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18 November 20124

Independent Planning Commission

Commissioners,

Proposed Plasrefine Recycling Pty Ltd facility at Moss Vale

Please find enclosed my submission related to your Inquiry on the Plasrefine proposal at Moss Vale. I have read parts of DPHI's Assessment Report, the submission by the EPA Comment on Response to Submissions (31 March 2023), and the Moss Vale STP Upgrade REF Final Draft and its associated Fact Sheet (May 2023). I have focused on the issue of management of Microplastics generated in the facility, and apologise if some of my concerns have been addressed in documents I have not reviewed.

I have no commercial interests related to the Plasrefine facility.

Yours faithfully

1 Microplastics

1.1 Characterisation of microplastics from the Facility

The term microplastics will be used in this submission to include nano and well as microplastics. Terminology is still developing, and I will simplify by only using the term micro to include both.

The material of microplastics is made up of a range of substances, like PVC, HDPE, and PET in waste goods, that are fed into the Plasrefine facility and are initially shredded into smaller pieces to enable subsequent separation, washing and consolidation to be sent on to manufacturers of recycled plastic goods. In this shredding, microplastics will be formed as a waste good, ranging in size from 1 micro-m (0.001mm) to 5 mm, that because of their size, cannot be separated by the optical and other sorting devices.

There is no Material Flow Analysis (Brunner and Recharger, 2004) of the the material plastics through the Plasrefine Facility that shows the weight of input waste plastic goods, the weight of recovered plastic material for recycling; the weight of waste plastic material from the APCDs (air pollution control devices) (as recovered dust and emitted fines); and the on site wastewater treatment plant (in recovered sludge for disposal, and trade waste effluent to sewer). That is, there is no daily, weekly or annual account on the weight of plastics through the facility, and importantly, the weight and fate of the waste microplastics.

1.2 Health impacts of microplastics

Microplastics are a new and emerging human health and environmental contamination issue; in general like PFAS was 10 years ago. WHO undertook an expert review of published information up to December 2021 (WHO, 2022), and concluded that existing studies were not using consistent experimental and data collection methods. Further studies should be undertaken using a better designed experimental method to enable better data to be collected so that more confident human health and environmental risk assessments can to be made.

A more recent review by Li et al (2023) concluded that, "A health risk assessment model should be established with the help of machine learning to early warn the exposure of microplastics". The particular concerns were with "nano-plastics" (< 1 micrometer) that will be more mobile and hazardous to human and animal health, and especially with "the early exposure to infants and the early development of embryos". Reviews have shown microplastics in human blood can be transported and deposited in 15 organs, such as spleen, liver and colon. Further, that pregnant women and infants are sensitive to microplastics, and that early exposure may lead to adult chronic diseases.

1.3 Precautionary Principle

The NSW Protection of the Environment Administration Act (Minister for the Environment, 2024), requires the maintenance of ecologically sustainable development via implementation of the Precautionary Principle (and others), namely:

that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of the precautionary principle, public and private decisions should be guided by:

- *(i)* careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
- (ii) as assessment of the risk weighted consequences of various options.

The following sections in this submission will show that release of microplastics to the environmental compartments of the air inside the Plasrefine facility, the disposal site for APCD dust, the disposal (/use?) site for the sludge from the Moss Vale STP (that accepts trade waste effluent from the Facility), and effluent from the Moss Vale STP, all have lack of full scientific

certainty on the associated potential human and animal health impacts. This uncertainty arises from:

- (i) lack of quantification of the size distribution and amounts of microplastics from the Facility to the various environmental compartments. So, human health and environmental risk assessment cannot be started.
- (ii) poor or non-existent quantitative dose/response relationship between micro plastic size characterisation and amount, and human and animal health. But with sufficient concern that adverse impacts could occur, and more detailed studies should be undertaken to control and avoid adverse impacts.

2 Collection, Treatment and Disposal of Microplastics from the Plasrefine Facility

2.1 Air born microplastics

Shredding of input plastic waste will release microplastics to the air around the shredder. There is no conceptual diagram of how this contaminated air will be contained and treated inside the Facility so that workers are not exposed via inhalation or skin contact. DPHI (2024) notes "*a series of air collection hoods located above relevant process emission points*" with associated APCDs to reduce emissions through roof vents. This needs to be improved so that shredding and conveying equipment is enclosed and operating under negative pressure, so that microplastics are not emitted to the air affecting operators. The concentration and amount of microplastics in the roof vents should be specified, with reference to equipment that has been certified/independently demonstrated to reach these levels. A detailed design is not required at this stage; but a conceptual diagram, with key operating specifications (eg negative pressure amount) given.

Modelling has shown (DPHI, 2024, p 45) that PM 2.5 and PM10 had been exceeded at the ABR facility - Microplastics go down to 0.001mm; much smaller than 2.5mm and 10mm in the modelling. There is no characterisation of the size distribution of microplastics from the shredders, so the impact of these potentially very small micro plastic particles is uncertain, but could be worse than the larger 2.5mm and 10mm size particles.

DPHI (2024, p 46) recommends monitoring and the preparation of an Operational Air Quality Management Plan (OAQMP) **after** the facility is built and operating, and that unspecified *"additional contingency measures would be implemented in a timely manner."* What are these contingency measures? What timeframe will they be required to be implemented? This monitoring and response approach is inadequate.

There is no information on what is the fate of the dust, containing some microplastics, from the APCDs (air pollution control devices) such as the ash collecting hopper (DPHI, 2024, p47). The microplastics are in a dispersible form and should not be disposed in an uncontrolled manner into a landfill. The dust/microplastics need to be contained in a concrete before disposal; or appropriately incinerated to destroy the structure of the micro plastic, and convert the plastics to CO2, H2O, HCI, stabilising metals (eg Pb, Cd in older PVC) prior to APCD treatment.

The uncertainties and lack of detail here needs to be rectified by the proponent doing conceptual design work with indicative conceptual process flow charts and diagrams; derived from:

- (i) exisiting plastics recycling facilities such as the PET recycling plant referred to by NSW EPA (2023). With microplastics, the type of plastic is not critically related to the partitioning of different sizes of microplastics in the Plasrefine facility. This facility, or any other 2 or 3 facilities in Australia or overseas can be used to prepare a conceptual design now before the Commission makes a decision/recommendation.
- (ii) If existing plants will not give access, or do not have material balance and performance information on microplastics (probable given the emerging nature of this issue), then a pilot plant should be constructed and operated in an independent organisation (CSIRO or a University) so that a verifiable plant design can be made.

2.2 Water born microplastics

2.2.1 Plasrefine facility

DPHI/the Applicant state that 90% of microplastics in process wash waters would be captured in the DAF unit's sludge and sent to landfill (DPHI, 2024, p46). There is no reference to a publication, equipment performance specification, or existing facility that substantiates this. The NSW EPA (2023, p8) show an existing facility for recycling PET performs poorly with microplastics sent to a STP, which are then difficult to remove from its effluent. Appropriate design of the Plasrefine facility to remove microplastics from its trade waste discharge to sewer was recommended.

Plasefine need to demonstrate that 90% (preferably higher) of the microplastics in the wash water can be removed in a DAF unit, with citation of an existing facility's performance, and/or proven performance data from a DAF equipment supplier. If this is not available for microplastics, which is possible because of it being an emerging issue, then a pilot plant with a synthetic wastewater needs to be set up at an independent organisation, such as CSIRO or a University.

If 90%+ of microplastics are indeed diverted to the Plasrefine WTP sludge, DPHI (2024, p46) state *"This filter cake would be taken to landfill as general solid waste and would not enter the environment"* If the filter cake dries on exposed landfill surface, then the microplastics are prone to being dispersed by wind to the surrounding environment. The filter cake should be buried at the landfill in a similar way to asbestos waste, or preferably bound in a concrete, before disposing to landfill. The landfill should then be labelled and mapped that it contains this waste, so that if there is future redevelopment of the landfill, eg excavation to put a road through it, then appropriate action can be taken to avoid dispersion of the microplastics to the environment.

If 10% of the microplastics in the wash water does report to the trade waste, and the concentration in the trade waste is 10mg/L, and the amount of trade waste is 10KL/d (DPHI, 2024, p 46) (I cannot find any reference to calculations to substantiate this), then the amount of microplastics in the trade waste to the Moss Vale STP would be up to 0.4 Kg/d, or 146 Kg/year. DPHI (2024, p 46) state *"This level is well below Council's trade waste requirement for maximum total particulates of 300 mg/l."* Microplastics are not inert particulates, and because of their human health concerns, need to be specified separately, to a level related to the STP's ability to partition them to a sludge which can then be managed to avoid dispersion to the environment.

2.2.2 Moss Vale STP

DPHI (2024, p 47) state "Council advised its upgraded STP (due in 2026) would be able to capture an additional 90 % of the microplastics disposed of via trade waste". There is no substantiation of this; the upgraded STP will certainly give excellent removal of P and N nutrients and bio-organics, but as seen in another existing STP (NSW EPA, 2023, p8), final clarifiers have difficulty removing microplastics. Again, reference to operational data from an existing STP, or if this is not available, then pilot plant trials using synthetic micro plastic contaminated wastewater should be undertaken. We need to demonstrate microplastics will not be released to the Wingecarribee River via Whites Creek, which is part of the Sydney Drinking Water Catchment. (https:// www.wsc.nsw.gov.au/Council/Projects-and-Capital-Works/moss-vale-sewage-treatment-plantupgrade#:~:text=Provide%20treatment%20infrastructure%20to%20meet,the%20Sydney%20Dri nking%20Water%20Catchment)

DPHI (2024, p 47) state "the level of microplastics in residual water are predicted to be very low (less than 4 mg/l)." There is no reference as to how this concentration was determined, and there is no human health risk assessment provided to demonstrate this is very low and at an acceptable level. Refer notes above related to needing to cite existing facilities or undertake independent pilot trials.

If the microplastics in the Plasrefine trade waste do predominantly report to the sludge/biosolids from the Moss Vale STP, then a concern is how should this sludge be disposed? NSW Public Works (May 2023, p 126) state in the Moss Vale STP upgrade Review of Environmental Factors, that:

• Any waste or contaminated products (sewage, bio-solids, contaminated soil, etc.) are appropriately managed either within the STP site or by transport to a suitable approved landfill disposal site.

Operation

• Biosolids would be managed in accordance with a Biosolids Management Plan to be prepared for the augmented STP.

• Biosolids management would be consistent with the EPA's Environmental Guidelines for the Use and Disposal of Biosolids Products (EPA, 2000).

• Land application of biosolids (if proposed) would be controlled to prevent any off-site migration.

The microplastics would be in the biosolids. These micro plastic contaminated biosolids should not be applied to land, and landfilling should be undertaken to avoid micro plastic contaminated dust from being blown to the surrounding environment. Refer to the controls suggested for disposal of micro-plastic contaminated sludge from the Plasrefine WTP above.

3 Conclusions and Recommendations

MIcroplastics are of human health and ecosystem concern, with the issues generally identified but needing further research to quantify outcomes associated with different levels of micro plastic dose at various size characteristics. The Precautionary Principle should be applied in approving the Plasrefine proposal.

Plasrefine need to ensure microplastics generated in the facility in air and wash water are contained in dust and sludge from treatment plants on site. They should not be diluted to the atmosphere, are sent in trade waste to the Moss Vale STP.

Plasefine should demonstrate acceptable performance of on-site treatment processes by reference to other existing plastics recycling plants where data can be independently obtained. If this is not possible, largely because of the emerging nature of microplastics concerns, then pilot scale trials should be undertaken by independent organisations (CSIRO, Universities) to enable technology to be chosen and designed.

A human health risk assessment should then be undertaken on the residual amounts of microplastics that are emitted via vents at the Facility, sludge from the Facility and the Moss Vale STP, and effluent from the Moss Vale STP.

These recommendations should be undertaken before approval for the Plasrefine facility is given. It is not acceptable DPHI (2024, p47) *"To ensure the onsite WTP is optimised to effectively reduce microplastics, the Department recommends requiring the Applicant to consult the EPA during its detailed design and regularly consider new wastewater treatment technologies and update the WTP accordingly."* These processes and outcomes are too vague, difficult to enforce and do not reference human health risk assessment.

References

Brunner, P H, Recharger, H; 2004, Practical Handbook of Material Flow Analysis, Lewis Publishers, ISBN 1-5667-0604-1

DPHI, Moss Vale Plastics Recycling Facility, State Significant Development Assessment Report (SSD-9409987), October 2024

Li, Y; Tao, L; Wang, Q; Wang, F; Li, G; Song, M; Potential Health Impact of Microplastics: A Review of Environmental Distribution, Human Exposure, and Toxic Effects. Environment and Health; August 10 2023, 1, 4, 249-257.

Minister for the Environment, Protection of the Environment Administration Act 1991 No 60, 1 July 2024.

NSW EPA, letter to Dept of Planning and Environment, Moss Vale Plastics Recycling Facility (SSI 940997) EPA comment on Reponse to Submissions, 31 March 2023.

NSW Public Works, Dept of Regional NSW, Moss Vale STP Upgrade, Review of Environmental Factors, for Wingecarribee Shire Council, May 2023.

WHO; Dietary and inhalation exposure to nano- and micro plastic particles and potential implications for human health. 2022. ISBN 978-92-4-005460-8.