management strategy. Spraying began in 2003 following the success of IRS by

### **At a Glance: Zambia**

Population (2012): 14.3 million<sup>1</sup>

Population at risk of malaria (2010): 100%<sup>2</sup>

Estimated annual malaria deaths/100,000 population (2008): 104<sup>3</sup>

Under-five mortality rate (2007): 119/1,000 live births, or approximately 1 in 8 children die before their fifth birthday<sup>4</sup>

<sup>1</sup> US Census Bureau, International Data Base 2012

<sup>2</sup> WHO World Malaria Report 2011

<sup>3</sup> WHO World Health Statistics 2011

<sup>4</sup> Demographic and Health Survey (DHS) 2007

the private sector at the Konkola Copper Mines. IRS is implemented by the National Malaria Control Centre (NMCC) of the Ministry of Health (MOH). Additional resources and technical support have been mobilized through a number of external partners, including the United States Agency for International Development (USAID), Roll Back Malaria partnership, Malaria Control and Evaluation Partnership in Africa, World Health Organization (WHO), Global Fund for HIV/AIDS, Tuberculosis, and Malaria, the World Bank, USAID Zambia's bilateral implementing partner, the Zambia Integrated Services Strengthening Project (ZISSP), and Research Triangle Institute (RTI) International.

In 2008, IRS was conducted in 15 districts situated in five provinces. In 2009, it was expanded to 36 districts covering all nine provinces in Zambia. In 2010, the NMCC, with

PMI support, expanded the reach of IRS to cover a total of 1.3 million structures in 54 districts, representing 75% of the districts in the country and protecting over 6 million people. The 2011 PMI IRS program covered 35 districts, while in 2012, twenty districts will be covered. Of those twenty, the following districts will be sprayed for the first time in 2012, as shown on Figure 1 below:

1. Mambwe
2. Nyimba
3. Nakonde
4. Mporokoso
5. Kaputa
6. Mungwi
7. Luwingu



### 1.1.1 DISEASE BURDEN

According to the 2008 national Health Management Information System (HMIS) data, malaria is still the number one cause of mortality and morbidity in Zambia, although a positive trend in reduced morbidity and mortality has been observed over the past three years, from 2006 to 2009. The national malaria incidence rate was 412 per 1000 population in 2006, 358 in 2007, 252 in 2008 and 246 in 2009. Table 1 shows the malaria incidence per 1000 population in the 20 IRS districts in the period 2007 to 2011. The table shows a general downward trend.

**Table 1: Malaria Incidence per 1,000 Population in 20 Districts, 2007-2011.**

District	Malaria incidence per 1000 population				
	2007	2008	2009	2010	2011
<b>Eastern</b>					
Chadiza	668	615	936	1026	954
Chama	794	499	640	850	828
Chipata	398	336	367	405	683
Katete	543	324	712	1038	922
Lundazi	467	303	372	531	552
Mambwe	515	250	699	1172	785
Nyimba	808	485	833	1263	1069
Petauke	531	371	139	155	163
<b>Northern &amp; Muchinga</b>					
Chilubi	159.7	731.8	74.4	511.1	212
Chinsali	328	151.4	27.8	85.8	283.2
Isoka	-	-	-	-	-
Kasama	123.8	330.6	207.2	166.19	-
Luwingu	-	-	290.83	472.03	171.14
Mbala	379	195	66	67	11
Mpika	383.1	236.7	198.3	499.5	481.2
Mporokoso	300.9	213.5	18.9	48.4	108.2
Mpulungu	421.2	402.2	192.02	218.91	306.38
Mungwi	539	276	140	173	253
Nakonde	106.4	134.4	97.7	73.2	95.4
Kaputa	882.1	243.6	117.4	142.1	-

Note: Dash (-) shows that data is not available

### 1.1.2 STRUCTURES SPRAYED IN 2011 AND TARGETS FOR 2012 IN THE 20 IRS DISTRICTS

Almost all PMI supported districts has increased the number of structures to be sprayed in 2012. In 2011 the total number of formal structures sprayed were 51,957 while the informal structures sprayed was 291,076 bringing the total number of structures sprayed to 369,992. For 2012 spray season the total targeted structures are 531,791 broken down as 78,423 for the

formal structures and 428,368 for the informal structures. The previous year's total target for these 20 PMI supported districts was 446,908 structures. This translates to the scale up percentage of 19 in 2012. This scale up will be done in the areas with very high incidence rates, referred to as "hot spots". Table 2 shows the number of targeted structures per district and the number of spraying days proposed.

**Table 2: Number of Structures Sprayed in 2011 and Targeted in 2012**

No	District	Estimated	# of structures sprayed last season			# of structures targeted this season			# of
		population	Formal	Informal	Total	Formal	Informal	Total	days for spraying
1	Chadiza	133,121	2,548	12,602	15,150	3,560	32,000	35,560	55
2	Chipata	469,926	5,831	39,986	45,817	8,000	47,000	55,000	60
3	Katete	269,264	4,658	32,113	36,771	5,000	45,000	50,000	60
4	Lundazi	355,966	2,875	25,526	28,401	3,500	36,500	40,000	60
5	Mambwe	69,243	2,295	8,253	10,548	2,500	10,500	13,000	45
6	Nyimba	101,616	1,875	16,672	18,547	2,500	23,500	26,000	50
7	Petauke	360,035	3,408	27,143	30,551	5,500	44,500	50,000	60
8	Chilubi	79,236	917	13,205	14,122	3,000	22,000	25,000	70
9	Kaputa	120,416	877	6,809	7,686	2,500	27,338	29,838	45
10	Kasama	256,348	5,321	17,542	22,863	6,158	19,875	26,033	55
11	Luwingu	138,996	2,438	9,752	12,190	4,050	12,150	16,200	45
12	Mbala	228,885	1,800	13,202	15,002	3,957	14,037	17,994	50
13	Mporokoso	107,496	1,630	6,302	7,932	1,800	13,200	15,000	35
14	Mpulungu	108,374	836	9,087	9,923	4,200	14,968	19,168	40
15	Mungwi	167,443	973	11,864	12,837	1,000	12,000	13,000	40
16	Chama	113,928	828	20,656	21,484	1,200	23,800	25,000	45
17	Chinsali	152,014	2,498	17,897	20,395	2,998	20,000	22,998	40
18	Isoka	93,392	2,719	11,554	14,273	4,000	12,000	16,000	45
19	Mpika	227,943	3,162	6,829	9,991	8,000	10,000	18,000	45
20	Nakonde	129,125	6,358	9,151	15,509	8,000	10,000	18,000	40
	<b>Total</b>	<b>3,603,531</b>	<b>51,957</b>	<b>291,076</b>	<b>369,992</b>	<b>78,423</b>	<b>428,368</b>	<b>531,791</b>	<b>915</b>

The Zambian National Malaria Strategic Plan (NMSP) for 2011-2015 has the goal of achieving universal coverage with either IRS or insecticide-treated nets as the main vector-based interventions.

## **I.2** TRANSITION OF PROCUREMENT AND ENVIRONMENTAL COMPLIANCE ACTIVITIES

Abt Associates is already the primary contractor for IRS technical and programmatic support to the NMCC under ZISSP. Under Zambia AIRS, responsibilities for the procurement and environmental compliance components of IRS activities were transferred from RTI to Abt Associates.

## **I.3** KEY AIRS PROJECT OBJECTIVES IN FY12

- Procurement of insecticides, IRS spraying hardware, personal protective equipment (PPE) and other IRS-related commodities and supplies sufficient to spray 531,791 structures in 20 districts.
- Support the implementation of the environmental compliance component of the IRS program. This includes appropriate environmental inspections before, during and at the end of spray operations to safeguard the environment, recipient communities and personnel involved in spray activities. Additionally, a letter report will be submitted.
- Conduct training in pesticide stock control compliance and oversight at central and district levels.
- Design and implement regional pesticide recapture and storage program for post-spray inventories of pesticide.

## 2. COUNTRY SUPPORT

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Abt Associates, under ZISSP, supports the NMCC in its planning and implementation of spray activities. Zambia AIRS project will ensure insecticide and IRS commodity procurement for PMI and provide support with environmental compliance. With all components of IRS support to the NMCC under one contractor roof, Abt will take the opportunity to consolidate management of these components under ZISSP. Zambia AIRS will ensure compliance with the Environmental Mitigation and Monitoring Plan (Annex C) included in 2011 SEA and will adjust it if needed for the current IRS implementation. Using the global AIRS project Performance Management Plan, Zambia AIRS will adapt the document to monitor and report on the components and indicators relevant to Zambia AIRS scope of work.

As part of the environmental compliance mandate, Zambia AIRS will provide fiscal and technical assistance to the NMCC with rehabilitation and maintenance of soak pits in target districts.

### 2.1 STAFFING COMPOSITION & EXPERTISE

Zambia AIRS will fund the salary and activities of an Environmental Compliance Officer (ECO) who will work out of the ZISSP project office and report to the ZISSP Malaria Director Peter Mumba. Like all AIRS country ECOs, the Zambia ECO will receive technical support and indirect supervision from the AIRS Environmental Compliance Manager Peter Chandonait based at Abt's office in Bethesda, U.S. A driver will be hired to assist with environmental compliance activities using the vehicle procured for this purpose under IRS2, TO1.

To allow the ECO to devote all his time to environmental compliance activities, Zambia AIRS will share a Procurement Coordinator/Administrative Assistant with ZISSP. Funding for this position will be split equally between ZISSP and AIRS. This position will be responsible for managing local procurement of IRS supplies including some PPE and district stores' supplies and consumables. During the "off-season" this position will support ZISSP administration. Table 1 summarizes these three Zambia AIRS positions and the responsibilities of each.

**TABLE I: ZAMBIA IN-COUNTRY PERSONNEL**

Position	Staff Name	Roles & Responsibilities
Environmental Compliance Officer	Jacob Chishiba LOE 100%	Support the implementation of the environmental compliance component of the IRS program. Coordinate implementation of pre-spray, mid-spray and end of spray environmental monitoring activities to ensure compliance with US government and local environmental regulations, and adherence to requirements as laid out in USAID Initial and Supplemental Environmental Assessments and Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP) and its amendments.
Procurement Coordinator/Administrative Assistant  Funding split 50/50 with ZISSP	TBD LOE 50%	Manage local procurement of IRS supplies and consumables needed for spray operations and stores management. Prepare local tenders, purchase supplies, and coordinate transport to district IRS stores. Maintain a registry of local and regional vendors.
Driver	TBD LOE 100%	Operate and maintain a project vehicle principally dedicated to meeting the transportation needs of the environmental compliance activities.

Note: LOE=level of effort

# 3. ENTOMOLOGY

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## CHARACTERIZATION OF MALARIAL VECTORS IN ZAMBIA

Knowledge on insecticide resistance in target species is a requirement to guide insecticide use in malaria control programs. However, the development of this knowledge has proved to be a challenge thus far in Zambia. Due to the absence of up-to-date entomological information, the decision to recommend pesticides for the 2012 IRS campaign was made primarily on the basis of the previous year's data. A meeting was held with stakeholders in April 2012. The objectives of the meeting were:

- Evaluate the susceptibility of malaria vectors in different ecosystems of Zambia to the main insecticides recommended by WHO and used in country (Deltamethrin, Permethrin, Lambdacyhalothrin, DDT, Fenitrothion, Bendiocarb).
- Enlighten scientific recommendation of insecticides for interventions of malaria vector control in Zambia
- Provide a baseline for the monitoring of the susceptibility of malaria vectors to insecticides in Zambia based on WHO protocol

The minutes and the outcomes of the meeting are presented in Annex A and further details on insecticide resistance mechanism are presented in Annex B.



# 4. INSECTICIDE PROPOSED

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## 4.1 INSECTICIDE SELECTION

The selection of the preferred insecticide class for use in the 2012 spray round is based on the following factors:

- Susceptibility of the local vectors
- Approval by WHO Pesticide Evaluation Scheme (WHOPES)
- Registration in country
- Acceptability of the pesticide to the NMCP
- Conformity with safety as described in USAID's Programmatic Environmental Assessment for Integrated Vector Management
- Duration of effectiveness

Based on the discussions between the MoH, Liverpool School of Tropical Medicine, Malaria Transmission Consortium, Zambia Integrated System Strengthening Programme, Malaria Institute at Macha/John Hopkins University, Zambia Environmental Management Agency, Mining Sector and Ministry of Agriculture, USAID, and the Centers for Disease Control and Prevention, the decision was made to propose the use of organophosphate in the 2012 IRS round in the PMI-supported districts. However, subsequent investigation revealed that it was not likely there would be sufficient quantities of this class of pesticide to cover the twenty proposed districts. Therefore, it was decided to propose the use of two classes of pesticide for 2012. They are carbamate (FICAM (bendiocarb)) and organophosphate (OP) (Actellic CS, pirimiphos-methyl). The impact of human exposure to these insecticides and the medical treatments required are outlined in Annexes D-G. Because of the nature of the organophosphates, increased spray supervision and random supervisory checks by the ECO to the supervisors and SOs will be conducted at least once a week. Training of all parties has emphasized the need for greater care with the organophosphate class of pesticide, recognition of the systems of exposure, and the protocol for medical referral.

The estimated insecticide quantifications and distribution by class are included in Annex H.

## 5. SPECIAL PRECAUTIONS

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In Northern and Muchinga Provinces where Ficom (bendiocarb) will be sprayed, the districts will spray twice, and this will result in longer exposure of spray operators to chemicals. Strict environmental health and safety compliance will be paramount for upcoming campaign. To avoid the risk of additional exposure to the insecticide, spray operators will be given strict instructions to use personal protective equipment correctly at all times and the ECO will execute weekly random location checks of the supervisors and SO compliance with the EMMP and health and safety requirements including checking to ensure that the SOs are healthy (no infections such as a cold or flu, not intoxicated etc.)

# 6. ENVIRONMENTAL COMPLIANCE

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## Environmental Health and Safety Compliance

Prior to implementation of IRS operations, there are many environmental compliance criteria that must be met to ensure correct and effective indoor residual spraying, and to minimize environmental risk. These environmental compliance activities include:

- Inspection of the environmental conformity of IRS sites (soak pits, storage rooms, etc.) before the campaign and ensure that two other inspections are carried out (one pre- and the other mid-campaign are planned);
- Ensuring that an environmental mitigation and monitoring plan is adhered to during IRS campaign;
- Ensuring the personal safety of the spray personnel through proper use of personal protective equipment (PPE) and compliance with standard operating procedures; and
- Ensuring that the environmental and community impact during and after the IRS campaign are minimized through effective IEC and proper stock management of insecticide.

These inspections and the resultant recommendations for improvements and remediation of sub-standard conditions and facilities are underway, and will be completed prior to the initiation of spray activities.

Risks of human exposure to insecticides include systemic reactions such as excessive sweating, salivation, headache, blurred vision, nausea, vomiting, stomach pain, giddiness, slurred speech, tightness in the chest, and muscular twitching (see Annexes D-G).

Disposal of leftover or expired insecticides and the insecticide containers will be conducted in compliance with Zambia Environmental Management Agency (ZEMA) regulations and specifications, using standard procedures. Each district health center owns and operates an incinerator, and these are made available to the Ministry of Health for the destruction of pesticide-contaminated wastes. ZEMA representatives oversee the destruction of the pesticides to assure proper operation of the incinerators during the process.