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FACILITATION (FAL) DIVISION — TWELFTH SESSION

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Agenda Item 6: International Health Regulations (IHRs)

DISINSECTION AND PESTICIDES IN AIRCRAFT CABINS

(Presented by the International Transport Workers' Federation (ITF))

SUMMARY

This paper raises concerns regarding the inconsistent and inappropriate application of disinsectants (or "practice of disinsection")on board aircraft. It identifies adverse health effects and toxicity associated with the pesticides currently approved for use in aircraft cabins. The ITF calls for a more rigorous and restrictive approach to disinsection practices and for urgent action to identify alternative means of controlling those insects that pose a demonstrated risk to member states, without exposing aircraft occupants to pesticides.

Action by the Division is in paragraph 6.1.

1. INTRODUCTION

1.1 The ITF recognizes the importance of measures to control the transmission on board aircraft of insects that might have an adverse effect on human health, agriculture or the environment.

1.2 The ITF is, however, concerned by a number of matters relating to the current international regulations, standards, and recommended practices governing disinsection, set out in Annex 9 and within the International Health Regulations (IHRS) of the World Health Organization (WHO).

1.3 Firstly, the ITF is concerned about the inconsistent application of the existing regulations, leading to the exposure of passengers and crews to pesticides, in many cases, without documented justification, and in many cases without their knowledge of such exposure.

1.4 Secondly, The ITF is seriously concerned about the adverse health effects and toxicity of the pesticides approved by the WHO for this purpose.

2. DISINSECTION

2.1 States' obligations to control the transmission of vector-borne illnesses and insects that threaten plant health are set out in Part IV of the IHRS of the WHO, particularly in Article 25, supplemented by additional provisions in Articles 40, 47, 57, 67 and 83. Broadly speaking, these permit States to require that aircraft arriving at an airport from an infected area be treated to control insect vectors to prevent the transmission of disease, and insects that may damage crops or the environment. A number of these Regulations relate specifically to the transmission of yellow fever and malaria. As a principle, the IHRS, in Article 40 restrict the use of disinsection to flights that pose a specific risk.

2.2 This approach is reflected by ICAO in Paragraph 2.22, of Annex 9, which reads:

> "*2.22 Contracting States shall limit any routine requirement for the disinsection of aircraft cabins and flight decks with an aerosol while passengers and crews are on board to same-aircraft operations originating in or operating via territories that they consider to pose a threat to their public health, agriculture or environment*."

2.3 This provision would seem to protect passengers and crew from exposure to aerosol pesticides in all cases except where there is an identified need for spraying on-board an aircraft arriving or transiting countries that have been listed by the WHO as posing a threat specific threat. As outlined in IP/6 by the Secretariat, in Para 3.2 a) of their Information Paper, the purpose of this Standard is to be restrictive regarding the use of aerosol disinsectation.

2.4 The experience if the ITF, however, is that, notwithstanding this Standard, many States continue to require aerosol or residual spraying where there is no clear justification. As IP/6 points out "*no uniform practice or procedures on the method(s) of disinsectation, to be followed was discerned… States approved of a variety of insecticides*." Currently, at least 60 countries issue disinsection requirements, either for all or selected incoming flights, according to IP/6. The vast majority of these countries specify that the aircraft must be treated with a solution that contains a pyrethroid pesticide (typically permethrin or phenothrin), either in the occupied or soon-to-be-occupied aircraft (aerosol spraying). Other States permit or require residual treatment of aircraft cabins and cockpit, resulting in the presence of insecticides that remain chemically active for at least 8 weeks. Contracting States must only authorize WHO-recommended methods and insecticides, as per ICAO Standard 2.24.

2.5 In view of the adverse health effects referred to below, the ITF is gravely concerned that practices and procedures are not restricted to those cases where there is a clear justification. In particular, some States require the disinsection of all aircraft arriving in their territory, even though many flights will have originated in pathogen-free locations. The use of residual spraying means that occupants on such treated aircraft will be exposed to insecticides even when there is absolutely no risk of disease transmission. The problem does not lie in the Standard, but rather in compliance with it. In particular, we urge all States to have regard to Paragraph 2.23 of Annex 9:

> "*2.23 Contracting States that require disinsection of aircraft shall periodically review their requirements and modify them as appropriate in the light of available evidence relating to the transmission of insects to their respective territories via aircraft.*"

3. EXPOSURE ASSESSMENT ON AIRCRAFT

3.1 There is evidence of significant variability in pesticide application methods between airlines and Contracting States, as well as varied individual susceptibility. However, the majority of the reports submitted by passengers, crew members, and their physicians describe symptoms (1) during and after in-flight spraying, or (2) during and after one of the two flight legs that follow residual treatment of the cabin and cockpit. Many of the complaints cite damp surfaces and a distinct odor of pesticides in the crew rest compartments.

3.2 The WHO has made passing references to reports of ill effects associated with its currently endorsed methods of aircraft disinsection, but its official position is that these practices, "when performed properly," are safe. Notwithstanding the range of individual sensitivity to pesticide products, there is evidence that exposure levels can vary dramatically, such that the caveat "when performed properly" can be null and void in practice. There is little guidance material for contracting states and no means to test or ensure compliance with pertinent ICAO standards. For example, ICAO has published recommended application volumes of pesticide products that must not be exceeded, although a recent report published by the California Department of Health Services describes ample evidence of over-spraying and ill health at a major US airline (CADHS, 2003).

3.3 The two-year investigation into doctors' reports of pesticide-related illness among cabin crew concluded that "post-disinsection aircraft ventilation procedures and administrative measures did not effectively limit exposure," and that "current assumptions about the human health impacts of residual disinsection underestimate the risks of this procedure" (CADHS, 2003). A mathematical model estimated that 45 minutes after the residual application ends, when crew members can be expected to board, the airborne concentration of permethrin in the cabin would approach 6 mg/m3 if there were no mechanical ventilation, which was not an unusual practice at the airline in question (CADHS, 2003). Over exposure may also carry serious implications for aviation safety: for example, one of their pilots reported such a severe allergic reaction that "he was having difficulty concentrating" and was "making mistakes upon landing" such that "the safety of flight was compromised" (AFA, 2002).

3.4 A recent US National Research Council committee recognized that the intermittent exposure regimen of crew members "is ideal for inducing sensitization or magnified responses to the same exposure," and recommended further investigation (NRC, 2002).

3.5 The potential for exposure to permethrin extends beyond the time immediately following residual application. By definition, the permethrin that is applied in aircraft must be chemically active for eight weeks. Carpeting and upholstered furniture can absorb and later release pesticides back into the air (Fenske et al, 1990).

4. CONCERNS WITH CURRENTLY APPROVED AIRCRAFT PESTICIDE SPRAYS

4.1 The active ingredients in the sprays used for aircraft disinsection are permethrin and phenothrin. Both are pyrethroids.

4.2 The most common symptoms recently reported by crewmembers exposed to pesticides are respiratory, nervous system, dermatological, eye, cardiovascular, and gastrointestinal (CADHS, 2003). In addition to the potential for acute illness, the potential for cumulative or chronic health problems has been cited (Ibid).

4.3 Possible heightened sensitivity to permethrin for people with skin disease and lowered immunity has been noted (Naumann & McLachlan, 1999). This is a concern because residually treated

aircraft are flown on both domestic and international routes where spraying is not even required. Passengers are not informed of the procedure in advance, or provided with useful information after the fact.

4.4 There is evidence that infants and young children may be particularly susceptible to permethrin (Naumann & McLachlan, 1999). There is evidence that certain pyrethroids may affect early neurologic and reproductive development. (Landrigan et. al., 1999). Babies and toddlers are known for their tendency to play on the floor and insert objects in their mouths, including upholstery. Neither pregnant women, nor the parents of babies and toddlers, are informed of the spraying in advance.

4.5 Co-exposure to compounds that inhibit the enzyme carboxyesterase (e.g., carbon monoxide) or the mixed function oxidase systems (e.g., piperonyl butoxide) can drastically increase the toxicity of the pyrethroids, up to 300 times (NRC, 2002; van Netten, 2002). Carbon monoxide can be generated in the aircraft air supply system and piperonyl butoxide is sometimes added to aircraft pesticide formulations.

4.6 The neurotoxic effects of permethrin have been documented both in animals (Rao and Rao, 1995) and humans (Altenkirch et al, 1996). Some of the typical effects observed following pyrethroid exposure (tingling, burning, numbness) are attributed to the action on nerve endings in the skin. Documented cases of acute, severe, neurologic effects (seizures, loss of consciousness) can follow heavy exposures (He et al, 1989).

4.7 In addition to its neurotoxic properties, permethrin has been recognized as an irritant, both to eyes and skin (WHO, 1993), and may be a sensitizer. Permethrin has been shown to act as an endocrine disrupter, suggesting an adverse effect on the reproductive system (Go et al, 1999; Garey and Wolff, 1998). Of 64 cases of chronic pyrethroid intoxication reported to the Federal Health Office in Germany in 1993, eight presented symptoms classified as "multiple chemical sensitivity syndrome" (Altenkirch et al, 1996).

4.8 The Material Safety Data Sheet (MSDS) for an aircraft spray that contains permethrin and is approved for residual application on aircraft states that the mist is discomforting to the eyes and is capable of causing a mild, temporary redness of the conjunctiva, temporary impairment of vision, and/or other transient eye damage/ulceration. The MSDS also indicates that "the material may be slightly discomforting to the skin if exposure is prolonged." Sprayed aircraft are regularly routed on flights that take more than 15 hours. Further, the MSDS states that "the vapour/mist is discomforting to the upper respiratory tract and lungs."

4.9 The label on a can of aircraft spray that contains phenothrin and is approved for in-flight application states that the aerosol is "hazardous if swallowed or absorbed through the skin", and warns the user to "avoid breathing vapors", "avoid contact with skin, eyes, exposed food, crockery, and cutlery", and "do not use in food preparation or processing areas." Nonetheless, for in-flight aircraft application, users are told to "spray all surfaces and ensure that ventilation openings are closed." The MSDS for the phenothrin-containing in-flight spray indicates the same health hazards and precautions as for the residual spray, except in this case, cabin crew and passengers are present when the cabin is treated.

4.10 Phenothrin has been described as a suspected kidney toxicant and a suspected neurotoxicant (RTECS, 1997). The US EPA "has received information which raises questions concerning the potential human health risks associated with the use of insecticide spray products in occupied aircraft cabins [and] doubts that the benefits associated with this use exceed the risks of such use" (EPA, 1996).

4.11 In addition to the active ingredients, residual and in-flight spray products also contain multiple solvents (such as xylene), and in-flight sprays contain a propellant such as fluorinated and/or chlorinated hydrocarbons.

4.12 Xylene is well absorbed through the skin and lungs, and symptoms of exposure include fatigue and irritation of the eyes and upper respiratory tract. Neurological effects, gastrointestinal

disturbances, and headaches have also been reported (NIOSH, 1987). International Chemical Safety Cards published by the WHO and the International Labor Organization warn that long-term or repeated exposure to any of the three xylene isomers "may have effects on the central nervous system, resulting in decreased learning ability." Also, for two of the three xylene isomers, reproductive effects have been reported in animal studies (WHO, 1999).

4.13 Exposure to freon depresses the heart rate, and trichlorofluoromethane in particular has been characterized as "one of the most toxic fluorocarbons" (Hanig & Herman, 1993).

5. SUPPORT FOR AN ALTERNATIVE, MECHANICAL MEANS OF COMPLIANCE

5.1 Even though the WHO promotes the application of pyrethroid pesticides in the occupied areas of commercial aircraft, it is also known for actively investigating "alternative approaches as part of integrated vector control strategies as an answer to well-known problems faced in the application of conventional chemical methods of control … including insecticide resistance, a decreased acceptance of spraying, environmental concerns, and the rising costs of insecticides" (WHO, 1986). Testing the feasibility and efficacy of non-chemical alternatives on commercial aircraft is consistent with this kind of progressive policy promoted by the WHO.

5.2 Mechanical means of disinsection are consistent with the spirit of ICAO Standard 2.25 that requires countries to "ensure that their procedures for disinsecting or any other remedial measure are not injurious to the health of passengers and crew, and cause the minimum of discomfort to them."

5.3 Air curtains intended to exclude flying insects have recently been tested under laboratory conditions at a United States Department of Agriculture laboratory, specifically for on-aircraft application. Preliminary test results indicate that the air curtains are effective.

6. ACTION BY THE DIVISION

6.1 The Division is invited to adopt the following B-type Recommendations:

Recommendation B/X —

States are strongly encouraged to implement the Standards on aircraft disinsection contained within Annex 9, in particular, to limit the requirement for disinsection to aircraft operations which pose a threat (2.22) and to review their requirements and modify them on the basis of a demonstrable need (2.23).

Recommendation B/XX —

ICAO is invited to assume a leadership role, working with the WHO and stakeholders including the ITF, in clarifying the intent of current aircraft disinsection standards, and develop guidance material that is specific and appropriate to commercial aircraft, to minimize exposure to pesticides in the cabin and cockpit.

Recommendation B/XXX —

ICAO is encouraged to urgently assess the effectiveness of a mechanical method of disinsection (e.g. an air curtain) as an appropriate alternative to the currently endorsed chemical methods.

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APPENDIX

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