

PRRO PERSUAP
(Pesticide Evaluation Report & Safe Use Action Plan)

For:
USAID/West Bank-Gaza Food Assistance Program

In support of the “Protracted Relief and Recovery Operation (PRRO)”
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Abbreviations and Acronyms used in the PERSUAP Report

AID	US Agency for International Development (also known as USAID)
ANE	Asia and Near East Bureau of USAID
BEO	Bureau Environmental Officer
C&A	Contracting and Agreement
CABI	UK Commonwealth Agricultural Bureau International
CAP	Consolidated Appeals Process
CFR	Code of Federal Regulations
CFSVA	Comprehensive Food Security and Vulnerability Assessment
CHF	Community, Habitat, Finance
cm	centimeters
CO	Country Office (of WFP)
CP	Cooperating Partner
CPC	Crop Protection Compendium
CRS	Catholic Relief Service
CTO	Cognizant Technical Officer (USAID Project Manager)
CV	Curriculum Vitae
DCHA	Democracy, Conflict and Humanitarian Assistance
EA	Environmental Assessment
EAP	Environmental Assessment Professional
ECG	Echocardiogram
EPA	US Environmental Protection Agency (also known as USEPA)
EXTOXNET	Oregon State University Ecotoxicology Network Pesticides Website
FAO	UN Food and Agriculture Organization
FCL	Full Container Load
FFT	Food for Training
FFP	Food for Peace
FFW	Food for Work
FIFO	First In First Out
GMO	Genetically Modified Organism
HHAO	Health and Humanitarian Assistance Office
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
IUED	Institut Universitaire d'Etudes du Development
m	meters
MD	Mission Director
MEO	Mission Environmental Officer
mg	milligrams
MSHA	Mine Safety and Health Administration
mt	metric tons
NGO	Non-Governmental Organization
NIOSH	National Institute for Occupational Safety and Health
NRI	Natural Resources Institute
OCHA	UN Office for the Coordination of Humanitarian Affairs
OPT	Occupied Palestinian Territory

PAN	Pesticide Action Network
PCBS	Palestinian Central Bureau of Statistics
PECS	Palestinian Expenditure and Consumption Survey
PER	Pesticide Evaluation Report
PERSUAP	Pesticide Evaluation Report and Safe Use Action Plan
PIC	Prior Informed Consent (international treaty)
PMS	Pesticide Management Specialist
POPs	Persistent Organic Pollutants (international treaty)
PPE	Personal Protection Equipment
ppm	parts per million
PPT	PowerPoint (computer program)
PRRO	Protracted Relief and Recovery Operation
RCRA	Resource Conservation and Recovery Act
REO	Regional Environmental Officer
RFQ	Request for Quotations
RUP	Restricted Use Product (Pesticide)
SCBA	Self Contained Breathing Apparatus
SOW	Scope of Work
SPFS	Special Programme for Food Security
SPU	Safe Pesticide Use
SUAP	Safe Use Action Plan
TDY	Temporary Duty
UK	United Kingdom
UN	United Nations
UNRWA	United Nations Relief and Works Agency
US	United States
USA	United States of America
USAID	United States Agency for International Development
USEPA	US Environmental Protection Agency (also known as EPA)
VAM	Vulnerability Analysis Mapping
WBG	West Bank-Gaza
WFP	World Food Programme
WHO	World Health Organization
WWW	World Wide Web

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EXECUTIVE SUMMARY FINDINGS

1. World Food Program (WFP) imports and distributes the following commodities to West Bank and Gaza: sugar, salt, vegetable oil, wheat flour, chickpeas (garbanzos) and beans. The last three—wheat flour, chickpeas and beans—are especially susceptible to infestation by stored grain pests.

2. The primary stored grain invertebrate insect pests present in Israel, West Bank and Gaza are (listed in order of importance): Indian meal moth *Plodia interpunctella*, Warehouse beetle *Trigoderma variabile*, Confused flour beetle *Tribolium confusum*, Cigarette beetle *Lasioderma serricorne*, Bean weevil *Acanthoscelides obtectus*, and Drugstore beetle *Stegobium paniceum*.

3. The primary stored grain vertebrate mammalian pests present in Israel, West Bank and Gaza are: Common mouse *Mus musculus* and Norway Rat *Rattus norvegicus*.

4. USAID recognizes and promotes—as *official policy*—Integrated Pest Management, or IPM.

Integrated Pest Management for stored grain pests includes:

- Sanitation/Cleaning *all* residues
- Good aeration of commodities
- Pest identification important
- Knowledge of pest biology, ecology, and behavior
- Risk-benefit analyses
- Multiple management tactics
- Routine monitoring is first & foremost

5. For this study most floors had been swept/rinsed and had very little residual commodity—that's good! Continued vigilance must be maintained to clean all surfaces well including window sills, ledges, and pallets. Extremely low levels of Indian meal moth, probably living from residuals, were found in two warehouses. Mouse droppings, from likely one or two mice, and likely feeding on small amounts of residual commodity, were found in two warehouses. All facilities had good aeration, though it was noted that shipping containers for water transport may not.

Since there are only six major insect pests and two major vertebrate pests, WFP monitoring staff should learn to positively identify them (and teach them to CP staff), understand the biology, ecology and behavior, and know the differences among them. Pest Identification Keys are available to show differences between similar species and lead to positive identification.

6. Monitoring-Detection can be performed by using:

- Perforated grain probe
- Plastic probe/pitfall trap
- Traps with pheromones for sex-attraction, aggregation & food attractants
- Visual checking with flashlight and hand magnifying lens

7. Most modern fumigation is done using aluminum phosphide/phosphine gas; it is preferable over magnesium phosphide, zinc phosphide, methyl bromide, and carbon dioxide.

8. Aluminum phosphide and Phosphine structure, chemistry, & risks are:

- Aluminum phosphide is: Al-P
- When reacting with water (H₂O) in air, oxygen is released and hydrogens (H) attach to the phosphorous, producing:
- Phosphine (tri-hydrogen phosphide): P-H₃
- Colorless/Odorless gas with ingredient added to make it smell like garlic or fish
- **It is an Explosive Gas!**
- Phosphine is flammable and explosive in air
- It can auto-ignite at ambient temperatures

9. Phosphine's route of entry to human body:

- The skin and eyes are not common routes of absorption of phosphine
- Oral ingestion is rare, but also deadly
- Inhalation is the commonest route of phosphine poisoning

10. Phosphine's affect on the human body:

- **Mild phosphine inhalation** mimics an upper respiratory tract infection (sore throat)
- Other symptoms may include nausea, vomiting, diarrhea, headache, fatigue and dizziness
- **High concentration inhalation** of phosphine may cause **severe** pulmonary irritation
- Leading to acute fluid in lungs, shut down of heart & vein functions, over-excitation of central nervous system, **coma and death**
- Exposure to 1400 mg/m³ (1000 ppm) for 30 minutes may be fatal

11. Phosphine diagnosis is accomplished by:

- A silver nitrate-impregnated paper test can be used for the breath and gastric fluid of the patients exposed to phosphine
- Cell blood counts, haemoglobin, haematocrit, arterial blood gas analyses, renal and liver function tests and cardiopulmonary monitoring and investigations (ECG and chest X-ray) are essential for the assessment of organ effects and the management of phosphine poisoning

12. Phosphine First Aid is accomplished by:

- Remove the patient from exposure site, and keep at rest
- If the patient is unconscious and breathing stops, immediately provide mouth-to-mouth resuscitation and if the heart stops, begin cardiopulmonary resuscitation
- There is **No antidote** for phosphine poisoning (early recognition & management are essential for treatment and life-saving)

13. Fumigation (**absolutely requires two trained and certified-level fumigators for each fumigation event**):

- In the USA, “persons who are not trained and certified for the use of grain fumigants should not attempt to fumigate stored grain”
- Follow the aluminum phosphide label to determine correct amount of chemical to use per cubic meter of infested food commodity
- Calm warm day with no wind and temperature above 16 degrees (and not less than 4 degrees) Celsius
- Learn & follow all safety regulations
- Have **two trained people** present for safety
- Plan to finish fumigation in 15-20 minutes maximum
- Post warning signs on all doors
- Use tape and 4 ml polyethylene sheeting
- Leave only necessary holes for putting aluminum phosphide tablets or gas from gas generator and quickly sealing them
- If using tablets, use probes to put tablets around (not in) grain sacks and pallets
- Remove webbing if Indian meal moth larvae are present
- Use proper respiratory protection equipment for **both fumigators**
- Use phosphine gas detection devices
- *Absolutely no phosphine tablets or residues come into direct contact with wheat flour*

14. WFP needs respiratory breathing protection for mouth/nose:

- Canister gas masks for phosphine concentrations of 0.3-15 ppm
- Self-contained breathing apparatus (SCBA) for phosphine concentrations above 15 ppm

15. So, WFP needs to have:

- Both canister and SCBA available to be ready for any phosphine concentration
- Phosphine meters present to **continually monitor** phosphine concentration while fumigating

16. And, WFP:

- Fumigators must measure concentration of phosphine to determine proper protective equipment
- One fumigator puts the tablets or gas, and the other seals the plastic & **continuously** monitors phosphine levels
- Passive phosphine detection devices can also be worn by applicators

17. Factors that contribute to less than 100% pest control

- Poor gas distribution
- Unfavorable treatment conditions
- Leaks
- Fines (grain dust)

- Type of pest (resistance is present)
- Grain temperature
- Presence of high amounts of insect eggs—a difficult stage to manage

18. For mice and rats, WFP warehouses in Israel have black bait boxes with anticoagulant rodenticide inside, a red warning label on top of the box, locks on the box, a thick cable securing the box to a pole or other permanent structure, and a red warning label on the wall above the box, all as required by Israeli law. CP warehouses in West Bank had no visible rodent control bait boxes, but some use small blocks of anticoagulant placed under pallets—*this is not recommended* as rodents can move the poison, break it up, domestic animals can eat it, children could find and eat it, and pieces of it might get accidentally mixed into food stocks.

One possibility for trapping mice without the need to check traps daily is the use a Mouse Master Repeating Multiple Mouse Wind-Up Trap. To avoid risks of using poison bait, a rat monitoring device can be installed that shows if rats are present, and only then is bait introduced to the warehouse, or mechanical snap traps are used (which reduces the risk of pieces of bait mixing with food commodity).

19. Anticoagulant in Rat/Mouse Traps:

- Fatal internal bleeding is caused by lethal dose of anticoagulants such as brodifacoum, coumatetralyl, or warfarin
- The anticoagulants cause damage to tiny blood vessels, increasing their permeability, causing diffuse internal bleedings which do not stop
- The anticoagulents are also anti-vitamins K (Rats/mice, and all mammals including dogs, cats, and people, need vitamins K for production of essential blood-clotting factors)
- With anticoagulant poisoning, the blood does not clot properly to seal leaking internal wounds, leading to rodent death from hemorrhaging in 1-2 weeks

20. **Past WFP warehouse fumigation** in Israeli warehouses was performed by an Israeli pest management company with Israel-certified fumigators. This method of pest control should be continued for warehouses in Israel, following Israeli law.

Past fumigation in Cooperating Partner (CRS, CHF) warehouses in West Bank was performed by two WFP staff that had some on-the-job practical experience and the WFP Food Storage Manual for guidance.

Past fumigation in Cooperating Partner (CHF) warehouses in Gaza was performed by three WFP staff that had received some past training from NRI, through UNRWA and the WFP Food Storage Manual for guidance.

For WFP to continue to do fumigation in West Bank and Gaza, at least two staff who work in West Bank and two staff who work in Gaza must be trained to a point where they can pass the requirements (take and pass exams and show sufficient safety competence) for a certifiable or similar standard present in Israel (or USA, UK, Canada, South Africa, Australia) in English or Arabic. Training could be done in Israel in English following Israeli certification standards, and

staff members need to be provided all Personal Protection Equipment (PPE) and Phosphine monitors. Training must be refreshed at minimum once a year and certifiable or similar training once every three years following the standards for the country trained in, or another country from the above list. And, PPE and phosphine meters must be properly maintained and kept current and safe for use.

It must be noted that West Bank and Gaza Territories do not have national-level fumigation laws, certification, and standards. And, according to WFP staff, no pest control company exists in WBG that can do certified-level fumigation following international safety standards. Therefore, WFP must provide these safety assurances for whoever fumigates their or their CP's warehouses. The option to have certified Israeli pest control company personnel go into WBG to do fumigation was rejected by WFP staff as impractical and unlikely.

21. PRRO IEE/PERSUAP Determination, Grant Language, and Conditions

This PERSUAP, following USAID's Regulation 216 and the Initial Environmental Examination requirements, recommends a **Negative Determination with Conditions**—meaning that there is no need at this point in time to move to a full Environmental Assessment (EA) for Israel, West Bank, or Gaza. But, Conditions must be followed by WFP and CPs.

Language to include in the grant between USAID and WFP:

The Conditions for WFP and CPs (CRS, CHF) to follow for receiving USAID/WBG commodity assistance are as follows:

CONDITIONS FOR ASSISTANCE

1. Make a plan and budget for and obtain professional national or international-level training and annual refresher for at least two West Bank WFP staff and two Gaza WFP staff tasked with fumigation. If it is not possible to bring Gaza staff to Israel for training, find a way to transfer this training knowledge and experience virtually to the two Gaza WFP staff—perhaps the West Bank staff, during their training, could in turn train the Gaza staff through internet guidance and phone conversations. If any of these trained fumigation staff leave WFP, immediately obtain training for new staff. Number of hours required for training will be determined by training provider based upon fumigation staff experience. *Training must be refreshed annually and fumigators re-trained to a certifiable level requirements at minimum, once every three years.*
2. Make a plan and budget for and obtain professional personal protective equipment (PPE) sets adequate for all levels of phosphine concentration likely to be encountered, maintain them in good working condition, replace canisters and recharge oxygen tanks as required, and continuously use PPE during all fumigations. This may especially include chemical resistant gloves, canister respirators and self-contained breathing apparatus (SCBA)—check with and get advice from Israeli Nationwide Extermination Company on what is used and acquired locally.
3. Make a plan and budget for and obtain professional phosphine monitoring meters, maintain them in good working condition, and continuously use them during all fumigations.

4. Put (and require of Cooperating Partners to put) rodent bait boxes with anticoagulant poison traps, equivalent with Israeli standards (locked, secured with cable, proper red warning signs in Arabic, periodic checking for feeding activity, and record-keeping) inside the warehouses near the front doors along the wall, one meter from commodities, and near any other doors. In West Bank and Gaza, do not place these bait boxes outside of warehouses unless the warehouse has a 24-hour guard and perimeter fence to keep domestic animals and children out.

5. Continue monitoring and sanitation campaign oversight to *completely* clean all WFP and Cooperating Partner warehouses at the end of each day during distribution and after each shipment is cleared, to completely eliminate potential sources of residual pest populations.

6. Use the latest insect pest monitoring and trapping techniques/technologies learned both during specialized Fumigation training, and from the Israeli Nationwide Extermination Company.

7. Continue using Best Management Practices for commodity transport and storage, including reduction in transport steps and time, reduction in storage times for each step, good packaging which keeps out pests and moisture and provides a measure of containment if pest infestations occur, with batch numbers for traceability.

For all fumigation in Israel, West Bank, and Gaza, WFP and their Implementing Partners will only contract or use such fumigation through a professionally trained and tested (or for Israel, certified/licensed) company or individual. All internationally recognized and Israeli-required Personal Protective Equipment will be used by the trained fumigation operator adequate to protect from the levels of phosphine present, as determined by adequately-maintained and functioning phosphine meter or test equipment, and required by Israeli law. All Personal Protection Equipment will be maintained and replaced on the recommended schedule.

All WFP and West Bank-Gaza warehouses will be monitored, cleaned and maintained to eliminate *all food residues* on floors, walls, pallets, ledges, in window sills, and any other surfaces where residues gather. The latest pest monitoring equipment and methods will be used as needed to monitor pest population levels.

Third Country Food Shipments

Now, in addition to purchasing and shipping commodities from the USA, there is an option on behalf of WFP for FFP to source and purchase commodities from suppliers in third countries like Turkey. Fumigants used on these commodities are gasses and, *if used properly*, leave no measurable residues on the foodstuffs. *No phosphine tablet residues should be allowed to contact or mix with wheat flour.* There is a risk that fumigators in third countries will not use fumigants safely. FFP and WFP monitor third country suppliers to ensure that the highest international human safety and food quality standards are maintained. No pesticides other than volatile fumigants will be used to control pests on food shipments that enter Israel/WBG.

1: Introduction to the PRRO PERSUAP

1.1 Purpose and Scope for an IEE/PERSUAP for PRRO

It was the death of 5 Pakistani Ministry of Health workers in 1976 during USAID anti-malaria spray campaigns that led USAID to develop regulations that dictate risk reduction to protect human health and safety, and environmental protection. In addition to the 5 deaths, about 2,800 sub-lethal poisonings from malathion exposure occurred that season. These could have been avoided with simple risk awareness and risk reduction training, personal protective equipment (PPE), along with knowledge of pesticide risks and ways to avoid them. Training in, *and use of*, Integrated Pest Management (IPM) not only provides opportunities for reducing overall amounts of pesticides, *it is USAID Policy*. The environmental regulations that were codified by USAID to mitigate pesticide and other environmental risks are referred to as Regulation 216.

US Government Regulation 216 Compliance

The US Government's Title 22, Code of Federal Regulations, Part 216, also known as 'Regulation 216', finds that certain environmental compliance procedures and a process must be followed on overseas projects to:

- create modern state-of-the-art development using best management practices,
- achieve optimal economic results with every dollar invested,
- avoid harming people in both our partner countries and the US,
- avert unintended negative economic growth,
- reinforce practical civil society and democracy through transparency and public participation,
- reduce diplomatic incidents,
- engender public trust and confidence in USAID, and
- comply with the law

Now, following Regulation 216, all USAID activities are subject to analysis and evaluation via—at minimum—an Initial Environmental Examination (IEE), and—at maximum—an Environmental Assessment (EA). And because of risk concerns presented by pesticides, the USAID environmental regulations require that at least the 12 factors outlined in the Pesticide Procedures described in 22 CFR 216.3 (b)(1)(i) (a through l) be addressed in the IEE for any program that includes assistance for the procurement or use of pesticides. The Asia Near East Bureau asks that these factors be examined in a particular type of technical analysis document, termed a "Pesticide Evaluation Report and Safer Use Action Plan" (PERSUAP), which is submitted as an attachment to a short summary IEE (the IEE itself can be very brief, with the analytical work contained in the attached PERSUAP).

The PERSUAP focuses on the particular circumstances of the program in question, the pesticide system within which the program operates, the risk management choices available, and how a risk management plan would be implemented in the field. Further details about what to include in a PERSUAP are given below.

In the USA, when the Environmental Protection Agency (EPA) registers pesticides for use, it specifies the manner in which the product can be “safely” used (that is, with an acceptably small risk), including safety equipment needed when applying the pesticide, how to apply it, the allowed uses, storage, transport, and disposal. But the context in which EPA makes these registration decisions is important to note. An extensive system of capabilities and resources exist in the USA that help give EPA confidence these specifications will be followed and the product will be used appropriately. These include a 97% literacy rate—meaning most of the population can read labels (contrast this with only 47% adult literacy for the population of USAID/WBG, with most of the literacy occurring in big cities away from agricultural areas); close control by EPA over the content of the pesticide label; training requirements and programs for those pesticide products that require applicator certification—like for many EPA acute toxicity class I or II pesticides and Restricted Use Pesticides (RUPs); worker protection requirements; occupational safety regulations; and relatively effective federal, state and local enforcement mechanisms.

In Middle-East countries, a local-level analysis and evaluation such as a PERSUAP is needed for pesticide safety enhancement by increasing understanding of risks of using pesticides (especially phosphine gas-producing tablets), and implement means to reduce these risks. In allowing the use of certain pesticides in its overseas programs, USAID cannot rely on the same societal capabilities and resources that the USEPA does in the USA to assure appropriate use of the product. The preparation of a PERSUAP gives an PRRO program manager the opportunity to consider practical actions by which to *reduce the risks* of using pesticide products in their program in West Bank-Gaza, taking into consideration the context in which the products will be used, the particular elements of the program, and the different capacities of the grantees and implementing/cooperating partners (and any other stakeholders involved).

Who prepares a PERSUAP?

Recipients of USAID funds are responsible for due diligence so that their activities do not harm the environment or human health. Thus, they assist with collecting local information and hire a pesticide system expert familiar with USAID regulations and developing country pesticide issues to analyze the information, visit sites, and recommend best practices and conditions for reducing risks and complying with US law. A PERSUAP analyzes the pest management choices available in the context of the larger pesticide system in the country, and identifies risks and ways to reduce these risks.

At the AID field mission, the Cognizant Technical Officer (CTO) and Mission Environmental Officer (MEO) are generally responsible for assuring that environmental review requirements for their programs are met, including tracking and approving IEE/PERSUAPs, and monitoring progress of the projects in meeting recommendations and timelines. Once the IEE/PERSUAP is reviewed and accepted by the CTO and MEO, it is recommended for approval by the Mission Director (MD), who then submits the document to the Bureau Environmental Officer (BEO) in Washington for approval and tracking.

Components of an activity-level PERSUAP

A PERSUAP basically consists of two parts, a “PER” and a “SUAP.” The Pesticide Evaluation Report (PER) addresses the background and pesticide system in USAID/WBG to inform stakeholders and partners of the levels and types of risk likely to be found, and sets the stage for the specific pesticide analysis. It then analyzes integrated pest and pesticide management options in USAID/WBG by vetting these through Regulation 216’s special section on Pesticide Procedures with 12 informational elements. Note that the use of Integrated Pest Management is USAID Policy, thus it is emphasized throughout the analyses, and must be a focus of all assistance programs that donate pesticides or advice on pesticides.

The Safer Use Action Plan (SUAP) puts the conclusions reached in the PER into recommendations for plans of action, including assignment of responsibility to appropriate parties connected with the pesticide program. This PERSUAP supports the environmental threshold decision of negative determination with conditions for the USAID/West Bank and Gaza’ Food Assistance Program and FFP in-kind contributions in relation to the potential use of pesticides during food storage and transportation, as listed below.

1.2 PRRO Project Description

USAID is a significant donor supporting the World Food Program’s new two-year (2007 – 2009) appeal for \$107 million to provide essential food assistance to over 665,000 non-refugee Palestinian beneficiaries in the West Bank and Gaza. The USAID/West Bank & Gaza mission plans to award a \$15 million grant to enable WFP to procure, transport, store, and distribute five essential food commodities (wheat flour, vegetable oil, chick peas/beans, sugar, and salt) to needy families through food-for-work (FFW) and food-for-training (FFT) activities. In addition, the USAID/Washington Food for Peace (FFP) program is directly shipping U.S. food commodities (wheat flour, vegetable oil) to the WFP activity. Additional information about the activities to be funded under the grant is presented in Annex to Attachment 1. Wheat flour, chickpeas and beans are especially susceptible to infestation by stored grain pests. Salt and sugar may be damaged by rodent urine and feces. Also, rodents may chew through containers for any of the commodities.

Mission-funded food commodities procured from international vendors by WFP must first be shipped to an Israeli port of entry and then transported into the West Bank or Gaza. Depending on the time of year and transit time, Israeli law requires fumigation of food commodities at their point of origin. WFP stores some of its containerized food in warehouses in Israel and also in palletized form in local warehouses in the Palestinian territories. When other pest control measures fail and there is a risk of infestation, fumigants may be applied to local warehouse stores. Thus, there are two points at which fumigants may be applied to Mission-supported food commodities: (1) at the point of origin¹ (WFP would require the commodity vendor to fumigate the commodities as part of the purchase contract) and (2) during local storage in Israel or the

¹ Whereas the USAID/FFP program is responsible for ensuring safe and proper fumigation of its directly-procured U.S. commodities at the point of origin (this issue will be addressed separately by USAID/FFP and is not a component of the current SOW), point-of-origin fumigation of *Mission-funded food commodities* is an essential issue to be addressed in the PERSUAP to be developed under the current SOW.

Palestinian territories (fumigation would be done by *well-trained and licensed* WFP staff or by local contractors hired by implementing partners CRS or CHF). After arrival in Israel and during local storage and transportation, FFP commodities may also be subject to fumigation by WFP.

1.3 Israel, West Bank, & Gaza Background

Israel, West Bank and Gaza are Middle East countries/territories, bordering the Mediterranean Sea, between Egypt and Lebanon. They have limited arable land and natural fresh water resources pose serious constraints; desertification; air pollution from industrial and vehicle emissions; groundwater pollution from industrial and domestic waste, chemical fertilizers, and pesticides. The Sea of Galilee is an important freshwater source.

The climate of Israel, West Bank and Gaza is sub-tropical and temperate, and hot and dry in southern and eastern desert areas. In Israel, soils are alluvial in the coastal plain. Parts of the arid northern Negev have windblown loess soils because of proximity to the coastal plain. West Bank, soils are mostly weathered limestone with high sand and clay content. The Jordan Valley has alluvial soils. The Jordan Valley (the upper part of the Great Rift Valley) which comprises one of the lowest depressions of the earth has been formed as a result of an "earth fissure", and is for the most part of it covered by diluvial marls which frequently display a dissected topography. Tertiary limestone also occurs in some localities.

1.4 Priority geographic places or areas of project intervention

CRS and CHF have 18 warehouses that distribute WFP commodity donations from USAID/WBG; 11 in West Bank and 7 in Gaza. See Attachment 2 for data on warehouses. In West Bank, they are located in the following Governorates: Jenin, Nablus, Bethlehem, Hebron, Jericho, Jerusalem, and Ramallah. In Gaza, they are located in Governorates North, Gaza Town, Mid Area, Khanyonis, and Rafah.

Field visits were not possible to Gaza due to security. The following warehouses in West Bank were visited: Bethlehem, Azmout and Qabalan in Nablus, and Kufr Na'mah in Ramallah. In addition a visit was made to Houlde warehouse in Israel.

1.5 USAID development partners involved in the project and influenced by PERSUAP

In addition to WFP, the other partners include Catholic Relief Services (CRS) and Cooperative Housing Foundation (CHF).

1.6 Study Methodology

Environmental Assessment Professional (EAP) was contacted in August 2007 by USAID/WBG about the need for a PERSUAP for protection of food shipments from vertebrate and invertebrate pests, and was invited to submit a proposal via an RFQ (Request for Quotations). The PERSUAP RFP was awarded in September (a copy of the Scope of Work/Terms or Reference is found at the end of this PERSUAP as Attachment 1). Information requests for commodities, pests and pesticides were sent to the WFP project staff to begin the process, and WFP staff

responded. A conference call was held with USAID/WBG and WFP, and a draft schedule was drawn up with possible site visits outlined. Environmental Assessment Professional (EAP) did internet searches of stored pests in Israel and Palestinian Territories, and pests of wheat flour, white beans and chickpeas. And, EAP did a one week visit to Israel and West Bank from September 27 to October 3, 2007.

Pesticide Use Defined

The USAID Environmental Procedures for pesticide “use” (as provided by USAID Environmental Procedures: Text of Title 22, Code of Federal Regulations (CFR) Part 216, Reg. 216), dictate that all projects involving assistance for the procurement or use, or both, of pesticides shall be subject to the procedures prescribed in 22 CFR 216.3 (b)(1)(i)(a-l). “Use” is interpreted broadly to include the handling, transport, storage, mixing, loading, application, clean up of spray equipment, and disposal of pesticides, as well as the provision of fuel for transport of pesticides, and providing technical assistance in pesticide management.

“Use” is said to occur if training curricula include information on safer pesticide use even if it does not involve actual application of pesticide. It also applies if pesticide procurement is facilitated by credit or loans. USAID also strongly encourages including instruction in IPM and alternatives to pesticides in any training on pesticide use as defined above. Under this approach, pesticides are considered a tool of ‘last resort’ and pesticide choice should as much as practical be the ‘least toxic’ choices. In contrast, support to limited pesticide research and pesticide regulatory activities are not subject to scrutiny under the pesticide procedures.

This definition of “use” applies throughout this PERSUAP document.

The USAID pesticide procedures also indicate that when a project includes assistance for procurement or use, or both, of pesticides registered for the same or similar uses by USEPA without restriction, the IEE for the project shall include a separate evaluating the economic, social and environmental risks and benefits of the planned pesticide use to determine whether the use may result in significant environmental impact.

The rationale for a PERSUAP-type of environmental review (as opposed to a full-scale Environmental Assessment) is that the affected projects are reviewed and an IEE approved for all other activities in the programs. The IEE can approve Categorical Exclusions and Negative Determinations with Conditions as appropriate to each case, with deferrals for pesticide use pending completion of PERSUAPs. The other rationale is that the pesticides are used under tight management, with well laid conservation practices, guided by trained and experienced members of staff who implement actions in the SUAP.

Pesticides are defined as *synthetic or natural product-derived* chemical products intended to kill, control, and repel insects, ticks, plant and animal diseases, weeds, and other pest organisms.

The PERSUAP analysis will cover one pesticide proposed for use by the project that is, at minimum: Registered by USEPA for the same *or similar* uses without restrictions—or if with restrictions (such as a Restricted Use Pesticide—RUP) then training and certification equivalent

to that found in the USA for use of RUPs and dangerous Fumigants; Registered by the local government, if possible; Available in the country. Websites used to gather information for this report are found in Attachment 3.

1.7 Best Management Practices for Stored Grain Warehouses & Handling

Kinds of Stored Grain Insects & Rodents

Several species of insects may infest grain in storage. The principal pests that cause damage are the adult and larval stages of beetles, and the larval stage of moths (For aid in identifying stored grain insects, see Attachment 4. Rodents (rats and mice) or their hair, urine and feces are another possible stored food contaminant. All may be a problem by their presence, either alive or dead, or in grain that is to be processed for food, or already processed.

Stored-grain insects are known as “internal feeders” if they feed within the kernels, otherwise they are referred to as “external feeders.” The granary weevil, rice weevil, lesser grain borer, and larvae of the Angoumois grain moth are internal feeders. External feeders (or “bran bugs”) that feed on grain dusts, cracked kernels, and grain debris without entering the kernel, include Indian meal moth, sawtoothed grain beetle, red and confused flour beetles, flat grain beetle, and cadelle. Other species, such as the foreign grain beetle and hairy fungus beetle, feed on molds or fungi growing on grain stored at excessive moisture levels.

Preventative Measures Before Storing

Storage Clean-up: Newly entered food commodity beans/wheat flour may become infested when it comes in contact with previously infested beans/wheat flour in shipping containers, truck beds, other commodity-handling equipment, augers, bucket lifts, or small amounts of commodity left in the storage warehouse.

Insects may crawl or fly into grain stores from nearby accumulations of old contaminated grain, bags, pallets, litter, or any other cereal products. Insect infestations can be prevented with good management practices. Where appropriate, the following guidelines should be used two or more weeks before grain is placed in bins:

- 1) In empty shipping containers, thoroughly sweep or brush down walls, ceilings, ledges, braces, and handling equipment, and remove all spilled debris.
- 2) Brush, sweep out and/or vacuum the truck beds, augers, and loading buckets to remove insect-infested grain and debris.
- 3) Remove all debris from fans, exhausts, and aeration ducts (also from beneath slotted floors, when possible).
- 4) Remove all debris from the storage site and dispose of it properly according to area, state, and/or federal guidelines (this debris usually contains insect eggs, larvae, pupae, and/or adults, all ready to infest the new grain).

5) Remove all debris and vegetation growing within ten feet of the warehouses (preferably the whole storage area).

6) Examine area to determine if rodent bait stations are required, and use if needed. Be sure to follow all label directions.

7) Spray cleaned area around bins with a residual herbicide to remove all undesirable weedy plants.

1.8 WFP Practices for Stored Grain Warehouses & Handling (as communicated by WFP)

1. As insecticides and fumigants to control insect are dangerous to human health, WFP trained staff carries out regular inspection of the stocks to give early warning of any attack by pests. Proper measures are in place for pest control in order to avoid necessity for fumigation of the food commodities. However, if the fumigation is necessary, it is done by qualified staff by following the rigorous WFP internal fumigation procedure.

2. When WFP purchases food commodities from vendors (whether local or international), we do not specify limitations/restrictions/conditions on the use of pesticides used in the production of these commodities. We provide general specifications. We request the seller to warrant that the cargo is fit for human consumption, of good and marketable quality, of a color proper to the product, free from abnormal smell and pests and shall conform to the Public Health regulations in force in the country of origin.

We also hire the service of a first class superintendence inspection company which issues weight/quality/packing certificates. The superintendence company is appointed and paid for by WFP. They will check that packing bags will be of a uniform weight, and will be serviceable. The superintendence company must have free access to the cargo at the time and place of production and/or loading and to reject any lot showing discrepancies with any contract terms including those in respect of quality, packing and marking. Such a lot will be replaced immediately at Sellers' time and expense. The Seller will inform WFP if unable to replace it. No cargo can be transported to final destination before the superintendence company's final approval. The superintendence company has to inspect that packing (bags, cartons, tins, etc.) are made with new, strong materials. Packing of poor quality will be rejected by the superintendents and will be replaced at the Seller's expense.

In addition, we request supplier to provide the following document:

- Certificate of origin;
- Phytosanitary/health certificate issued by the competent authorities and specifying that the product is fit for human consumption;
- Fumigation certificate if necessary;
- Radiation certificate if necessary;
- Crop year certification, when requested;

-Certification that commodity does not derive from genetically modified organisms (GMOs) issued by competent authorities, when requested.

Highlights on WFP's pest control and fumigation guidelines (as communicated by WFP)

- In general, the most important element in pest control is to ensure that the stores are well maintained. (i.e. store cleaned, stacks have enough space between them, frequent rotation of the stocks, "FIFO" (First In - First Out) rule applies)
- When it comes to fumigation, although Methyl Bromide is a very effective fumigant, WFP has a policy not to use Methyl Bromide because, when released into atmosphere, it depletes stratospheric ozone. For this reason WFP relies on phosphine only. Phosphine sachets are preferred, or tablets for if conditions are dry (relative humidity less than 40%)
- The fumigant phosphine is very toxic to people as well as to pests. Health and safety considerations are important for pest control staff, store workers and anyone else who might be exposed to this toxic gas. In any of the operations involved in fumigation there are never fewer than two staff involved. Staff members involved in fumigation have to have personal respirator and protective clothing. The fumigation site (warehouse) has to be properly marked that the use of gases is ongoing.
- When the fumigation is done, these are the steps to be followed:
 - i. Initial preparations (measures of store, calculating dosage, check no human habitations with 100 m radius, check stacks...)
 - ii. Sheeting the stack
 - iii Spraying store surfaces with insecticide (inclusive of spraying the floor and the walls)
 - iv Applying the fumigant and sealing the stack (before applying fumigant, remove staff not involved in fumigation, mark the site...)
 - v Monitoring the fumigation
 - vi Aeration;
 - vii Disposal of the residue and Inspection of fumigation performance.

The above is applied when WFP staff are performing fumigations, as well as when the external company is contracted to do the fumigation.

1.9 Logistics for WFP Commodities from both FFP and USAID/WBG (as communicated by WFP)

Logistics involves planning, purchase, packaging, storage and transport, as well as managing the quantity and quality of product, how many steps and types of steps are involved from commodity procurement to distribution, and how long each takes with an eye toward efficiency and speed. For stored grains best management practices, the less the amount of time in storage and transport, the better—few insects remaining after fumigation do not have time to develop. And, control of storage and shipping environments, especially good aeration and lower temperatures reduce opportunities for insect development.

Commodities from countries outside of Israel, West Bank and Gaza are required by Israel to be fumigated at the point of origin. From there they are either stored temporarily or trucked to foreign ports, where they are put into temporary storage and finally into shipping containers and shipped to Israel. A shipping container can hold approximately 20 metric tons (400 bags weighing 50 kilograms each). If water enters the container by accident en route, the shipment is rejected.

All shipments arrive in country via Ashdod port, south of Tel Aviv. At the port they are checked for security, quantity and quality. It generally takes 14-21 days to do the custom clearance and container security x-ray checks.

For Gaza destinations, the containers are then transported to Youshivia for de-stuffing of containers and palletizing the cargo. This operation is due to the closure of Karni crossing terminal, the only point that has facilities for container handling. The commodities are then further transported in pallets to the Gaza cooperating partner (CP) warehouses.

For West Bank destinations, the containers are moved directly to West Bank destinations and off-loaded to the CP warehouses. In cases where the CP store cannot absorb full container load (FCL), the commodities are transhipped at Khoulda warehouse for de-stuffing of containers and palletizing the cargo.

The above applies when the monthly port arrival quantities are in-line with the monthly distribution requirements quantities.

WFP OPT (Occupied Palestinian Territories) CO (Country Office) does not store its commodities more than two months in CP warehouses. Any commodity requiring the storage for more than two month is kept in the WFP directly managed warehouses. The key logistics element for proper pest management is the frequent stock rotation. WFP has the system and tools for managing the whole supply chain, which among other things it plans and implements the minimum storage period in any of the storage points during the supply chain.

However, the USAID/FFP consignments are shipped and received in large quantities in "one go". For example, WFP is receiving 27,000 mt of wheat flour, vegetable oil and peas, whereas the monthly PRRO requirements are 2,500 mt for FFW and FFT implemented projects. In addition to the extra storage costs, this represents lengthy storage (more than a year) of food commodities, representing the higher risk of infestation. Furthermore, the sailing time from US (United States) ports to Israel ports is taking four months. WFP recommends that the mechanism should be in place to receive the commodities in smaller lots over the whole duration of the PRRO.

2: PESTS, IPM, AND PESTICIDES FOR STORED FOOD SECURITY COMMODITIES

2.1 Most Common Stored Grain Pests in Israel, West Bank and Gaza

According to Nationwide Extermination staff, the primary stored grain invertebrate insect pests present in Israel, West Bank and Gaza are (listed in order of importance): Indian meal moth *Plodia interpunctella*, Warehouse beetle *Trigoderma variabile*, Confused flour beetle *Tribolium confusum*, Cigarette beetle *Lasioderma serricorne*, Bean weevil *Acanthoscelides obtectus*, and Drugstore beetle *Stegobium paniceum*. The primary stored grain vertebrate pests present in Israel, West Bank and Gaza are: Common mouse *Mus musculus* and Norway Rat *Rattus norvegicus*.

2.2 Integrated Pest Management

USAID recognizes and promotes—as *official policy*—IPM. Integrated Pest Management for stored grain pests includes:

- Sanitation/Cleaning *all* residues
- Good aeration of commodities
- Pest identification important
- Knowledge of pest biology, ecology, and behavior
- Risk-benefit analyses
- Multiple management tactics
- Routine monitoring is first & foremost

2.3 Monitoring & Sanitation Results from Field Visits

For this study most floors had been swept/rinsed and had very little residual commodity—that's good! Continued vigilance must be maintained to clean all surfaces well including window sills, ledges, and pallets. Extremely low levels of Indian meal moth, probably living from residuals, were found in two warehouses. Mouse droppings, from likely one or two mice, and likely feeding on small amounts of residual commodity, were found in two warehouses. All facilities had good aeration, though it was noted that shipping containers for water transport may not.

Since there are only six major insect pests and two major vertebrate pests, WFP monitoring staff should learn to positively identify them (and teach them to CP staff), understand the biology, ecology and behavior, and know the differences among them. Pest Identification Keys are available to show differences between similar species and lead to positive identification.

2.4 Pest Monitoring and Detection Methods

Monitoring and detection of pests is of utmost importance to effective pest control, following good sanitation. Monitoring and detection for insect pests can be performed by using perforated grain probes, plastic probe/pitfall traps, traps with sex-attraction pheromones, aggregation pheromones for beetles, use of food attractants, and visually checking with flashlight and hand

magnifying lens. Understanding which pests are present, relatively how many, and being able to positively identify them is important.

For rodents, the best method for determining presence and activity is to look for fecal droppings. Mouse and rat urine is also distinctive in smell and another indicator of presence. A method for determining relative abundance is to monitor the rate of disappearance of anticoagulant poison remaining in black bait boxes at regular intervals.

2.5 Phosphine, and Comparison with Methyl Bromide and Carbon Dioxide

Most modern fumigation is done using the inorganic substance aluminum phosphide/phosphine gas; it is preferable over magnesium phosphide and methyl bromide. Magnesium phosphide releases phosphine too quickly for fumigator safety and methyl bromide is being phased out world-wide due to its negative impact on the upper-atmosphere ozone layer (it is also potentially very dangerous to fumigators). WFP has a policy not to use methyl-bromide. Carbon dioxide is not used widely for this scale of fumigation, due to lack of an airtight seal and specialized and dangerous use of pressurized cylinder gas. Carbon dioxide also dissipates so fast that re-gassing usually is required several times to maintain sufficiently high levels for control, and 10 days are required for control—this is generally impractical for food assistance logistics.

Aluminum phosphide's chemical structure is Al-P. When reacting with water (H₂O) in air, oxygen is released and hydrogens (H) attach to the phosphorous, producing tri-hydrogen phosphide, P-H₃ (phosphine). Phosphine gas is colorless and odorless, with ingredients and byproducts added or in it to make it smell like garlic or fish. In pure gas form, it is highly flammable and explosive when present in ambient air. And it can auto-ignite at ambient temperatures. Phosphine is produced from natural and man-made processes. In nature, geologic processes release phosphine and in human activities, phosphine is a side product of welding, semi-conductor, and other man-made processes.

Aluminum phosphide pellets also contain other chemicals which evolve ammonia which helps to reduce the potential for spontaneous ignition or explosion of the phosphine gas. They may also contain other agents, such as methanethiol, to give the gas a detectable garlic smell to help warn against its presence in the atmosphere.

2.6 Acute Human Toxicology of Phosphine

Phosphine's route of entry to the human body is primarily via inhalation through the mouth and nose. The skin and eyes are not common routes of absorption of phosphine, and oral ingestion is rare, but also deadly.

Phosphine's affect on the human body are as follows: At mild phosphine inhalation, symptoms mimic an upper respiratory tract infection (sore throat). Other symptoms may include nausea, vomiting, diarrhea, headache, fatigue and dizziness. At high concentration inhalation, phosphine may cause severe pulmonary irritation leading to acute fluid in lungs, shut down of heart & vein functions, over-excitation of central nervous system, coma and death. Exposure to 1400 mg/m³ (1000 ppm) for 30 minutes may be fatal.

2.7 Chronic Human Toxicology of Phosphine

Phosphine is *not a chemical of concern* for chronic toxicity due to the following affects: endocrine, carcinogen, groundwater, developmental or reproductive toxin.

2.8 Phosphine Poisoning Diagnosis and First Aid

Phosphine diagnosis is accomplished by the use of a silver nitrate-impregnated paper test can be used for the breath and gastric fluid of the patients exposed to phosphine. Other medical tests include: cell blood counts, haemoglobin, haematocrit, arterial blood gas analyses, renal and liver function tests and cardiopulmonary monitoring and investigations (ECG and chest X-ray) are essential for the assessment of organ effects and the management of phosphine poisoning

Phosphine First Aid is accomplished by first removing the patient from exposure site, and ing them at rest. If the patient is unconscious and breathing stops, immediately provide mouth-to-mouth resuscitation and if the heart stops, begin cardiopulmonary resuscitation. There is no antidote for phosphine poisoning—therefore, early recognition & management are essential for treatment and life-saving.

3: FUMIGATION & RODENT CONTROL SAFETY & ENVIRONMENT

3.1 Fumigation with Phosphine, Regulation 216, and Fumigator Safety

The following is a brief description of important steps needed for fumigation using phosphine, but it should not replace actual certifiable or similar training on its use in a country with very high and conservative standards of safety. In addition, a cost-benefit analysis needs to be performed to decide if the grain/flour and amounts infested are better disposed of away from the storage warehouse, fed to animals, or actually fumigated with all of the risks that go with fumigation.

Fumigation absolutely requires *two trained and certified (or similar level) fumigators* for each fumigation event. In the USA, by law “persons who are not trained and certified for the use of grain fumigants should not attempt to fumigate stored grain”. Phosphine is a Restricted Use Pesticide (RUP), which in the USA dictates that specialized applicator training, in this case fumigation training, must occur for purchase and use. Generally Regulation 216 does not permit RUPs to be used on USAID projects, especially if alternatives exist, and it strongly discourages use of EPA Class I toxins to be used by untrained personnel. In this case, there is no adequate alternative to phosphine, so it is only permitted with *conditions* that certifiable or similar training occurs for all persons that purchase and use phosphine.

Well trained and certified/licensed fumigators need to follow the aluminum phosphide label to determine correct amount of chemical to use per cubic meter of infested food commodity. Aluminum phosphide can only be used on calm warm days with no wind and temperature above 16 degrees (and not less than 4 degrees) Celsius. Fumigators must learn and follow all safety

regulations, and never do fumigation without two well-trained and certified people present for fumigation speed and safety.

Fumigators should have a plan of action that is discussed prior to fumigating (or even do a practice run without phosphine while timing the operation prior to the real run with phosphine), with well-defined roles and responsibilities. Generally Four millimeter thick polyethylene sheeting should be used to make the tent over the bags to be fumigated. Once the tent is in place, the placing of aluminum phosphide tablets or phosphine gas and sealing the tent should be finished from start to finish in no more than 15-20 minutes, for maximum safety. The recommended minimum concentration of phosphine gas needed for control is 150 ppm for a minimum of 7 days of exposure. This is generally too much time for grain/flour, and the warehouse, to be out of access in a food logistics program like the one WFP runs. Phosphine in the form of sachets or tiny bags is slightly slower at release than tablets. Phosphine from a phosphine gas generating machine makes concentrations go much higher much faster as they rapidly turn aluminum phosphide tablets into gas. Fumigation using phosphine gas generators can generally be terminated after 48-72 hours (2-3 days) of exposure, which would help speed food distribution logistics. Thus, though expensive, this may be the solution that would work for WFP.

Warning signs must be posted on all doors before, during and after fumigation. On the polyethylene tent put over the infested grain, leave only necessary holes for putting aluminum phosphide tablets or gas from gas generator inside and quickly sealing them. Generally one person puts tablets or gas from a phosphine generator, while the other follows quickly to seal the holes. If using tablets, probes are generally used to put the tablets inside the grain and pallets. If Indian meal moth is present, it is recommended that all webbing on top of the grain is removed before fumigation.

Proper respiratory protection must be provided for both fumigators. And, phosphine gas meters must be used to monitor phosphine gas concentration continuously during fumigation, and after the several day waiting period. Phosphine passive detectors (that indicate when dangerous levels of phosphine are present) may also be worn by both fumigators as an extra indicator.

An ash-like residue of aluminium hydroxide, along with a small amount of undecomposed aluminum phosphide, is left where each tablet was placed after phosphine is generated, so care must be taken to keep the original fumigant tablets in a position—not in or above the commodity—that no residue can enter the commodity. *Phosphine tablets or residue must not come into contact with wheat flour.* This is another reason that fumigators require extensive training and testing, to ensure best practices and reduce risk.

3.2 Required PPE Breathing Apparatus

WFP needs respiratory breathing protection for mouth/nose: Canister gas masks for phosphene concentrations of 0.3-15 ppm; Self-contained breathing apparatus (SCBA) for phosphene concentrations above 15 ppm.

3.3 Factors that contribute to less than 100% pest control

The following factors may contribute to less than perfect control: Poor gas distribution; Unfavorable treatment conditions; Leaks in the polyethylene tent; Fines (grain dust); Type of pest; Some insect species and sub-populations have developed some resistance to phosphine; Grain temperature; and Presence of high amounts of insect eggs—a difficult stage to manage. The polyethylene tent must be sealed very tightly for effective control to occur.

3.4 Phosphine and the Environment

Phosphine is a natural gaseous carrier of phosphorus in its geochemical cycles, and it might be of importance to the phosphorus balance of eutrophic lakes. Otherwise, there is no data of its effects on birds, honeybees, and aquatic inhabitants, likely because it is unlikely to enter environments where it would have an impact. There is a slight risk to domestic animals if they enter undetected into a warehouse being fumigated, but this risk is minimal.

3.5 Phosphine, Insects Developing Resistance to Phosphine, and Food Quality

Because continued use of the previously widely used fumigant methyl bromide has been banned under the Montreal Protocol, phosphine is the only widely used cost effective, rapidly acting fumigant that does not leave residues on the stored product. Given the heavy reliance on phosphine as a means of protecting grain from insect infestation, it is disturbing to note that pests developing high levels of resistance toward phosphine have become commonplace in many countries of Asia and in Australia as well. Most modern food shipments will require no more than two fumigations with phosphine due to reductions in time from commodity source to consumer, which is normally less than one year. For most beans and pulse seeds, there is no discernable reduction in germination or quality with multiple fumigations. Therefore reduction in food quality is not an issue.

3.6 Past WFP warehouse fumigation with phosphine

In Israeli warehouses, fumigation was performed by an Israeli pest management company with highly trained and certified fumigators. This method of pest control should be continued for warehouses in Israel, following Israeli law and fumigator's training and certification scheme.

Past fumigation in Cooperating Partner (CRS, CHF) warehouses in West Bank was performed by two WFP staff that had some on-the-job practical experience and the WFP Food Storage Manual for guidance.

Past fumigation in Cooperating Partner (CHF) warehouses in Gaza was performed by three WFP staff that had received some past training from NRI, through UNWRA and the WFP Food Storage Manual for guidance.

Method of Past Phosphine Application

As described by WFP staff that performed fumigation in the past 12 months, infestation occurred on 50-60 bags of leftover wheat flour in Jenin that became moth-infested after sitting unused for 2-3 months.

The infested bags were covered with plastic, aluminum phosphide tablets were placed in ashtrays under the pallets, and a sand snake was used to hold down the edges of the plastic to seal it against the ground. A canister respirator and gloves were used for PPE. No phosphine monitoring equipment was available. And the phosphine was left, and the warehouse evacuated for 48 hours.

For WFP to continue to do fumigation in West Bank and Gaza, at least two staff who work in West Bank and two staff who work in Gaza must be trained to some national (USA, UK, Canada, South Africa, Australia) or international standard, and be provided all PPE and Phosphine monitors. Complete training must be repeated at minimum, once every three years and refresher training done at minimum, once a year. And, PPE and phosphine meters must be properly maintained and kept current and safe for use.

3.7 Rodent Management in Food Commodity Warehouses

For mice and rats, WFP warehouses in Israel have black bait boxes with anticoagulant coumarin rodenticide inside, a red warning label on top of the box, locks on the box, a thick cable securing the box to a pole or other permanent structure, and a red warning label on the wall above the box, all as required by Israeli law. CP warehouses in West Bank had no visible rodent control bait boxes, but some use small reddish blocks of anticoagulant placed under pallets—*this is not recommended* as rodents can move the poison, break it up, domestic animals can eat it, children could find and eat it, and pieces of it might get accidentally mixed into food stocks.

Anticoagulant in Rat/Mouse Traps cause fatal internal bleeding caused by lethal dose of anticoagulants such as brodifacoum, coumatetralyl, or warfarin. These anticoagulant substances cause damage to tiny blood vessels, increasing their permeability, causing diffuse internal bleedings. At the same time, the anticoagulants interfere with several K vitamins which are needed by mammals for production of essential blood-clotting factors, so their blood does not clot properly to seal wounds. Thus this dual mechanism of increasing internal bleeding while decreasing the animal's ability to form clots generally leads rodent death in 1-2 weeks. Generally the animal will return to its nest, grow sluggish and die there.

3.8 Rodent poison anticoagulant impacts on human health and environment

Anticoagulants may be absorbed through the skin as well as ingested. In both cases they are toxic to humans and may lead to: Nosebleeds, bleeding gums, bloody urine, extensive bruising in the absence of injury (ecchymoses); Fatigue, shortness of breath (dyspnea) on exertion; and May cause fluid in lungs (pulmonary edema). Brodifacoum is a WHO (World Health Organization) Class 1a toxin, labeled Extremely Hazardous, and Warfarin is a WHO Class 1b toxin, labeled Highly Hazardous. EPA labels it as Highly Toxic in technical concentrations. Many formulations for household use are classified as Class II and III toxins. Coumatetralyl is not EPA-registered for use in the USA.

For chronic human toxicity, warfarin is listed as a reproductive or developmental toxin, and is not listed as a chemical of concern for cancer or endocrine disruption. Brodifacoum is not listed as a reproductive or developmental toxin, and is not listed as a chemical of concern for cancer or endocrine disruption.

Warfarin is not acutely toxic to most aquatic environment inhabitants, including fish, zooplankton and crustaceans. Brodifacoum is moderately toxic to earthworms and fish.

4: REGULATION 216.3 (B) PESTICIDE PROCEDURES AS APPLIED TO WBG PRRO PROJECT PER

Regulation 216.3 (b) Pesticide Procedures

The following is an analysis of fumigation and rodent control, following Regulation 216.3 Pesticide Procedures, as required by USAID and the PRRO PERSUAP SOW.

4.1 Pesticide procedures element a: USEPA registration status of the proposed pesticide

Pesticides are registered in the U.S. by active ingredient and by formulation. “Registration status” possibilities of the active ingredients and the formulated products include active registration, never registered, and cancelled. USAID is effectively limited to using pesticide active ingredients registered in the U.S. by the U.S. Environmental Protection Agency for the same or similar uses. Other pesticides not registered in the U.S. may be authorized, but only if the USAID program can show that no alternatives are available, as required under USAID Pest Management Guidelines for the use on non-U.S. registered pesticides. Host country pesticide registration procedures must also be identified and followed.

Both aluminum phosphide and phosphine gas are registered by USEPA, but are RUPs. Warfarin and brodifacoum are registered by USEPA, and neither is listed as a RUP. These are also registered by the Israeli Government. The Palestinian Authority has no pesticide regulations.

4.2 Pesticide procedures element b: Basis for selection of the pesticide

This refers to the economic and environmental rationale for choosing a particular pesticide. In general, the least toxic pesticide that is effective is selected.

As discussed above, aluminum phosphide/phosphine gas are the quickest, most effective, safest, and most cost-effective of the choices.

4.3 Pesticide procedures element c: Extent to which the proposed pesticide use is, or could be, part of an IPM program: USAID policy promotes the development and use of integrated approaches to pest management whenever possible. This discusses the extent to which the proposed pesticide use is incorporated into an overall IPM strategy.

As discussed above, IPM is USAID’s choice for pest management, and key IPM elements sanitation and monitoring are occurring with WFP activities. Complete sanitation is very

important for removing 100% of commodity residues at all times, and especially between shipments.

4.4 Pesticide procedures element d: Proposed method or methods of application, including the availability of application and safety equipment: This examines in detail how the pesticide is to be applied and the measures to be taken to ensure its safe use.

As discussed above, for WFP, likely the best method for phosphine application is by using aluminum phosphide tablets in a phosphine gas generator, which allows rapid fumigation and warehouse reentry after 48-72 hours, which is shorter than the 5 days required with aluminum phosphide tablets alone.

4.5 Pesticide procedures element e: Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed use, and measures available to minimize such hazards: This of the IEE examines the acute and chronic toxicological data associated with the proposed pesticide. In addition to hazards, this of the IEE also discusses measures designed to mitigate any identified toxicological hazards, such as training of applicators, use of protective clothing, and proper storage.

As described above, phosphine gas and rodenticides warfarin, and brodifacoum have acute human toxicity issues, but limited chronic issues, with the exception of warfarin which has reproductive or developmental issues.

As described above, there are limited environmental issues with the three chemicals, with the exception of moderate impacts on fish and earthworms with brodifacoum.

4.6 Pesticide procedures element f: Effectiveness of the requested pesticide for the proposed use: This of the PERSUAP requires information similar to that provided in item b, but more specific to the actual conditions of application. This also considers the potential for the development of pest resistance to the proposed insecticide.

As described above, Aluminum phosphide/Phosphine gas and rodenticides warfarin, and brodifacoum are chosen due to effectiveness, and lack of good alternatives.

4.7 Pesticide procedures element g: Compatibility of the proposed pesticide use with target and non-target ecosystems: This examines the potential effect of the pesticide on organisms other than the target pest (for example, the effect on bee colonies kept in the area). Non-target species of concern also include birds and fish. The potential for negative impact on non-target species should be assessed and appropriate steps should be identified to mitigate adverse impacts.

None of the pesticides studied have impacts on honeybee colonies. Brodifacoum has issues with moderate toxicity to fish and earthworms.

4.8 Pesticide procedures element h: Conditions under which the pesticide is to be used, including climate, flora, fauna, geography, hydrology, and soils: This examines issues such as the potential for contamination of surface and groundwater sources.

The climate of Israel, West Bank and Gaza is sub-tropical and temperate, and hot and dry in southern and eastern desert areas. In Israel, soils are alluvial in the coastal plain. Parts of the arid northern Negev have windblown loess soils because of proximity to the coastal plain. West Bank, soils are mostly weathered limestone with high sand and clay content. The Jordan Valley has alluvial soils.

The Jordan Valley which comprise one of the lowest depressions of the earth has been formed as a result of an "earth fissure", and is for the most part of it covered by diluvial marls which frequently display a dissected topography. Tertiary limestone also occurs in some localities.

Eastern Heights, Central Highlands and the Semi-coastal region consists of Cenomanian, Eocene, Turonian and Senonian limestones. While the Cenomanian and Turonian limestones are mostly very hard and resemble marble, the Senonian and Eocene lime-stones are generally of soft and chalky nature.

Gaza has a substratum of Tertiary limestones, calcareous sandstone marls, clay and marine diluvium. Partially fossilised dune sand deposits cover wide stretches of land. These dune sands are often cemented by calcareous sediments and cemented infiltration, and form therefore compact masses of hard rocks.

Hydrology in Israel; about one-quarter of water is from the Hasbani River, which rises in Lebanon; and one-quarter is from the Banias River, which rises on the Golan Heights. Both surface and underground water sources have a common origin: rain or snow. Underground water can be accessed through springs, where the aquifer comes to the surface, or at wells or via boreholes that penetrate the dry layers of soil or rock until they reach the water-bearing layer.

4.9 Pesticide procedures element i: Availability of other pesticides or non-chemical control methods: This identifies other options for control of pests and their relative advantages and disadvantages.

As discussed above, phosphine gas is the only real choice for WFP to use at present. As upcoming hermetically-sealed technologies are tested more and become effective and mainstream, there are possibilities for using no or less phosphine, but these choices are not yet commercially available.

For rodents, anticoagulants are the method of choice in the pest control field. Mechanical traps are possible, but require daily maintenance and re-setting, which may not be practical for WFP. Baited glue traps may be useful against very small mice, and are used presently to a limited extent.

Neither Insect Growth Regulators like methoprene, nor Organophosphates like malathion can be used for treating stored grain pests in Israel. *Bacillus thuringiensis* for treatment of Indian meal moth is likewise not registered in Israel.

4.10 Pesticide procedures element j: Host country's ability to regulate or control the distribution, storage, use, and disposal of the requested pesticide: This examines the host country's existing infrastructure and human resources for managing the use of the proposed pesticide. If the host country's ability to regulate pesticides is inadequate, the proposed action could result in greater harm to the environment.

Israel has very strong and conservative regulations for controlling pesticides. However, the controlling authorities in West Bank and Gaza have limited capabilities for several reasons limited to regional security.

4.11 Pesticide procedures element k: Provision for training of users and applicators: USAID recognizes that safety training is an essential component in programs involving the use of pesticides. The need for thorough training is particularly acute in developing countries, where the level of education of applicators may typically be lower than in developed countries.

WFP has a contract with the UK-based NRI to perform specialized fumigation training and certification. This mechanism may be used to WFP to train two staff from West Bank and two staff from Gaza in fumigation technologies and rodent management. Or, fumigation staff may be trained in Israel.

4.12 Pesticide procedures element l: Provision made for monitoring the use and effectiveness of this pesticide: Evaluating the risks and benefits of pesticide use should be an ongoing, dynamic process.

At present, the main provision is visual inspection of fumigated shipments to determine effectiveness. Future controls can include a database which collects information on rodent activity and tracks insect species by scientific name, once staff members are trained to properly identify them.

Stored grain pest resistance to phosphine gas has been noted in several countries in Asia. The level of resistance present in Israel, West Bank and Gaza has not been tested, but could be an issue for the future.

Cautions

All fumigants are dangerously when improperly used. Follow the cautions listed on the container label and use only in strict accordance with label directions. Wear respiratory protection approved by NIOSH (National Institute for Occupational Safety and Health)/MSHA (Mine Safety and Health Administration) for the level of hydrogen phosphide gas to which you will be exposed to. The effective life of a gas mask canister is limited. Keep an accurate account of the time that a canister is used and replace it after each use, if you smell fumigant, or the canister is

out-dated. Self-contained breathing apparatus requires a refilling source. Your local fire station or rescue squad may be a refill source.

Never fumigate a bin by yourself. Have another person on site to help if you get into trouble. The helper must also be properly fitted with approved respiratory protective devices. Devise a code so that you can communicate with each other. Make sure gas and electrical connections are turned off. Have the telephone numbers of the police and fire departments, hospital, physician, and rescue squad available.

Do not drink alcoholic beverages for a day before, during, or after exposure to grain fumigants. Do not think that because you might have gotten away with fumigations without these precautions before that you can always get away with disregard to safety. Fumigants demand respect if you want to avoid injury or death.

If there are differences in statements in this guide and the aluminum phosphide label, **follow the label** instructions.

5: PRRO IEE/PERSUAP Determination, Grant Language, and Conditions

This PERSUAP, following USAID’s Regulation 216 and the Initial Environmental Examination requirements, recommends a **Negative Determination with Conditions**—meaning that there is no need at this point in time to move to a full Environmental Assessment (EA) for Israel, West Bank, or Gaza. But, Conditions must be followed by WFP and CPs.

5.1 Language to include in the grant between USAID and WFP:

5.2 The Conditions for WFP and CPs (CRS, CHF) to follow for receiving USAID/WBG commodity assistance are as follows:

Conditions

1. Make a plan and budget for and obtain professional national or international-level training and annual refresher for at least two West Bank WFP staff and two Gaza WFP staff tasked with fumigation. If it is not possible to bring Gaza staff to Israel for training, find a way to transfer this training knowledge and experience virtually to the two Gaza WFP staff—perhaps the West Bank staff, during their training, could in turn train the Gaza staff through internet guidance and phone conversations. If any of these trained fumigation staff leave WFP, immediately obtain training for new staff. Number of hours required for training will be determined by training provider based upon fumigation staff experience. *Training must be refreshed annually and fumigators re-trained to a certifiable level at minimum, once every three years.*
2. Make a budget for and obtain professional personal protective equipment (PPE) sets adequate for all levels of phosphine concentration likely to be encountered, maintain them in good working condition, replace canisters and oxygen tanks as required, and continuously use PPE during all fumigations. This may especially include gloves, canister respirators and self-contained breathing apparatus (SCBA)—check with and get advice from Israeli Nationwide Extermination Company on what is used and acquired locally.
3. Make a budget for and obtain professional phosphine monitoring meters, maintain them in good working condition, and continuously use them during all fumigations.
4. Put (and require of Cooperating Partners to put) rodent bait boxes with anticoagulant poison traps, equivalent with Israeli standards (locked, secured with cable, proper red warning signs in Arabic, periodic checking for feeding activity, and record-keeping) inside the warehouses near the front doors along the wall, and any other doors. In West Bank and Gaza, do not place these bait boxes outside of warehouses.
5. Continue monitoring and sanitation campaign oversight to *completely* clean all WFP and Cooperating Partner warehouses at the end of each day during distribution and after each shipment is cleared, to completely eliminate potential sources of residual pest populations.
6. Use the latest insect pest monitoring and trapping techniques/technologies learned both during specialized Fumigation training, and from the Israeli Nationwide Extermination Company.

7. Continue using Best Management Practices for commodity transport and storage, including reduction in transport steps and time, reduction in storage times for each step, good packaging which keeps out pests and moisture and provides a measure of containment if pest infestations occur, with batch numbers for traceability.

For all fumigation in Israel, West Bank, and Gaza, WFP and their Implementing Partners will only contract or use such fumigation through a professionally trained and certified-level (by Israel, USA, UK, Canada, South Africa, Australia) company or individual. All internationally recognized and Israeli-required Personal Protective Equipment will be used by the certified-level fumigation operator adequate to protect from the levels of phosphine present, as determined by adequately-maintained and functioning phosphine meter or test equipment, and required by Israeli law. All Personal Protection Equipment will be maintained and replaced on the recommended schedule.

All WFP and West Bank-Gaza warehouses will be monitored, cleaned and maintained to eliminate *all food residues* on floors, walls, pallets, ledges, in window sills, and any other surfaces where residues gather. The latest pest monitoring equipment and methods will be used as needed to monitor pest population levels.

Third Country Food Shipments

Now, in addition to purchasing and shipping commodities from the USA, there is an option on behalf of WFP for FFP to source and purchase commodities from suppliers in third countries like Turkey. Fumigants used on these commodities are gasses and, *if used properly*, leave no measurable residues on the foodstuffs. *No phosphine tablet residues should be allowed to contact or mix with wheat flour.* There is a risk that fumigators in third countries will not use fumigants safely. FFP and WFP monitor third country suppliers to ensure that the highest international human safety and food quality standards are maintained. No pesticides other than volatile fumigants will be used to control pests on food shipments that enter Israel/WBG.

6.0 SAFER USE ACTION PLAN (SUAP) CONDITIONS

The safer use action plan is a best management practices management tool for planning and tracking progress for an activity. Each of the above conditions can be put into such a plan. A blank copy of an action plan from the business community is attached (Attachment 6) as a reference. The following divides the conditions up into Immediate and Continuous or On-going Actions.

6.1 Immediate Actions

By March 15, 2008:

1. Make a plan and budget for and obtain professional national or international-level training and annual refresher for at least two West Bank WFP staff and two Gaza WFP staff tasked with fumigation. If it is not possible to bring Gaza staff to Israel for training, find a way to transfer this training knowledge and experience virtually to the two Gaza WFP staff—perhaps the West Bank staff, during their training, could in turn train the Gaza staff through internet guidance and phone conversations. If any of these trained fumigation staff leave WFP, immediately obtain training for new staff. Number of hours required for training will be determined by training provider based upon fumigation staff experience. *Training must be refreshed annually and fumigators re-trained to a certifiable level at minimum, once every three years.*
2. Make a budget for and obtain professional personal protective equipment (PPE) sets adequate for all levels of phosphine concentration likely to be encountered, maintain them in good working condition, replace canisters and oxygen tanks as required, and continuously use PPE during all fumigations. This may especially include gloves, canister respirators and self-contained breathing apparatus (SCBA)—check with and get advice from Israeli Nationwide Extermination Company on what is used and acquired locally.
3. Make a budget for and obtain professional phosphine monitoring meters, maintain them in good working condition, and continuously use them during all fumigations.
4. Put (and require of Cooperating Partners to put) rodent bait boxes with anticoagulant poison traps, equivalent with Israeli standards (locked, secured with cable, proper red warning signs in Arabic, periodic checking for feeding activity, and record-keeping) inside the warehouses near the front doors along the wall at least a meter away from commodities, and near any other doors. In West Bank and Gaza, do not place these bait boxes on the outside of unfenced and unguarded warehouses.

6.2 Continuous Actions

5. Annual refresher training for staff that will perform fumigation.
6. Continue monitoring and sanitation campaign oversight to *completely* clean all WFP and Cooperating Partner warehouses at the end of each day during distribution and after each shipment is cleared, to completely eliminate potential sources of residual pest populations.

7. Use the latest insect pest monitoring and trapping techniques/technologies learned both during specialized Fumigation training, and from the Israeli Nationwide Extermination Company.

8. Continue using Best Management Practices for commodity transport and storage, including reduction in transport steps and time, reduction in storage times for each step, good packaging which keeps out pests and moisture and provides a measure of containment if pest infestations occur, with batch numbers for traceability.

6.3 USAID/WBG Monitoring

Completed Action Plans, supported, tracked and signed by WFP Representative and Country Director, can be sent to USAID/WBG for their tracking and monitoring of WFP actions on the above conditions.

7.0 Budget for WFP Fumigation Staff Training, Safety Equipment and Pest Controls (for 4 persons; 2 in West Bank and 2 in Gaza)

<u>Item</u>	<u>cost per unit</u>	<u>units</u>	<u>total</u>
Personal Canister gas mask:	\$245	4 persons	\$980
Self Contained Breathing Apparatus (SCBA)	\$1862	2 (to rotate)	\$3724
Personal Chemical Resistant Gloves	\$20	4 persons	\$80
Initial fumigation training (cost is educated guess)	\$500	4 persons	\$2000
Phosphine gas monitor meters (1 for use; 1 for backup)	\$2000	2 meters	\$4000
Mouse Master repeating mouse trap (1 per warehouse room*)	\$20	36 traps	\$720
Rat bait box stations	\$15	36 boxes	\$540
Total for Pest Management Training & Supplies			\$12044
Annual Refresher Training (cost is educated guess)	\$150	4 persons	\$600
Annual Equipment (all of the above) Maintenance	\$300	4 sets	\$1200

* 18 WFP Warehouses in West Bank and Gaza, most with at least 2 storage rooms; 1 for wheat flour; the other for beans/chickpeas. This equals a total of 18 warehouses x 2 rooms = 36 traps at one trap per warehouse room.

8.0 INITIAL AND ANNUAL REFRESHER TRAINING

This PERSUAP recommends that the training provided for food shipment warehouse fumigators include annual refresher training, in addition to initial certifiable or similar training, to be consistent with USA practice under federal RCRA (Resource Conservation and Recovery Act), AHERA (Asbestos Hazard Emergency Response Act), CHMM (Certified Hazardous Materials Managers), hazardous communication standards, worker-right-to-know, etc. and state and western nation equivalents.

Sufficient training with annual refresher training as would be required in most Western countries provides insurance and assurance against an unfortunate pesticide incident caused to or by an *untrained* worker funded for pesticide use by USAID, thus the Agency would not have been putting the worker and environment at risk, and there would be sufficient defense against negligence. At the same time, high-quality training and annual refresher training is a best management practice for all of the hazardous materials industry.

Stored Product Pest Management and General Fumigation Training Requirements

Trainees will be trained and tested to show annual competence with:

Proper grain storage

Stored grain protection

Understand and learn to practice best sanitation procedures

Understand monitoring for stored product pests

Identification of common stored product pest species

Insect behavior and control

Alternative pest control

Understand risks of various fumigants

Understand mitigation of fumigant risks

Fumigation Certification & Hands-on Training

Grain Quality & Pest Management Hands-on Workshops

Understand proper PPE for fumigants and other stored product pesticides

Understand Permissible Exposure Limit (PEL)

Employ continuous monitoring to warn employees before the PEL is reached

Have a Fumigation Safety Program that describes methods, work practices, devices, or processes which the director determines will ensure that employees will not be exposed to concentrations of fumigants in excess of the PEL

Proper first aid for possible overdose or poisoning

The employer shall have an accident response plan at the fumigation worksite. The plan shall provide instructions to protect employees during situations such as spills, fire and leaks

Employees shall be trained in accident management procedures based on the plan

Require understanding of the use and maintenance of air-supplied respirator equipment

Practice fumigation inside an enclosed space, with at least two trained and PPE protected employees that shall be present at all times

Prior to the commencement of fumigation, warning signs shall be posted in plainly visible locations on or in the immediate vicinity of all entrances to the space under fumigation and shall not be removed until fumigation and ventilation have been completed, and the premises are safe

for reentering. Warning signs shall be printed in red on white background and shall contain, in Arabic and English, the following statement in letters not less than two inches in height; "DANGER-FUMIGATION". They shall also depict a skull and crossbones not less than one inch in height and shall state in letters not less than one-half inch in height the name of the fumigant, the date and time the fumigant was injected, and the name, address and telephone number of the applicator performing the fumigation.

Employees shall not be allowed to enter fumigated enclosed areas, except to determine the fumigant concentration or facilitate aeration, unless the concentration in the area is known to be at or below the level specified

The fumigant shall not be released into an occupied work area

After completion of the fumigation, the treated area or products shall be managed so that employees entering the area or working with the treated products are not exposed to a concentration in excess of the level specified

Training with practice fumigation teams will refresh training each year to remain certifiably safe.

All trainees will be required to pass the same or a similar exam that the certifying body would give to national fumigators required to be certified. Palestinians may not be able to become Israeli-certified fumigators, but they should be required to meet safety standards sufficiently.

**Preparation of a Pesticide Evaluation Report and Safe Use Action Plan
(PERSUAP)
for USAID/West Bank and Gaza's Grant to support the World Food Program's
Protracted Relief and Recovery Operation (PRRO) 10387.1**

I. Purpose

This Scope of Work (SOW) describes the services and deliverables to be provided by one Pesticide Management Specialist (PMS) on behalf of USAID/West Bank and Gaza and its new grant to support the World Food Program (WFP) Protracted Relief and Recovery Operation (PRRO 10387.1) in the Palestinian Territories.

The services and deliverables described herein will enable the above-mentioned project to respond to and comply with the requirements of USAID Regulation 22CFR 216.3(b). These services will make it possible for the project to comprehensively contribute to environmental and human health safety on this project, while achieving project goals.

II. WFP Project Background and Activities

USAID is a significant donor supporting the World Food Program's new two-year (2007 – 2009) appeal for \$107 million to provide essential food assistance to over 665,000 non-refugee Palestinian beneficiaries in the West Bank and Gaza. The USAID/West Bank & Gaza mission plans to award a \$15 million grant to enable WFP to procure, transport, store, and distribute five essential food commodities (wheat flour, vegetable oil, chick peas/beans, sugar, and salt) to needy families through food-for-work (FFW) and food-for-training (FFT) activities. In addition, the USAID/Washington Food for Peace (FFP) program is directly shipping U.S. food commodities (wheat flour, vegetable oil) to the WFP activity. Additional information about the activities to be funded under the grant is presented in Annex 1.

Mission-funded food commodities procured from international vendors by WFP must first be shipped to an Israeli port of entry and then transported into the West Bank or Gaza. Depending on the time of year and transit time, Israeli law requires fumigation of food commodities at their point of origin. WFP stores some of its containerized food in warehouses in Israel and also in palletized form in local warehouses in the Palestinian territories. When other pest control measures fail and there is a risk of infestation, fumigants may be applied to local warehouse stores. Thus, there are two points at which fumigants may be applied to Mission-supported food commodities: (1) at the point of origin² (WFP would require the commodity vendor to fumigate the commodities as part of the purchase contract) and (2) during local storage in Israel or the Palestinian territories (fumigation would be done by WFP staff or by local contractors). After

² Whereas the USAID/FFP program is responsible for ensuring safe and proper fumigation of its directly-procured U.S. commodities at the point of origin (this issue will be addressed separately by USAID/FFP and is not a component of the current SOW), point-of-origin fumigation of *Mission-funded food commodities* is an essential issue to be addressed in the PERSUAP to be developed under the current SOW.

arrival in Israel and during local storage and transportation, FFP commodities may also be subject to fumigation by WFP.

III. Scope of Work: Preparation of PERSUAP

The Pesticide Management Specialist (PMS) will be responsible for preparing a *Pesticide Evaluation Report and Safe Use Action Plan* (PERSUAP) related to the use of fumigants applied by WFP and its contractors/suppliers to USAID-supported food commodities during transportation and storage.

A PERSUAP consists of two parts:

- 1) Pesticide Evaluation Report (PER) which details the systems analysis of the local pesticide management system from import to ultimate disposal and addresses the twelve informational elements required in 22 CFR 216.3(b); and
- 2) Safer Use Action Plan (SUAP) which translates the conclusions and recommendations reached in the PER into a plan of action, including assignment of responsibility to appropriate parties connected with the pesticide program.

The PERSUAP will include appendices evaluating the economic, social, and environmental risks and benefits of the planned pesticide use to determine whether the use may result in significant environmental impact.

Using a systems analysis approach, the PMS will prepare a PERSUAP which examines pesticide usage and management processes used by WFP and its contractors/suppliers, and which evaluates and provides documentation addressing, at a minimum, the following twelve factors for each pesticide proposed for use:

- a) The U.S. Environmental Protection Agency (USEPA) registration status of the requested pesticide;
- b) The basis for selection of the requested pesticide;
- c) The extent to which the proposed pesticide use is part of an integrated pest management program;
- d) The proposed method or methods of application, including availability of appropriate application and safety equipment;
- e) Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed use and measures available to minimize such hazards;
- f) The effectiveness of the requested pesticide for the proposed use;
- g) Compatibility of the proposed pesticide with target and nontarget ecosystems;
- h) The conditions under which the pesticide is to be used, including climate, flora, fauna, geography, hydrology, and soils;
- i) The availability and effectiveness of other pesticides or nonchemical control methods;
- j) The requesting country's ability to regulate or control the distribution, storage, use and disposal of the requested pesticide;
- k) The provisions made for training of users and applicators; and

- l) The provisions made for monitoring the use and effectiveness of the pesticide.

If the proposed use of a pesticide is restricted by the USEPA on any basis, additional information and analysis is required per 22 CFR 216.3(b).

Focused on the particular circumstances of the program in question, the risk management choices available, and how a risk management action plan would be implemented in the field, the PERSUAP will provide the necessary analysis and recommendations to WFP, its implementing partners, contractors, and suppliers in order to:

- a. Ensure compliance with USAID’s pesticide policies, procedures, and regulations;
- b. Ensure compliance with the Government of Israel’s pesticide importation, testing, storage, use, disposal and registration regulations, laws, policies and procedures;
- c. Ensure compliance with the Palestinian National Authority’s pesticide importation, testing, storage, use, disposal and registration regulations, laws, policies and procedures;
- d. Identify and recommend appropriate mitigating actions to reduce risk of potential adverse impact of pesticide use and explain how such approaches can be integrated into the project’s activities;
- e. Identify and recommend alternative actions and/or pesticides and promote the adoption of particular pesticides and pesticide use technologies supported by USAID, as appropriate;
- f. Facilitate use of Integrated Pest Management (IPM) with a view of avoiding or reducing unnecessary pesticide risk, using “off the shelf” IPM measures that could be adapted for specific project needs;
- g. Identify and address key pesticide use issues, particularly those that impact pesticide utilization by WFP staff, contractors, food commodity vendors/suppliers;
- h. Ensure compliance of WFP food commodity vendors/suppliers and/or sub-contractors with USAID environmental pesticide policies and procedures by incorporating specific terms and conditions related to the use of fumigants in all USAID-funded procurement instruments issued by WFP;
- i. Ensure accessibility of protective clothing and equipment needed, and training on safe use and disposal of all pesticide-related materials and supplies;
- j. Implement effective operational monitoring and evaluation of pesticide management;
- k. Recommend a training program design, including a plan to train participants who will be implementing the recommendations of the study; and
- l. Define roles and responsibilities of key staff and other key stakeholders in pesticide management and use;

The PMS will prepare the PERSUAP in close consultation and coordination with WFP, its implementing partners, and USAID. The PERSUAP development process, especially design of the Safe Use Action Plan, is an important capacity-building opportunity to enhance local skills and knowledge regarding safer pesticide management. Partner participation in planning mitigation measures and training program is especially important.

IV. Roles and Responsibilities

USAID/West Bank and Gaza through the Cognizant Technical Officer (CTO) for the WFP grant and the Mission Environmental Officer (MEO) will take an active role in working with the PMS in the conduct of the study. The CTO will collaborate with WFP to schedule and organize the logistics for field visits and consultation meetings in Israel and in the West Bank³ as needed. The CTO and MEO will review progress and other draft materials produced by the PMS and perform liaison functions, as needed, with the Asia/Near East Regional Environmental Officer (ANE/REO). The Regional Environmental Officer (REO), as appropriate, may also collaborate with the PMS at the initiation of the study to provide information and perspective and links to USEPA, as might be necessary.

The World Food Program for the West Bank and Gaza will assign a contact person(s) to work with the PMS. The contact person will assist the PMS in developing the study by providing information about uses and conditions of use for all pesticides, the types of project activities, and roles and responsibilities of implementing partners, vendors, and sub-contractors, with the purpose of ensuring that all relevant pesticides are covered and to help the PMS design training for those at risk in the field. WFP will also help provide relevant background documents for the study and will help organize local field visits. The contact person(s) will be responsible for reviewing and providing comments on the draft report.

The Pesticide Management Specialist will:

- 1) Conduct an initial conference call with USAID and the World Food Program to prepare for TDY field visit to Tel Aviv/Jerusalem (with site visits in Israel and the West Bank)
- 2) Submit a proposed schedule/calendar for activities during the TDY
- 3) Submit a list of background documents needed to complete the PERSUAP
- 4) Conduct all necessary preparatory research (including determination of USEPA status) and relevant document review regarding the potential pesticides to be used under the WFP activity
- 5) Conduct a TDY field visit, including: conduct introductory briefing(s) with USAID and WFP; make site visits to relevant locations and meetings with key contacts in Israel and the West Bank; integrate WFP and USAID staff and implementing partners in PERSUAP development activities as appropriate to promote local capacity-building; provide an orientation/training session for WFP employees regarding integrated pest management and safe use action plans as related to their project activities; conduct close-out briefing(s) with USAID and WFP
- 6) Within 5 working days after completion of the TDY, submit a draft PERSUAP (in accordance with the specifications contained in III, Scope of Work) for USAID review
- 7) Within 3 working days after receipt of feedback from USAID, make necessary revisions and submit a final PERSUAP

³ Travel to Gaza Strip will not be permitted under this SOW.

V. Deliverables

- (1) Draft PERSUAP (for USAID review and approval)
- (2) Final PERSUAP

VI. Period of Performance

o/a August 27, 2007 – September 28, 2007

[Note: because of local holidays and related travel restrictions, the TDY should be preferably be conducted during the week of September 3, with the week of September 17 as the second option.]

VII. Desired Qualifications

- College or graduate level education and specialized professional training, plus three years or more of work experience in relevant fields such as integrated pest management, systems analysis, environmental sciences, Regulation 216
- experience in preparing PERSUAP documents
- consulting experience in developing countries

VIII. Application Instructions

- CV (Curriculum Vitae) with details of relevant professional training and experience
- Three professional references
- Proposed work schedule (number of days/hours) and tasks for preparing the PERSUAP as described herein
- Budget and narrative justification

Annex 1

PROTRACTED RELIEF AND RECOVERY OPERATION (PRRO) - OCCUPIED PALESTINIAN TERRITORY 10387.1

Targeted Assistance for Relief, Support to Productive Activities and Skills Development for Vulnerable non-refugee Palestinians

BACKGROUND

Since the outbreak of the second intifada in September 2000, the Palestinian territories have experienced increased poverty and food insecurity. In 2005, 44% of the population was considered poor; this figure was estimated at 65.8%⁴ in 2006 and may reach 72% in 2007⁵. The depth of poverty also rose, with 55% of households (2.4 million people) living in extreme poverty, unable to meet their basic needs of food, clothing and housing⁶. Unemployment now affects over 30% of the active population.⁷

The January 2006 Hamas victory in the Palestinian Legislative Council elections resulted in the loss of transfer payments and external financial support to the Palestinian National Authority. The lost transfer income, and subsequent loss of funds to pay PA employees, resulted in further economic fragmentation and declines in household purchasing power throughout Gaza and the West Bank. Restrictions on movement of goods and people within and into/out of the Palestinian territories have intensified. Checkpoints increased by 40% in 2006 and 58% of the barrier dividing the West Bank from Israel has been constructed⁸, isolating 19% of West Bankers from their land and 23% from their jobs⁹. The repeated closures of the main goods crossing at Karni¹⁰ caused financial losses for Gaza farmers and business owners.

Inability to buy food as a result of loss of employment and lack of access to land or water resources, in a context of degrading socio-economic conditions, are the main causes of food insecurity. The 2006 Comprehensive Food Security and Vulnerability Assessment (CFSVA) conducted by the United Nations World Food Program (WFP) and the Food and Agriculture Organization (FAO)¹¹ estimated that 34% of the 3.9 million Palestinians are food-insecure and that another 12% are vulnerable to food insecurity in the near future. Of the non-refugee Palestinians who make up 58% of the total population, 672,000 are food-insecure and another 259,000 could become food-insecure if the situation does not improve.

While food insecurity is almost equally an urban and rural phenomenon, there are important disparities between the West Bank and Gaza, as well as between and within governorates. Food

⁴ Palestinian Central Bureau of Statistics (PCBS) data on poverty rates, using income data (2nd quarter).

⁵ World Bank, West Bank and Gaza Strip Update, September 2006, p.10. This takes into account the relative poverty line of US\$2.2 per person per day. The absolute poverty line is US\$1.6 per person per day.

⁶ OCHA (Office for the Coordination of Humanitarian Affairs) CAP (Consolidated Appeals Process) 2007.

⁷ PCBS data. Third Quarter 2006.

⁸ OCHA CAP 2007. As of early October 2006, 406 km of the 703 km planned had been completed; 65 km was under construction. The completed barrier will leave 10 percent of the West Bank on the Israeli side and 60,000 Palestinians in closed areas between the barrier and the Green Line.

⁹ Survey Conducted by the Institut Universitaire d'Etudes du Développement (IUED) in May 2006.

¹⁰ OCHA CAP 2007. Karni crossing was closed for 35 percent of year 2006 and opened for imports only.

¹¹ WFP/FAO CFSVA. December 2006.

insecurity is more widespread in the Gaza where 58% of the non-refugees are food insecure compared with 24% in the West Bank.

The resilience of Palestinians to adapt to the deteriorated situation is decreasing. During the first half of 2006, the average Palestinian household reduced cash expenditures on food by 7.8% compared to the same period in 2005¹². Higher basic food commodity prices reduced the average person's purchasing power which led to a 4% decrease in quantity of food purchased¹³. Families that were self-reliant in 2000 have now exhausted all available means by which to cope. The Palestinian households who have lost their source of income since the second *intifada* have no savings left, have sold private and productive assets, and are now resorting to negative coping mechanisms. These include going into debt, withdrawing children from school, selling-off productive assets, and reducing the number and quality of meals. In order to mitigate the possibility of further negative effects on the most vulnerable non-refugee populations and to respond to increased needs for food assistance, WFP expanded its original Protracted Relief and Recovery Operation (PRRO) (10387.0) in July 2006 with a 25 percent increase in the non-refugee beneficiary caseload from 480,000 to 597,000.

Because there is no assurance that the economic and food security situation in the West Bank and Gaza will improve soon, it is likely that, in the short and medium term, a significant portion of the population will remain poor and vulnerable to further shocks as their savings are exhausted, assets depleted, and income-generation opportunities limited. Thus, direct assistance as envisioned under WFP's new PRRO (10387.1), will provide an essential buffer against deterioration in food security among Palestinians.

PRRO OVERALL OBJECTIVES, STRATEGY AND ACTIVITIES

The overall objective of WFP's new two-year Protracted Relief and Recovery Operation (PRRO) is to meet the food needs of the most vulnerable food-insecure non-refugee Palestinians by supporting productive activities and skills development while providing essential food commodities to vulnerable populations.

The PRRO design is based findings from a number of studies including the food security assessment, market assessment, food for education assessment, nutrition and other reviews. Targeted interventions will offer assistance according to the food security, socio-economic and livelihood profiles of the most vulnerable non-refugee Palestinians to ensure that actual needs are met. Rations for different beneficiary categories and interventions will be introduced. Full rations will be provided to people entirely dependent on assistance, while smaller rations will be provided to poor beneficiaries with some, albeit limited, resources. The PRRO will emphasize self-reliance through productive activities. Food-for-Work (FFW) and Food-for-Training (FFT) will concentrate on creating conditions for increased productivity and generating future employment opportunities.

¹² Palestinian Expenditure and Consumption Survey (PECS) data, June 2006.

¹³ WFP/FAO CFSVA, December 2006. The quantity of food consumed was reportedly reduced by 4 percent (PCBS PECS – First semester of 2006).

USAID-SUPPORTED INTERVENTIONS

USAID/West Bank and Gaza (WBG) cash assistance and USAID/Food for Peace (FFP) in-kind contributions will support direct food distribution, Food-for-Work (FFW) and Food-for-Training (FFT) activities, through three interventions as detailed in Table 1.

Table 1 USAID-Supported Interventions for WFP PRRO 10387.1			
Component 1 - Protracted and emergency relief			
Intervention	Objective of assistance	Beneficiary profile/Targeting criteria	Geographic targeting
1.A – Direct food distribution - Assistance to most vulnerable groups	Prevent destitution by providing rations to cover 60% of household food needs	Food-insecure households affected by income and consumption poverty but not destitute, high dependency ratio, irregular employment	Urban centers, emphasis on governorates where food insecurity level is above national average
Component 2 - Recovery through support to productive activities and skills development			
2.A - FFW - Preservation of productive assets	Promote self-reliance and restore livelihoods through preservation of agriculture and fishery assets	Poor farmers and fishermen and long-term unemployed will be prioritized	Rural areas and fishing zones
2.B - FFT - Income-generation and vocational skills development	Promote self-reliance by imparting marketable skills and assets.	Food-insecure long-term unemployed and unskilled workers	Urban and to a lesser extent rural food-insecure areas.

USAID/WBG-funded food commodities will include wheat flour, vegetable oil, pulses (i.e. chickpeas, white beans, and lentils), sugar, and salt, and will be complemented by the in-kind donations received from USAID/FFP. The wheat flour will be fortified with vitamin A, D, B complex, folic acid, iron and zinc. Vegetable oil will be fortified with vitamin A and D. Salt will be iodized. The rations presented in Table 2 reflect the local food consumption habits and have been designed to fulfil the objectives of each intervention as per the recommendation of the December 2006 WFP nutrition review.

Vulnerability Analysis Mapping (VAM) data will be used to target governorates and food insecure areas within the governorates. Within the vulnerable geographic areas, beneficiary groups for USAID assistance will include non-refugee food insecure households in rural and urban areas such as unskilled or unemployed labourers, Bedouin communities, poor farmers, fishermen, large households with limited income, and women headed-households. Households receiving food assistance from other sources will be excluded. Beneficiary selection will be conducted according to WFP's eligibility criteria and in close cooperation with cooperating partners, community-based organizations, local relief committees, women's groups and

beneficiaries. Gender considerations will be mainstreamed throughout the program. WFP will work closely with the cooperating partners to increase the role of women in the design, decision-making and implementation of projects, and to ensure that 50% of the local selection and project formulation committee members will be women.

Table 2 Illustrative Food Basket by Intervention Type							
Intervention type	Objective of the ration	Wheat Flour	Pulses	Vegetable oil	Sugar	Iodized salt	Kcal / day / person
Component 1 - Protracted and emergency relief							
1.A – Direct food distribution - Assistance to most vulnerable groups	Meet partial food needs	300	20	20	10	5	1,375 -
Component 2 - Recovery through livelihoods protection and skills development							
2.A - FFW - Preservation of productive assets	Income transfer	450	25	40	25	5	2,175 -
2.B - FFT - Income-generation and vocational skills development	Incentive	300	20	20	10	5	1,375 -

As often as circumstances allow, beneficiaries will be assisted through FFW/FFT activities that focus on the creation or rehabilitation of household and community assets and enhancement of skills, particularly of women. Able-bodied members of targeted households will be requested to work or attend training for an average of respectively 25 or 20 hours per month to qualify for assistance. However, to maximize WFP responsiveness in the context of economic and security instability, WFP and its cooperating partners may, in consultation with USAID, distribute USAID-supported food commodities directly to eligible beneficiaries without any food-for-work or food-for-training requirements. In such cases, WFP may, in consultation with USAID, modify the food baskets (quantitatively) to ensure adequacy of the ration with the project type. As part of its contingency planning and implementation, WFP will analyze factors such as the economic situation, food insecurity, unforeseen emergencies (i.e. political crises, public health or natural disasters), and overall safety and security to determine when and where a shift to general food distribution is merited. In exceptional circumstances, and in consultation with USAID, WFP may waive certain selection criteria when households which would not otherwise be eligible are deemed to have acute food insecurity needs.

For the implementation of the USAID-funded FFW/FFT and food distribution activities, WFP will establish partnerships with U.S.-based international non-governmental organizations (NGOs) depending on geographical coverage needs and institutional capacities. Non-U.S. organizations and individuals proposed as project partners will be subject to prior review and approval by USAID per Mission policies and procedures. Letters of agreement between WFP and such cooperating partners (CPs) will provide budget levels and outline responsibilities for targeting, beneficiary selection, implementation procedures/protocols, distribution systems, and monitoring and reporting.

Attachment 2: List of CHF and CRS warehouses

Area	Governorate	Wareouse Name/Site	Address	Capacity mt*	Partner
West Bank	Bethlehem	Warehouse Bethlehem	Staih Road/Beit Sahour city		CRS
West Bank	Hebron	Warehouse Hebron City	Hebron city- As Sh'abeh Road	3,000	CRS
West Bank	Jenin	Warehouse Al Yamoon Village	Al Yamoon village- Industrial zone Street	1,150	CHF
West Bank	Jenin	Warehouse Meseliah village	Meseliah village- Arab American University street	300	CHF
West Bank	Jericho	Warehouse Jericho city	Jericho city enternace/ opposite Intercontinental Hotel	140	CRS
West Bank	Jerusalem	Warehouse Biddo village	Biddo village- Radar Street	165	CRS
West Bank	Nablus	Warehouse Azmout Village	Azmout Main Street/ Azmout enterance		CHF
West Bank	Nablus	Warehouse Sabastya Village	Sabastya village- Al - Madaris Street	300	CHF
West Bank	Nablus	Warehouse Qabalan Village	Qabalan village-Al - Soltani Street	370	CHF
West Bank	Ramallah	Warehouse Arura village	Arura village-near East Bani Zeid Elementary school	200	CHF
West Bank	Ramallah	Warehouse Kufr Na'mah village	Kufr Na'mah- near Kufr Na'mah high school and village council	120	CHF
Gaza	North	Warehouse Jabalia	Jabalia village,East of Salah Al Deen street,Al kereem street	488	CHF
Gaza	Gaza Town	Warehouse Gaza	Al Daraj quarter ,Beside Mosa Bin Nosier school	600	CHF
Gaza	Mid Area	Warehouse Dair Al Balah	Dair Al Balah city,Salah Al Deen street ,east enterance of Dair al Balah city	179	CHF
Gaza	Khanyonis	Warehouse Khanyonis	Baten Al Sameen ,Ishbeer street	200	CHF
Gaza	Khanyonis	Warehouse Khanyonis	Bany Suhaila village,Al Rawda street	569	CHF
Gaza	Khanyonis	Warehouse Khanyonis	Al Qarara village,Abu Hammad Street	200	CHF
Gaza	Rafah	Warehouse Rafah	Kherbet Al Adas quarter,Taha Hoseen Street	686	CHF

Attachment 12: Websites Useful for Pesticide Searches

<http://www.pesticideinfo.org> (PAN most complete pesticides database)
<http://extoxnet.orst.edu/pips/ghindex.html> (EXTOXNET Oregon State database)
<http://www.epa.gov/ecotox/> (EPA Ecotox Database)
<http://www.cdpr.ca.gov/docs/epa/m2.htm> (link to OPP site)
<http://cfpub.epa.gov/oppref/rereg/status.cfm?show=rereg> (EPA Registr. Eligib. Decisions)
http://www.epa.gov/pesticides/biopesticides/ai/all_ais.htm (EPA regulated biopesticides)
<http://www.epa.gov/opppmsd1/RestProd/rupjun02.htm> (EPA restricted use pesticides)
http://www.epa.gov/pesticides/health/tox_categories.htm (EPA Toxicity Classifications)
<http://www.epa.gov/opppmsd1/PPIsdata/index.html> (EPA pesticide product information)
<http://www.chemfinder.camsoft.com> (chemical database & internet search, free & fee)
<http://www.hclrss.demon.co.uk/index.html> (compendium of pesticide common names)
http://www.agf.gov.bc.ca/pesticides/f_2.htm (all types of application equipment)
http://www.hclrss.demon.co.uk/class_insecticides.html pesticides classification and common names compendium

Electronic information on pesticides was collected by the consultant using several websites: www.epa.gov for compliance; www.who.int/ipcs/publications/pesticides for WHO classification; www.kellysolutions.com for formulations registration status information; www.greenbook.net and www.cdms.com for efficacy information and Material Safety Data Sheets found on pesticide labels; as well as the PAN www.pesticideinfo.org and EXTOXNET <http://extoxnet.orst.edu/pips/ghindex.html> websites for specific toxicological, registration and environmental data.
<http://www.foodaidmanagement.org/pdfdocs/usaiddoc/FldGuide2000Text1.PDF> (good doc on outline of how to do environmental assessments, beyond compliance)

Hard copy information on toxicity class and nontarget hazard was referenced from technical manuals reviewed in the U.S. such as The Pesticide Manual by Tomlin (1997), Farm Chemical Handbook (2005), Agricultural Chemicals Books by Thomson (1995-8), The Agrochemicals Handbook by the Royal Society of Chemistry UK (1991), The UK Pesticide Guide by the British Crop Protection Council (1998), and The UK Pesticide Guide (1999).

CABI Site for Crop Protection Compendium (CPC)

<http://www.cabi.org/compendia/cpc/index.htm> to enter CABI CPC for crop/pest recs.

Pesticide Toxicity to Honey Bees

<http://www.entm.purdue.edu/Entomology/ext/targets/e-series/EseriesPDF/E-53.pdf>
<http://www.ohioline.osu.edu/hyg-fact/2000/2161.html> (Ohio State Extension site)

Pesticide Toxicity to Natural Enemies (Beneficials)

<http://www.ipm.ucdavis.edu/PMG/r108900111.html>

Biological Pesticides List

<http://www.koppert.com> (a Dutch biologicals company doing business internationally)

<http://www.biobest.be> (a Belgian biologicals company doing business internationally)
http://www.epa.gov/pesticides/biopesticides/ai/all_ais.htm (EPA's biopesticide list)
<http://www.bio-bee.com/english/welcome.html> (a biopesticide company in Israel)

Minimum Residue Limits for Pesticides & Veterinary Drugs in Food

<http://faostat.fao.org/faostat/collections?version=ext&hasbulk=0&subset=FoodQuality>

PERSUAPs Sites

<http://www.encapafrika.org/sectors/pestmgmt.htm> (PERSUAPS guidance)

International Conventions

<http://www.pops.int/> (Persistent Organic Pollutants—POPs website)

http://www.pops.int/documents/convtext/convtext_en.pdf (POPs Convention text)

<http://www.chem.unep.ch/pops/pdf/redelipops/redelipops.pdf> (reduce & eliminate POPs)

<http://www.pic.int/> (Prior Informed Consent—PIC website)

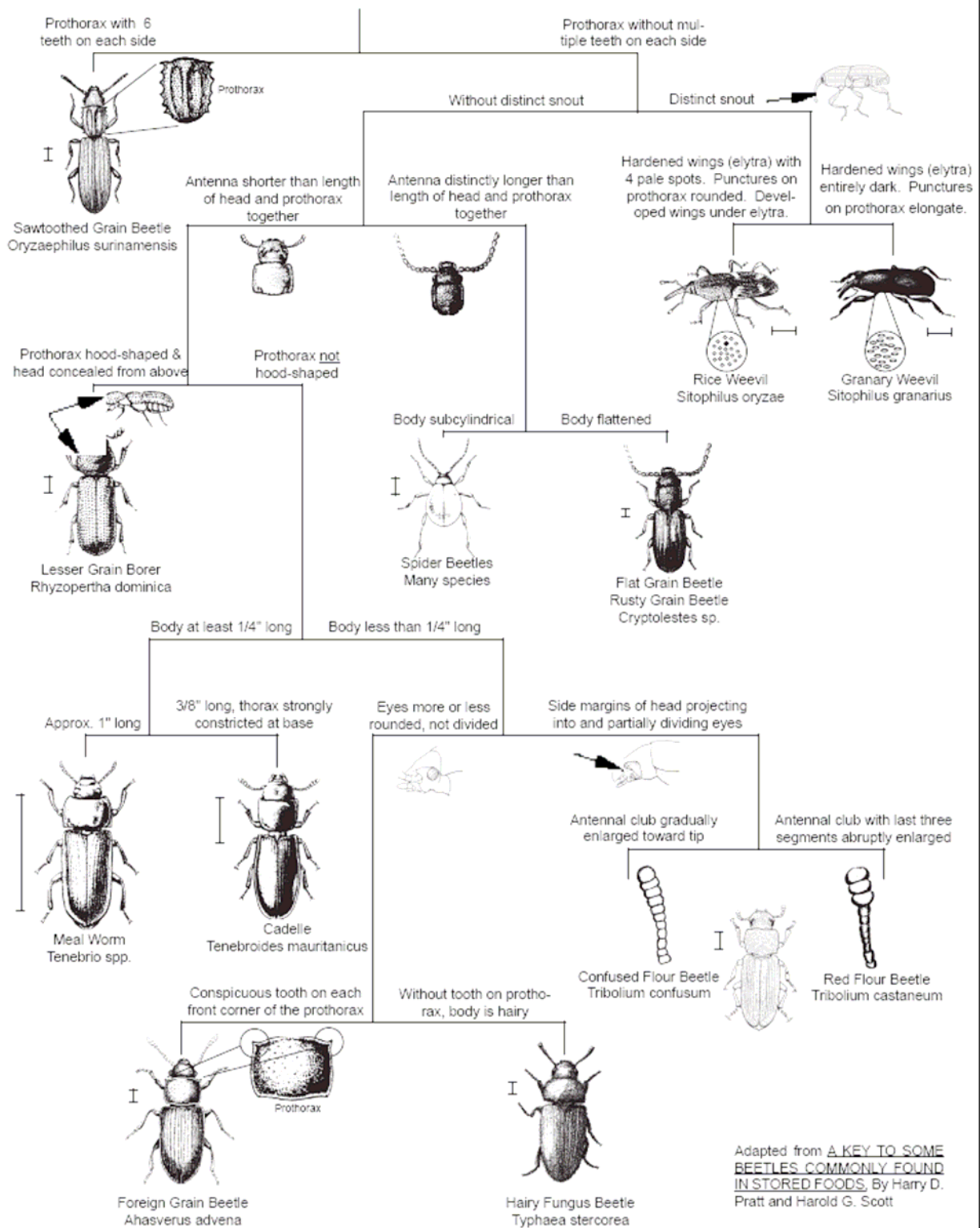
methyl-bromide site

<http://www.epa.gov/ozone/mbr/harmoniz.html>

Audio-Visual IPM and SPU (Safe Pesticide Use) resources

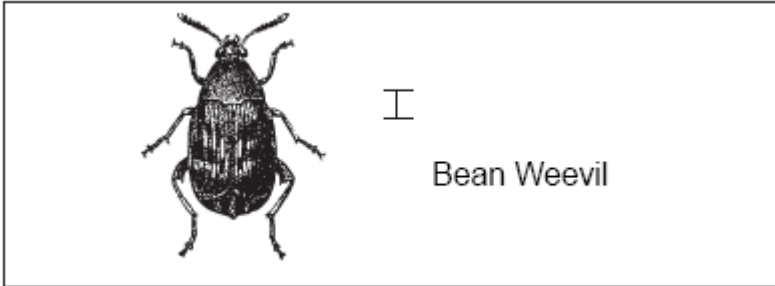
<http://entweb.clemson.edu/pesticid/publicitn/resource.htm>

Attachment 4: A Pictorial Key to Beetle Pests of Stored Grains, and Flour Moths



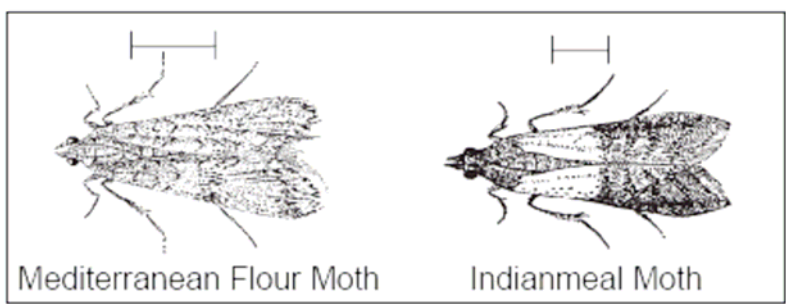
BEAN AND PEA WEEVILS

These are brownish-colored, short, stout-bodied beetles flecked with patches of black, gray, and white. The larvae develop within dried beans and peas. An illustration of the bean weevil is found below:



FLOUR MOTHS

These are small moths with a wingspan of about 1 cm. Of the two more common species, the Indian meal moth's forewings have a coppery color on the outer two thirds and whitish-gray at the basal (head) end, while the Mediterranean flour moth's forewings are a pale gray with transverse wavy black lines. The larvae of both species are pinkish-white and web together the materials (grain products) in which they develop. The adult moths fly about the house near the site of the infestation, but are non-feeding. The mature larvae may also leave their food and crawl about cupboards, walls, and ceilings looking for a place to pupate. An illustration of the bean weevil is found below:



Attachment 5: Action Plan Format

Title:

Objective:

Steps	Start	End	Who

Goals:

Discussion:

Final Sign-off: A. Vercken _____

Send to USAID/WBG CTO, MEO as a PERSUAP Compliance Monitoring Instrument