RADIATION SAFETY ASSESSMENT FOR BAE DISPOSABLE BRA PAD

NUKLEAR MALAYSIA

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RADIATION SAFETY ASSESSMENT: RADIATION DOSE FROM BAE DISPOSABLE BRA PAD

1.0 INTRODUCTION

The disposable energy bra pad also known as "lymphatic drainage bra pad" made from BAE's patented-technology process which contains blend of mineral extracted from earth and it has ability to enhance, activate and harmonize cells in the human body thereby promoting blood circulation, improve the stability of psychological quality and a healthier human energy magnetic field. This Safety Assessment report is prepared upon the request from BAE International Inc. Company to Health Physics Group in Malaysia Nuclear Agency to estimate doses arising from Normal Use (External Usage) of BAE Disposable Bra Pad.

2.0 OBJECTIVE

The objectives of this radiation safety assessment are:-

i. To estimate radiation dose received for the member of public in normal and worst condition;
ii. To compare between radiation safety assessments with the licensing criteria and;
iii. To ensure the use of BAE Disposable Bra Pad is below the regulatory limit for member of public.

3.0 SCOPE

The scope of this Radiation Safety Assessment is restricted to the BAE Disposable Bra Pad products that:

i. Contain blend of minerals extracted from earth.
ii. Limited to the sample products provided by BAE International Inc. for radiation screening which is disposable bra pad.
iii. The product may be destined for individual used do not exceed the limit of effective dose rate define by the regulatory body, AELB which is 10μSv per year.

4.0 PRODUCT DETAILS

The products details are described in the **Table 4.1**.

No.	Product Name	Appearance	Dimension [Diameter (cm)]
1.	Disposable Bra Pad	Flat pad with sticker outside, soft nude color on outside, white color with green patch on inside.	13

Table 4.1

5.0 RADIATION SAFETY ASSESSMENT

In normal use of Disposable Bra Pad, the product is place under the bra. The doses to member of public (end user) are limited due to external exposure of radiation. The annual effective dose, E (to the whole body) is derived as formula below:

Normal use (user) for disposable bra pad with r= 6.5cm

$$E = H_{skin} \times w_T \times \frac{Area\ exposed}{Total\ Area} \times t_{use}$$

where

H_{skin} is surface dose rate on disposable bra;
w_T is tissue weighting factor for breast (0.12);
t_{use} is total time usage per annual.

In estimating the potential doses, the following assumptions have been made:

i. Only one product is used per day.
ii. The product is placed under the bra for 24 hours first 30 days and the rest of the day for 12 hours per day in a year as mentioned in the brochure.

In total , the maximum dose received by the user for normal use in a year is 2.616 μSv.

***Refer to certificate of radiation screening by Malaysian Nuclear Agency in Appendix II.**

Calculation for Annual Effective Dose, Disposable Bra Pad (Normal Use):

For 24 hours (first 30 days);

$$E = H_{skin} \times w_T \times \frac{Area\ exposed}{Total\ Area} \times t_{use}$$

$$E = 0.33 \times (0.12) \times \frac{\pi r^2}{10^4 cm^2} \times (24 \times 30) hr$$

$$E = 0.378\ \mu Sv$$

For 12 hours (335 days);

$$E = H_{skin} \times w_T \times \frac{Area\ exposed}{Total\ Area} \times t_{use}$$

$$E = 0.33 \times (0.12) \times \frac{\pi r^2}{10^4 cm^2} \times (12 \times 335) hr$$

$$E = 2.238\ \mu Sv$$

If the user ignores the usage direction, the maximum dose received by the user in a year is 4.602 μSv.

Calculation for Annual Effective Dose, Disposable Bra Pad:

For 24 hours (365 days);

$$E = H_{skin} \times w_T \times \frac{Area\ exposed}{Total\ Area} \times t_{use}$$

$$E = 0.33 \times (0.12) \times \frac{\pi r^2}{10^4 cm^2} \times (24 \times 365) hr$$

$$E = 4.602\ \mu Sv$$

6.0 LABELING AND INFORMATION

The labeling and information of the products are attached in Appendix I.

7.0 COMPARISON BETWEEN RADIATION SAFETY ASSESSMENTS WITH THE LICENSING CRITERIA

The regulatory body, AELB has sets a basic criterion to be considered for an exemption to control of consumer product containing radioactive material. The effective dose to be incurred by any individual member of public from the practice or source within the practices is set to be less than 10 μSv per year.

Based on this study, the effective dose arises from the normal use is far less than the limit set by the regulatory body, AELB.

8.0 SUMMARY

This radiation safety assessment demonstrated that the annual effective dose received by the end user from the use of BAE Disposable Bra Pad are below the limit set by the regulatory body, AELB which is 10 μSv per year.

Prepared by,

(NUR KHAIRUNISA BINTI ZAHIDI)
Research Officer &
Radiation Protection Supervisor,
Health Physics Group,
Radiation Safety and Health Division,
Malaysian Nuclear Agency

Reviewed by,

(KHAIRUDDIN BIN MOHAMAD KONTOL)
Manager,
Health Physics Group,
Radiation Safety and Health Division,
Malaysian Nuclear Agency

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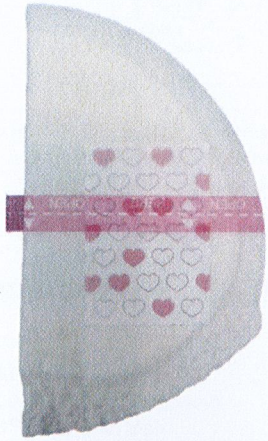
1. ATOMIC ENERGY LICENSING BOARD, Assessment and Licensing of Consumer Product Containing Radioactive Material. LEM/TEK/69 (2015).
2. INTERNATIONAL ATOMIC ENERGY AGENCY, Exemption from Regulatory Control of Goods Containing Small Amounts of Radioactive Material. TECDOC-1679, IAEA, Vienna (2012).
3. INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation Safety for Consumer Products. IAEA Safety Standards Series No. SSG-36, IAEA, Vienna (2016).
4. COMMISSION OF THE EUROPEAN COMMUNITIES, Radiation Protection 65, Principles and Methods for Establishing Concentrations and Quantities (Exemption values) Below which Reporting is not Required in the European Directive (1993).



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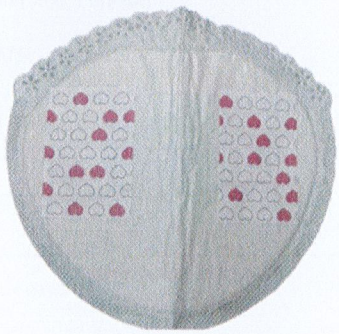

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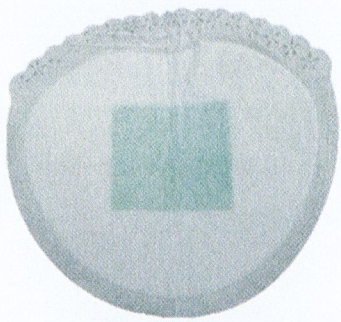

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