NATIONAL BIOSAFETY BOARD DECISION

APPLICATION FOR APPROVAL FOR LIMITED MARK-RELEASE-RECAPTURE OF *Aedes aegypti* WILD TYPE AND *Aedes aegypti* GENETICALLY MODIFIED MOSQUITOES OX513A(My1)

NBB REF NO: NRE(S)609-2/1/3
APPLICANT: INSTITUTE OF MEDICAL RESEARCH
DATE OF DECISION: 5 OCTOBER 2010

The National Biosafety Board (NBB) on the 5 October 2010 made a decision to grant an **approval with terms and conditions to** the application from the Institute of Medical Research (IMR) for a field trial to release genetically modified (GM) male mosquitoes.

This approval permits the release of male genetically modified (GM) Yellow Fever mosquitoes, *Aedes aegypti* OX513A(My1) strain and male non-GM *Aedes aegypti* mosquitoes (wild type) to conduct a field trial entitled "**Limited Mark-Release-Recapture** (MRR)* of *Aedes aegypti* wild type and OX513A(My1). The proposed release sites are in Bentong, Pahang and Alor Gajah, Melaka.

The recommendation of Genetic Modification Advisory Committee (GMAC) to the NBB was for an approval with terms and conditions. Proper risk management strategies are to be followed as stipulated through the terms and conditions imposed (Appendix 1). Additionally close monitoring will be done to ensure that the terms and conditions imposed are implemented on the ground.

Public consultation for this application was done in August 2010 for a period of 30 days. Concerns raised by the public were addressed and taken into consideration when making the decision.

The basis of NBB decision is as follows:

- The proposed field experiment is **only for a limited small scale release** and does not endanger biological diversity or human, animal and plant health when proper risk management strategies are followed as stipulated through the terms and conditions imposed with the approval. In addition, for the purpose of the field trial studies, the released male mosquitoes will be recaptured using standard procedures practiced by Ministry of Health;

- Risks identified for this field experiment were quite low in the context of a Limited Mark-Release-Recapture field trial. However, for a larger scale release, these risks will be re-evaluated;

- IMR has been very actively involved in GM mosquito research since 2006. Previous studies have already been conducted as laboratory experiments (contained use) and semi-field trials**. This field experiment is the next phase of this research and **an important prerequisite for any subsequent full scale release for population suppression;**

- **Only a small number of mosquitoes will be released** in comparison to the existing wild population based on previous baseline population surveys conducted by IMR. In addition, the released GM mosquitoes have no selective survival advantage and will diminish through the process of natural selection;

- The proposed **release site will be free from any dengue outbreak** for at least 3 months before the start of the field trial and this will be verified by the relevant health authorities;

- **Only male mosquitoes are released and male mosquitoes do not bite or carry the dengue virus.** The Standard Operating Procedures for sorting the male mosquitoes for the release has been assessed and approved by GMAC. Sorting will be done mechanically, followed by a serial manual re-check on all the sorted mosquitoe pupaes by three highly trained laboratory technicians of IMR;

- Upon completion of the field trial, responsible site management is imposed to ensure that the area is completely cleared of any released GM mosquitoes. i.e. the monitoring period is extended and also additional fogging will be done to ensure that there are no residue GM mosquitoes in the environment;

- NBB, through the Department of Biosafety, will closely monitor the implementation of the field trial to ensure compliance at every stage of the release;

- Science based issues/uncertainties highlighted by researchers well versed with the issue were taken seriously and included in the scientific assessment by GMAC;

- Some of the scepticism expressed through public consultation about the field trial was due to lack of understanding of the science behind the field trial and an assumption that it is the final release to suppress *Aedes aegypti* population. Other valid concerns were considered in the assessment;

- Residents from the field trial site will be engaged in Public awareness activities and information about the field trial will be made available;

- Socioeconomic consideration including the number of deaths and the cost of medication due to Dengue were included. New technologies should be explored to complement the integrated pest management programme (IPM). The suppression of *Aedes aegypti* population by incorporating biotechnology in the IPM is promising; and

- Cayman Island has already done a field release of this GM mosquito and there were no issues caused by the release. Other countries such as United States of America (Colorado), Thailand, Brazil and India are involved at contained use experiments involving GM mosquitoes. Countries like Singapore and Vietnam are reviewing this technology involving GM mosquitoes.

Additional Information:
Issues to be addressed for future big scale releases:

- Release of transgenic mosquitoes may cause other pests to become more serious;
- Increase in the population of another mosquito species due to suppression of the target mosquito;
- Stability of the transgenes*** in the field;
- Behaviour of GM mosquitoes in the field;
- Sorting error when handling large quantities of GM mosquitoes to be released; and
- Establishment of an effective IPM to incorporate the new GM technology.

*Note: Mark-release-recapture (MRR) is a technique whereby a number of organisms/animals are marked in a way that makes them easily recognized when they are encountered again within a habitat. It is assumed that the marked organisms/animals that are released will mix back into the rest of the local population.

**Note: Semi field trials - experiments conducted in a Temporary Contained Trial Facility at IMR - a fully contained structure, simulating the living space for a household of 2-4 people in Kuala Lumpur.

***Note: Refers to the new genes incorporated into the GM mosquitoes

APPENDIX 1

TERMS AND CONDITIONS FOR CERTIFICATE OF APPROVAL

Part A

Information and/or documentation that should be submitted to NBB at least two weeks prior to the start of field trials

a) Documentation from District Council/Majlis Daerah or relevant authorities on the presence or otherwise of aquaculture, poultry and pharmaceutical industries within a vicinity of 500 meters of the release sites, and information on whether any of these industries regularly use tetracycline in their operations [This is related to the concern that there may be residual tetracycline around the release sites.]

b) Confirmation from the relevant health authorities that the sites selected has been free from any dengue outbreak for at least 3 months before the start of the field trial.

c) Detailed information on the positioning of the ovitraps and BG-Sentinel traps (documentation on setting-up of traps, including GPS information and photographs has been proposed by the applicant). Proper cautionary measures should be taken to ensure that that traps are positioned at suitable locations/heights for effective trappings.

d) A consent letter should be provided from the Local Council for the district/s where the release sites are located for the proposed MRR field trial.

e) Public Notification and Consensus - It is mandatory that the applicant through a public forum obtains prior consensus and approval from the inhabitants in the release sites regarding the proposed MRR field trial.

Part B

Actions to be taken and reported to NBB during /after the field trial

a) All proposed activities and methods submitted in the dossier and agreed upon through other means of communication with the applicant should be appropriately and responsibly adhered to.

b) Sex sorting must be carried out in compliance with the SOP submitted (SOP for Sex Sorting of Aedes aegypti Mosquitoes). Additionally, all OX513A(My1) mosquitoes for release must be checked and not merely a ‘quality control sample’.

c) All extra insects/ recaptured insects are to be transported in shatter-proof double-covered containers for subsequent identification, analytical studies or appropriate disposal (according to SOP at IMR).

d) At the end of the field trial, fogging for a 400m radius is required according to the Ministry of Health's guidelines and a clean-up operations (*gotong-royong*) should be conducted to eradicate all breeding grounds. A second fogging should be conducted one week after the end-of-field-trial fogging.

e) At the end of the field trial (first fogging), applicant is required to continue monitoring for another month to ensure no residual OX513A(My1) strains are left behind. The traps should be checked on a daily basis. During this additional one month monitoring period, fogging should be done if any residual OX513A(My1) is detected.

f) Upon completion of the open field trial, a comprehensive report should be submitted to the National Biosafety Board within two months from the end of the trial.

Department of Biosafety, Malaysia
5 October 2010