



ENVIRONMENTAL TECHNOLOGY VERIFICATION (ETV)

VERIFICATION STATEMENT

TECHNOLOGY TYPE: **Remediation Technology**

APPLICATION: **Oil Spill Clean Up**

TECHNOLOGY NAME: **Ecowaste**

COMPANY: **Stanton Pharmacal, Incorporated**

Disclaimer

This report/statement is the result of an impartial, consensus-based approach to evaluating innovative environmental technology in accordance with the ETV Technical Protocol. The data presented are believed accurate and the analyses credible. The statements made and conclusions drawn regarding the product evaluated do not, however, amount to an endorsement or approval of the product in general or for any particular application.

This Statement is based from the activities supported by the IPCT ETV Group, the Expert Panelists, and Stanton Pharmacal, Incorporated.

Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the Authors and do not necessarily reflect the views of the Department of Science and Technology



This ETV Statement summarizes the results of the observations and tests conducted on *Ecowaste* (ETV-06-016).

ETV TEST DESCRIPTION

During the initial Technical Panel meeting discussions, the panelists and the technology proponent agreed on an ETV Test Plan to validate the claims of *Ecowaste* on it being organic in nature being of plant extract and has no chemical additives; it is biodegradable and non-toxic; and it is effective for oil spill removal and has not toxic degradation by-products.

The evaluation and verification coverage for *Ecowaste* encompassed the following:

1. Observation of actual production of *Ecowaste*
2. Non-toxic and effectiveness for use as oil spill dispersant
3. Anti-microbial activity

VERIFIED TECHNOLOGY DESCRIPTION

Its material safety data sheet (MSDS) describes *Ecowaste* as a dark golden brown liquid that is 100% soluble in water and with specific gravity at 15.6 degrees Centigrade (°C) and boiling point of 1.1395 and 103°C, respectively. The product is a plant extract concentrate that must be diluted with water in recommended concentrations for specific applications. The MSDS further states that its concentrate analysis is *highly basic* with a pH = 13 and contains with traces of alkanoids, saponins, and glycosides.

VERIFICATION OF PERFORMANCE

This section presents the evaluation and discussion of the results of the verification procedures.

1.0 Observation of actual production

Members of the ETV Expert Technical Panel observed the production of *Ecowaste* at its processing plant in Pasay City. The process in producing *Ecowaste* consists of the following:

- Manual chipping/chopping of banana trunks
- Pulping of banana trunks for two (2) hours
- Collecting of liquid portion containing the product

Pulping is done in a 200-liter steel drum with a stainless steel strainer at the bottom. Liquefied petroleum gas (LPG) is used to heat the steel drum. The

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contents are stirred from time to time to assist in the breaking down of the pulp. To accelerate the extraction of the product, potassium and sodium alkali solutions with banana extract concentrate as catalyst is added to the process.

The fibers left after the extraction process may be utilized as cotton substitute.

2.0 Non-toxic and effectiveness for use as oil spill dispersant

The Marine Environmental Protection Command (MEPC) of the Philippine Coast Guard (PCG) issued a letter to ITDI signifying the results of their evaluation of *Ecowaste*. In a letter dated 15th June 2007 to ITDI, Commodore Arturo P. Olavario, Commander of MEPC, stated that they found *Ecowaste* was found non-toxic and effective for use as oil spill dispersant. As a result of this evaluation, PCG issued Accreditation Certificate No. PCG-06-08-111 dated 6th November 2006. The Accreditation Certificate was issued pursuant to Republic Act 5173, Presidential Decree (PD) 600 as amended by PD 979 and marine pollution (MARPOL) related regulations

It should be noted that Presidential Decree 979 mandates PCG to take the lead role in marine environmental protection. As such, PCG has promulgated rules and regulations pertaining to the performance of its functions particularly with regard to the prevention, control and mitigation of oil pollution within the territorial waters of the country.

3.0 Anti-microbial Activity

Tests for anti-microbial activity of *Ecowaste* involved anti-microbial assay, percent kill test and minimum inhibitory concentration (MIC). The Microbiological Research and Services Laboratory (MRSL) of the Natural Sciences Research Institute of the University of the Philippines conducted the tests for *Ecowaste*.

3.1 Anti-microbial Assay

The anti-microbial assay of a substance, expressed numerically as anti-microbial index (AI), provides for the effectiveness of such substance in inhibiting the growth of test microorganisms. The higher the value of the AI, the more effective the anti-microbial property of that substance.

The anti-microbial assay of undiluted *Ecowaste* was tested on six (6) microorganisms and the results of its AI are shown below:

Test Organism	Anti-microbial Index
<i>Escherichia coli</i> UPCC 1195	3.4
<i>Pseudomonas aeruginosa</i> UPCC 1244	3.3
<i>Staphylococcus aureus</i> UPCC 1143	3.7
<i>Salmonella typhimurium</i> UPCC 1368	3.4
<i>Candida albicans</i> UPCC 2168	2.0
<i>Trichophyton mentagrophytes</i> UPCC 4193	2.0

3.2 Percent Kill Testing

The percent kill testing involved the use of a 1% *Ecowaste* sample with *Escherichia coli* UPCC 1195 as test organism. Aerobic plate counts (APC) for the tests were performed based on the guidelines described in Bacteriological Analytical Method (Food and Drug Administration, 7th edition). APC indicates the level of microorganism in a product.

Percent kill is calculated using the following formula:

$$\% \text{ kill} = \frac{\text{No. of colony-forming units in the control (initial count)} - \text{No. of colony-forming units in the test solution (final count)}}{\text{No. of colony-forming units in the control (initial count)}} \times 100\%$$

Results of the test showed 99.998% reduction in the test organism after five (5) minutes contact time with 1% *Ecowaste*.

3.3 Minimum Inhibitory Concentration (MIC) Test

MIC is the lowest concentration of an anti-microbial that will inhibit the visible growth of a microorganism after overnight incubation. MICs are important in diagnostic laboratories to confirm resistance of microorganisms to an anti-microbial agent and also to monitor the activity of new anti-microbial agents

MIC test for *Ecowaste* was conducted against a commercial brand anti-microbial agent (*Lysol*®). The MIC test was conducted using *Escherichia coli* UPCC 1195 and *Staphylococcus aureus* UPCC 1143.

Results of the first test showed the following results:

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- MIC of *Ecowaste* was at 1.0% against *E. coli* while that of *Lysol*® against the same organism was beyond 2.0%, the highest concentration tested
- For *S. aureus*, MIC for *Ecowaste* was beyond 2.0% (the highest concentration tested) while that of *Lysol*® against *S. aureus* was 1.25%

REFERENCES

- Andrews, JM. Determination of minimum inhibitory concentrations. *Journal of Antimicrobial Chemotherapy* 48 (Suppl. 1): 5-16 (2001).
- Maturin, Larry and James T. Peeler. Chapter 3: Aerobic Plate Count. *Bacteriological Analytical Method* (online). Center for Food Safety and Applied Nutrition. U.S. Food and Drug Administration, 1998.