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REVIEW OF THE REPORT:
"Health Risk Screening Assessment of the Upgraded Pinjarra Refinery",
prepared by ENVIRON for Alcoa in July 2008.

SCOPE

To provide independent peer-review of the report "Health Risk Screening Assessment of the Upgraded Pinjarra Refinery" (HRSA), prepared by ENVIRON for Alcoa in July 2008. The review is provided from a public health perspective.

LIMITATIONS

It is acknowledged that the HRSA forms only one element of a sequence of reported investigations and analyses, but it is reviewed without reference to this additional material. Thus non-inhalational exposure pathways are not considered, and the monitoring data and environmental models upon which the HRSA is based are accepted as accurate.

FINDINGS

The HRSA addresses three categories of possible health impact from inhalational exposure to emissions from the refinery and associated disposal area: Acute effects, non-carcinogenic chronic effects, and carcinogenic chronic effects. A total of 21 compounds covering the full range of substances known to have health effects with respiratory exposure were assessed (with the exception of dioxins and furans which were already known not to be present), making the assessment both relevant and comprehensive. The detail provided both on the rationale and on the results (as appendices) for each compound in the report is exemplary. The exposure modeling in the HRSA is rigorous in so far as discrete receptor locations representing high-risk population exposure areas were used to supplement dispersion models, and provide max-min data to which the health risk assessment can make reference.

(1) For the acute effects, a Hazard Index (HI) was calculated, based on summed hazard quotients as earlier applied at Pinjarra by Toxikos (2003). It is a strength of the HRSA that this approach has been used, both because it represents the state-of-the-art approach to screening health risk assessment, and because it allows a direct comparison between HIs calculated pre- and post-implementation of the Pinjarra Efficiency Upgrade (PEU) project. No post-upgrade HI exceeds 1, and the post-upgrade HIs are consistently lower than the baseline (pre-PEU) HIs by over 10%. NO_2 and PM_{10} provide the highest % contributions to the HI.

(2) For non-carcinogenic chronic effects, a HI was also calculated as above, and again represents a strength of the HRSA. No HI exceeds 1, and the post-upgrade HIs are consistently lower than the baseline HIs by over 20%. NO_2 provides the highest % contribution to the HI.

(3) For carcinogenic chronic effects, the incremental carcinogenic risk (ICR) was calculated as an estimate of the lifetime risk of an individual developing cancer as a result of exposure to the compounds in question. It is a strength of the study that the most conservative guideline for increase in risk available, that of the USEPA at 1/1,000,000, was used in assessing these ICRs.
The highest ICR calculated for the post-upgrade scenario is 1.58×10^{-6}, which is very close to satisfying the stringent USEPA guideline referred to above. All post-upgrade ICRs are below the baseline ICRs. Formaldehyde provides the highest % contribution to the ICR.

ASSESSMENT

Based on the HI for acute effects, the HI for non-carcinogenic chronic effects, and the ICR for carcinogenic chronic effects, it can be concluded that air quality following the Pinjarra Efficiency Upgrade does not pose a health risk by inhalational exposure.

All HIs calculated for the post-upgrade scenario are less than 1, and, consistent with the most conservative interpretation of HIs, leave no cause for concern. The highest ICR calculated is borderline for compliance with the toughest guidelines available (USEPA), and would easily comply (by several orders of magnitude) with less stringent guidelines that use a cut-offs up to 1/10,000 (section 5.1). In addition to the extreme conservatism inherent in the calculation, the concentration at ground level of formalin (which was the highest % contributor to the ICR) is likely to have been over-estimated by between 25 and 100% (section 3.4.2). The calculated ICR therefore also leaves no cause for concern.

The HRSA conclusion that the potential for emissions to cause health effects is “low” could therefore arguably have been made stronger: Based on the data presented this reviewer would have called the risk “negligible”. However, there is always uncertainty in health risk assessment, and the report covers these issues well. It is also good public health practice to err on the side of conservatism, so from this perspective the conclusion of a “low” risk and some uncertainty is supported by the present review. Although the PEU has already reduced the HIs and ICR below those calculated for the baseline scenario, ongoing monitoring to ensure that no change occurs would be a reasonable recommendation to draw from the

report. Given the very professional nature of the HRSA, the reassuring results presented, and in the presence of ongoing monitoring, local residents should have no cause for concern.

Thank you for the opportunity of carrying out this review.

Philip Weinstein

21 July 2008