Appendix II: Sampling:

We collected samples from the 7 leading retailers including City' Super, Eugene, Mannings Baby, ParknShop, Watsons Baby, Wellcome, and Yata for two major reasons.

1) Demand: In the market review, we found that 85% of respondents bought their baby personal care products from major retailers.
2) Supply: Major chain retailers are more likely to sell authentic products since their reputation relies on consumer trust.

Criteria: In order for products to be on the 'White List', they must pass all of the following criteria:

1) Biological: Products must pass (i) Estrogenic Endocrine Disrupting Chemical (EDC) tests which analyse the way chemicals interact and affect the human body (As mentioned before, endocrine disruptors are chemicals that negatively affect hormones in the human body and cause fatal health problems)and (ii) Acute Toxicity Test which measures the toxicity of the product.
    a. In order to pass EDC Tests, products cannot exceed the amount of Estrogen Equivalent Concentration (EEQ) that is allowed. According to "Evaluations of the joint FAO/WHO expert committee on food additives (JECFA)" (2000, latest evaluation in 1999) on Estradiol-17beta, published by Food and Agriculture Organization of the United Nations (FAO) and World Health Organization (WHO), the acceptable daily intake (ADI) of Estradiol-17beta is 0-50 ng/kg bw[i].
    b. Acute Toxicity Tests are regulated and followed according to ISO15088 and OECD TG236 standard.

2) Chemical: Products must pass all chemical tests required for product safety. Heavy metals, methanol, and free formaldehyde levels must not pass regulations from the Safety and Technical Standards for Cosmetics, 2015 edition, China Food and Drug Administration (i) Heavy Metal Contamination - Part 1 General, Table 2 (3.4) Restricted Limit of Harmful Elements in Cosmetic Products. Baby skincare products cannot exceed the following:
    - Heavy metal
        a. Arsenic (As) ≤2mg/kg(ppm)
        b. Lead (Pb) ≤10mg/kg(ppm)
        c. Mercury (Hg) ≤1mg/kg(ppm)
        d. Cadmium (Cd) ≤5mg/kg(ppm)
    - Methanol ≤2000mg/kg(ppm)
    - Free formaldehyde ≤2000mg/kg(ppm)

3) Ingredient Checking: Products must not contain any chemicals that are associated with health complications, eco-toxicity, or contamination by scientific safety evaluations, or are banned by the following governmental agencies and authoritative bodies.

- US: USFDA's 'Summary of colour additives for use in the United States in foods, drugs, cosmetics, and medical devices' and 'Prohibited & Restricted Ingredients'
- EU: European Commission No. 1223/2009
- China: China FDA's 'Safety and Technical Standard for Cosmetics' (2015)
- Japan: Japan's 'Standards for Cosmetics' (2000)

These criteria are measured by:

1) EDC activity is evaluated by quantification of Estrogen Equivalent (EEQ) concentration in the product. This test is provided by Vitargent using their patented transgenic medaka eleutheroembryos assay. Sample extracts are obtained upon pre-treatment protocol and then exposed to estrogenic EDC-sensitive medaka eleutheroembryos for 24 hours. When estrogenic EDCs are detected, livers of the fish eleutheroembryos give off a green florescence light. The intensity of the light will be quantified and compared to the 17beta-estradiol dose response curve to calculate EEQ.

2) Acute Toxicity Tests uses zebrafish embryo technologies. According to the National Institutes of Health, 84% of genes known to be associated with human disease have a zebrafish counterpart. They have proven to have the capacity to screen over 1,000 toxicants and is widely used in biomedical safety and efficacy evaluation. In this test, when toxins are detected, abnormal symptoms are seen. After pre-treatment, products are tested on zebrafish embryos to identify the level of concentration necessary to cause a fifty percent fatality in the tested embryo (LC50). Definition fatality in the tests are regulated and followed according to ISO15088 and OECD TG236 standard.

3) Chemical testing used several different testing methods. To test for heavy metals, the microwave digestion method (which increases both the speed of thermal decomposition and solubility of heavy metals in solution so that the heavy metals can be quantified) and Inductively Coupled Argon Plasma Mass Spectrometry (which detects metals and non-metal and quantifies them by ionising the sample and separating the ions) was used. Methanol analysis uses gas chromatography – flame ionisation detector (FC-FID) which measures the concentration of methanol in a gas stream. To test for free formaldehyde, an ultraviolet spectrophotometry (UV-VIS) which measures the attenuation of a beam of light after it passes through a sample due to absorption of a specific molecule, in this case – free formaldehyde was used.

4) Ingredient check uses the international guidelines and cross reference ingredients in the baby personal care products to make sure that they do not contain any banned ingredients.

Partners and Collaborators: Below are the official partner laboratories that are helping

WGO conduct the biological, chemical, and ingredient checking tests.

WGO (project lead): The World Green Organisation (WGO) is an independent non-governmental organisation concerned with environmental conservation and environmentally related livelihood and economic affairs by proposing an integrated, three-pronged solution that combines social, environmental, and economic aspects, leading to an environmental revolution. Through science-based policy research and community projects, the WGO aims to enhance the quality of the environment, promote a greener economy, and improve people's livelihoods. In particular, it focuses on the social concerns of underprivileged groups and on the creation of a green economy, to help realise its vision of sustainable development.

VITARGENT (biological testing provider): Vitargent (International) Biotechnology Limited, established in October 2010, is an innovative bio-testing service provider with international award-winning transgenic medaka eleutheroembryo based Estrogen Equivalent Test as an alternative to animal testing. Vitargent's vision is to combine scientific expertise with social responsibility to improve consumer product safety and protect environment – "Smarter Testing, Safer Choices, Better World!" The company has served various internationally renowned cosmetics groups, food conglomerates, testing labs, universities and government bodies worldwide.

ALS HONG KONG (chemical testing provider)**:** Australian Laboratory Services (ALS) is the world's largest and most diversified analytical testing service provider. ALS delivers projects and services through four main operating divisions: Minerals (Geochemistry, Metallurgy, Mine Site and inspection), Life Sciences (Environmental, Food and Pharmaceutical, Animal Health and Electronics), Energy (Coal, Oil and Gas) and Industrial (Asset Care and Tribology). ALS is the global benchmark for quality and integrity, and we have built our reputation on quality, client service, innovation, and technical excellence. ALS Hong Kong's commitment to systemisation and standardisation allows our people to focus on what is important.

TÜ V Rheinland (chemical testing provider): The TÜ V Rheinland is a leading provider of technical services worldwide. Since our foundation in 1872, we have been providing safe and sustainable solutions for the challenges arising from the interaction between man, the environment and technology. As an independent, neutral and professional organisation, we are committed to working towards a future that can fulfil the needs of both mankind and the environment in the long-term.

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[i] http://apps.who.int/food-additives-contaminants-jecfa-database/chemical.aspx?chemID=1835