

IN THE PLANNING AND ENVIRONMENT COURT
AT TOWNSVILLE

No. BD 4658 of 2004

BETWEEN: **CAROL JEANETTE BOOTH**

Applicant

AND: **FRIPPERY PTY LTD (ACN 010 890 007)**

First Respondent

MERVYN MEYER THOMAS

Second Respondent

PAMELA ANN THOMAS

Third Respondent

AFFIDAVIT

Filed on: February 2007

Filed by: Environmental Defenders Office (Qld) Inc

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I, **Dr Hugh John Spencer**, Director of the Cape Tribulation Tropical Research Station, Cape Tribulation, in the State of Queensland, affirm:

1. I prepared an affidavit in this matter which was affirmed on 31 August 2005 and filed on 5 September 2005. That affidavit set out my relevant expertise and expert opinion on flying-fox classification, biology and ecology, levels of shock that may cause death, injury or harm to flying-foxes, and my views that 'frapping' is not likely to be a cause of death.
2. I have been instructed and I understand that:
 - (a) I have a duty to assist the Court; and
 - (b) My duty to the Court overrides any obligation I may have to any party to the proceeding or to any person who is liable for my fees or expenses.

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Deponent

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AFFIDAVIT OF DR HUGH
JOHN SPENCER
Filed on behalf of the Applicant
PEC-5

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Mr Thomas' observations of fatalities on the Mark VII grid

3. I have been asked by the applicant to provide a supplementary affidavit explaining my response to questions from the trial judge (at pages 118-119 of the transcript) whether "testing is the only litmus test to see whether [the grids] work or not". In response to this question I agreed that "direct observation" was important but noted that "death does not have to occur immediately ... [it] can be quite delayed and death's not necessarily always defibrillation. Death comes from other reason[s] and so it may take days sometimes for something to die." I also said "in the absence of direct observation a lot [of] this type of research tends to be very speculative."
4. Mr Thomas says he has observed a large number of flying-foxes make contact with his Mark VII grid and has observed no deaths. He has a counter which he says records flying-foxes contacting the grid. At the trial in 2005 he said that over a 130 nights in 2004 the counter recorded 5,648 flying-fox contacts with the Mark VII grid and that he observed no deaths from those contacts.¹ I am asked to comment on whether observations of 5,648 contacts with no observed fatalities or any other number of contacts (for instance 10,000 or 100,000) with no observed fatalities prove that the Mark VII grid does not kill, injure or harm flying-foxes. In my opinion this direct observational evidence does *not* prove that the Mark VII grid does not kill, injure or harm flying-foxes. As I noted previously, death can be quite delayed. The animal may fly away and die elsewhere after a variable period. An injured or harmed animal may also fly away, meaning it is not possible to observe the impacts of the harm or injury. Proving that there was no death, injury or harm would be very complicated and difficult. One would need to track animals, capture them, and examine them for evidence of injury or harm or to observe their later death. As Mr Thomas has not done this, his observational evidence indicates that the Mark VII grid does not cause immediate death but it does not prove that the Mark VII does not kill, injure or harm flying-foxes.
5. In my opinion the sort of testing that would be required to scientifically determine the impacts of Mr Thomas' electric grid on flying-foxes, particularly whether the electric grids kill, injure or harm flying foxes (using a plain meaning of those terms), would involve mimicking the likely levels of contact by the flying-fox with the grid wires, and subjecting the flying-fox to the same electric current regimes. Flying-foxes not killed immediately would have to be intensively monitored until they either survived (could fly and forage) or died of their injuries. This would take several weeks, and no intervention on behalf of the animal could be carried out.
6. However, in my opinion it is extremely unlikely that any Australian Animal Ethics Committee would give approval to conduct such testing because of the suffering that the 'experimental animals' would be subjected to.

¹ Affidavit of Mervyn Meyer Thomas, affirmed 4 July 2005, paragraph 44. Transcript pages 129-131.

Relative impacts of different grid systems

7. The following table is derived from Mr Thomas' evidence at the trial and shows the different electrical properties of the different grid systems, as well as the death rates he says he observed on those systems. Below I comment on the likely relative impacts of these different grid systems. Note that, while Mr Thomas referred to only one version of the "Mark VII grid", he made significant changes to the duration of current in this grid after observing deaths in 2002. In practice, therefore, there were two versions, which I will distinguish as "Mark VII(a)" and "Mark VII(b)" to avoid ambiguity in the following table. However, for simplicity I will refer to the Mark VII(b) grid in subsequent paragraphs as the "Mark VII" grid.

Table 1: Electrical parameters and deaths on the respondents' grids

Grid system	Current (milliamp)	Duration	Death rate
Fyre Fox	200 mA	continuous	30/night
MK III	?	continuous	5/night
MK IV	6 mA	continuous	4/night
MK V	6 mA	5 sec on, 2 sec off	3/night
MK VI	30 mA	5 sec on, 2 sec off	1-2/night
MK VII (a)	30 mA	<u>2 sec on, ? sec off</u>	?/night (20-30 in total)
MK VII (b)	30 mA	>/=1 sec on, 4 sec off (with further on/off)	0/night

8. I note initially that there are a number of inconsistencies in the impacts Mr Thomas says he has observed on the different grid systems. In particular, Mr Thomas says that the MKVI grid (with a current of 30 mA) was less lethal than the MKV (with a current of 6 mA). Both had the same current duration (5 seconds on, 2 seconds off) so the higher current should have produced the higher death rate but Mr Thomas says he observed the opposite. Similar inconsistencies apply when the likely effects of the MKVII with the MKIV and MKV are compared.
9. The risk of death, injury or harm to animals caused by electric shock depends mainly on the magnitude and duration of the current flow. It appears that Mr Thomas has based what he says to be a safe level of electrical current for flying-foxes (30 mA) on levels relevant for humans. Table 2 shows current thresholds for various physiological effects in humans. These figures come from a publication *Electrical Stimulation and Electropathology* by J. Patrick Reilly, published by Cambridge University Press in 1992, with the relevant extract on page 434 is **Exhibit HJS-1** to this affidavit. Thus, 30mA is slightly less than the current which may result in ventricular fibrillation in humans.

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Table 2: Threshold levels for various physiological effects in humans for continuous 15- to 100-Hz current

Physiological effect	Threshold (mA)
Involuntary muscular reaction	0.5
Inability to let go (tetanized muscle)	10
Ventricular fibrillation	35

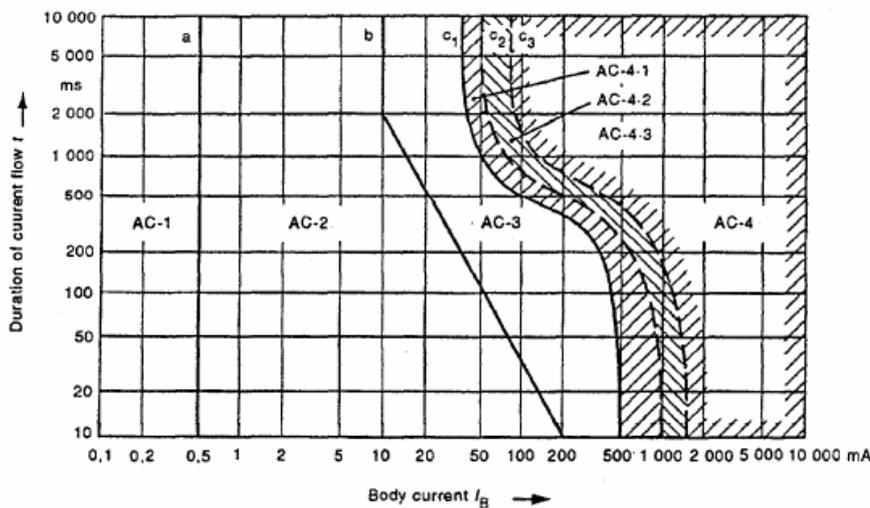
10. However, what is apparently safe for humans is far from safe for flying-foxes because flying-foxes are much smaller than humans. Because no experiments have been done to ascertain the safe level of current for flying-foxes (and are not likely to gain ethics approval), it is necessary to apply the principles of current density in order to ascertain an approximate safe level, as well as ascertain the likely impacts of certain levels of current on flying-foxes. As explained in the extract from *Electrical Stimulation and Electropathology* in Exhibit HJS-1 to this affidavit, the “current density in a homogenous model is the induced current divided by the cross-sectional area”. Flying-foxes have about 1/12 the cross-sectional area of humans, so the current density is effectively multiplied by 12 for currents flowing from head to abdomen in flying-foxes. Thus, the 30 mA of the MKVII grid becomes effectively 360 mA, which is well above the lethal threshold for any animal.
11. Even the lowest level of current in the respondents’ grids—6 mA in the MKIV and MKV, which equates to an effective current density of 48 mA (6 x 12)—is effectively higher than the threshold for ventricular fibrillation in humans. Mr Thomas has observed deaths on 6 mA grids, demonstrating that a level of current considered safe for humans is lethal for flying-foxes.
12. This current flow behaviour assumes that the power source energizing the grid is a ‘current-source’ which is driven by a sufficiently large voltage to overcome the effects of the contact resistance between the animal and the wires. In Mr Thomas’ explanation of the “Edenvale MVII Deterrent System”, page 15, point 1, he makes the point that this is *exactly* how the device is designed, using 380V to ensure current delivery regardless of the nature of the contact. This document is attached as **Exhibit HJS-2** to this affidavit.
13. Thus *any* flying fox bridging the wire will receive the full 30 mA through whichever part of the anatomy constitutes the current path. If a wing makes contact, the effective current densities could have the equivalent effect of exposing a human to many amperes of current, causing serious permanent tissue damage and burns, as the wing membrane cross section is less than 0.001% of the cross-sectional area of a human. Such injuries would result in morbidity, if not outright death, and the animal would die of starvation as the wing membrane sloughed off and it became unable to fly.

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14. The duration of the current in each of the grids is well over the threshold for pathophysiological impacts. As I explained in my previous affidavit, at page 5, *one second* of current at a tissue current density of 0.5 mA/cm², as would be obtained in an adult flying-fox subjected to a 30mA current, is more than enough to cause burning, fibrillation, muscle contraction and other pathophysiological effects of electricity. This is exemplified for humans in the graph below, which comes from the Australian Standard AS/NZS 60479.1 “Effects of current on human beings and livestock - General aspects” (Figure 14). This graph shows that a current of 360 mA may cause ventricular fibrillation at 100-200 milliseconds, much less than the duration of the current in the MKVII.

Figure 1: Time/current zones of effects of a.c. currents 15 Hz to 100 Hz



15. The time during which Mr Thomas operate his grids (November-December) is when flying-foxes are pregnant and give birth. Foetal flying-foxes are likely to be sensitive to even smaller currents than adult flying-foxes. Attached as **Exhibit HJS-3** to this affidavit is a paper “Electric Shock in Pregnancy” by Daniel Fatovich published in the *Journal of Emergency Medicine* in 1993, which is a literature survey of the impacts of electric shock on human foetuses. Shocks which do not harm the mother may cause the death of the foetus, as occurred in three-quarters of cases. The paper concludes that “exposure of the fetus to a 100 to 380 V, 25 mA current for 0.3 seconds may be regarded as lethal. This is much less current than is required to produce significant injury to the mother, which is consistent with the case reports.” Thus, the magnitude and duration of the current of the MKVII is large enough to cause the death of a human foetus. Therefore, applying the principles of current density the MKVII is highly lethal for flying-fox foetuses.
16. As discussed above, the levels of death Mr Thomas says he has observed for each of the grids do not represent the total number of deaths caused by the grids, as flying-foxes are likely to have died elsewhere after being shocked (noting also that the young

of any females killed would also die). Thus, even if the figures of deaths recorded on the grids were accurate they do not represent total deaths.

- 17. In summary, there is a very high likelihood that each of the different versions of electric grids operated by Mr Thomas kill, injure and harm flying foxes. My view on his Mark VII grid has not changed from my previous affidavit or Mr Thomas' evidence of observing no deaths on the Mark VII despite large numbers of contacts being recorded. If Mr Thomas' observations are correct they indicate that the Mark VII grid does not cause immediate death. However, his observations say nothing about whether the Mark VII grid causes delayed death or injury or harm to the flying-foxes that collide with the grid. In my opinion there is a high probability that the MK VII is lethal or causes morbidity and eventual death from wing burn, muscle damage and visceral damage.
- 18. From personal observation. Flying foxes can be seriously electrocuted and still fly off, only to die later. Serious wing burns, may not, on the short term, prevent flight, and these serious burns can also be anaesthetic – that is the nerve fibres that underly pain reception have been destroyed, something I can vouch for from personal experience.

Lack of deterrent effect

- 19. Based on my knowledge of flying-fox behaviour and electric grid systems, as well as observations of grid systems, I do not think that any of the electric grid systems constructed by Mr Thomas are likely to be effective in deterring flying-foxes for fruit crop protection. The flying-foxes that were initially and instantly killed on contact with an electric grid could not warn other bats of the danger, so higher numbers of bats could be killed which would result in a decrease in bat population.
- 20. If flying-foxes were shocked but not harmed by the grid system it is highly unlikely that they would in future avoid the entire orchard. Rather, they would learn to avoid the grids in the orchard. During experimental work carried out in 2006 at the Cape Tribulation Tropical Research Station, of which I am Director, we have observed that old fixed grids appear to be seen by flying-foxes as an obstacle to be avoided. This would indicate that any flying-foxes contacting with the grid are likely to be newcomers to the orchard. Flying-foxes have a well developed spatial sense, which means they would be able to distinguish between grids and fruit trees.

Declaration

- 21. The factual matters stated in this affidavit are true, to the best of my knowledge. I have made all enquiries considered appropriate in review of this matter. The opinions stated in the affidavit are genuinely held by me, and I have referenced all matters I consider to be significant. I understand my duty to the Court and believe I have complied with this duty to the best of my ability. To the best of my knowledge there are no readily ascertainable additional facts that would assist me in reaching more reliable conclusions.

<p>..... Deponent</p>	<p>..... Justice of the Peace / Solicitor</p>
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Affirmed by Hugh John Spencer)
at this)
..... day of February 2007)
Before me:)

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Deponent

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Justice of the Peace / Solicitor