Review of
"Human Health Risk Characterization, Corrales Environmental Health Air Quality Evaluation" Prepared by Gradient Corporation, March 25, 2004

Prepared by
Environmental Health Epidemiology Unit
Public Health Division
New Mexico Department of Health

June 2, 2004

1. Background:

Using funding from an EPA grant, NMED-Air Quality Bureau contracted with the Gradient Corporation to conduct a health risk evaluation of acute and chronic health effects. This scope of work was to prepare a "report characterizing the estimated health risks from air toxics in the Village of Corrales, New Mexico based on available air quality monitoring and modeling analyses… This should include toxicologic interpretation of exposure to detected compounds as well as calculated hazard quotients/indices and estimated cancer risks." The results of the Gradient Risk Assessment were released in a report on March 25, 2004 and indicated: "In conclusion, this risk assessment did not find evidence that any of the measured or modeled chemicals are associated with increased acute or chronic health risks."

Because of voiced public concern regarding the validity of the Gradient report, NMED requested this additional review of the report by NMDOH.

2. NMDOH Evaluation of the Acute Health Effects Risk Assessment

The method of analysis for the acute health risk assessment was to evaluate all detected values by comparison to acute screening levels. The monitoring data that were considered for this analysis consisted of 22 canister samples collected primarily in residential areas of Corrales and open-path Fourier Transform Infrared (FTIR) data collected from 4 locations near the Intel facility. The ratio of maximum detected values to acute screening levels at each sampling location was summed to consider the potential for additive effects.

Using monitoring data in this manner is appropriate for an acute assessment. In the case of FTIR data, one-hour maximums were used for the risk assessment. It is appropriate to compare one-hour maximums to one-hour screening levels, i.e., the same unit of time for the data and the risk criteria. The question is whether the one-hour concentrations measured are representative of the actual maximums that could occur in the area.

In the case of canister data, it cannot be determined if these values are representative of potential exposures for acute or chronic exposures. However, as these data are all that are available, it is appropriate to consider them in the risk evaluation as conducted. However, it cannot be determined whether or not this approach is conservative, since sufficient data are not available to determine whether these concentrations are representative of the maximum potential one-hour concentrations that could occur.

With regard to the use of existing data to represent acute exposure concentrations, reasonable assumptions were made by Gradient given the level of available data. However, the extent of conclusions that can be drawn from this level of data needs to be qualified, since these samples represent only a small amount of the potential exposure time. Also, it appears that there are significant fluctuations in emissions as well as meteorology. These factors again suggest uncertainty as to whether these results represent exposure concentrations that may occur.

As stated by Gradient, "Although USEPA has a comprehensive … database for chronic toxicity factors, a comparable database for acute toxicity factors is not available. The USEPA risk

assessment guidance supports the use of acute dose-response values from multiple sources…" The risk assessment presented a thorough summary of available acute screening values and applied a hierarchy based primarily on the source of the values, i.e., to preferentially use Acute Exposure Guideline Levels (AEGLs) and Emergency Response Planning Guidelines (ERPGs).

As there are considerable uncertainties in this assessment, an alternative to the approach used by Gradient would be to apply a more conservative approach (*i.e.*, making assumptions that are expected to err on the side of health protection in order to compensate for what is not known). This could be justified in this case due to the limited amount of information regarding the actual acute exposure concentrations and the lack of knowledge regarding comprehensive human toxicology of the detected compounds. The most conservative approach would be to use the lowest referenced health-based screening level. This is justifiable given the minimal level of data and ongoing exposures to fluctuating concentrations of multiple compounds.

A final consideration in the analysis of acute health risks would be to consider the acute health complaints. While not part of a formal risk assessment, it would be useful to take these complaints into account as part of a comprehensive assessment of Corrales air quality, given that many residents have complaints which they have attributed to air exposures.

In conclusion, regarding the acute assessment, the overall approach is reasonable given the level of data. However, given the uncertainties in the data and the screening values, and the numerous acute health effect complaints, the overall assessment cannot be conclusive in evaluating the possibility of acute health effects.

3. NMDOH Evaluation of the Chronic Health Effects Risk Assessment

The chronic health effects risk assessment consisted of evaluation of 27 chemicals that were selected by NMED for modeling based on NMED criteria for Intel chemicals which had either been detected, reported or were otherwise of interest. Eleven of these modeled chemicals were evaluated for chronic health risks associated with direct inhalation of the chemicals, utilizing Reference Concentrations (RfCs) from EPA or other sources. The remaining 16 were not assessed because they did not have established RfCs, but were compared to Texas Exposure Screening Levels (ESLs).

While Gradient based its assessment on the modeled data specific to Intel emissions that was provided to it, this approach does not provide a comprehensive evaluation of the potential for risk due to air pollutants in the Corrales airshed. This assessment cannot conclusively evaluate the potential for chronic health risks for the following reasons:

- The report only evaluated the potential chronic health effects on 11 of the 82 chemicals detected in air samples. Additional screening was conducted on modeled concentrations of another 16 chemicals. In order to adequately evaluate potential chemicals of concern, there should be a toxicity-based screening of all detected chemicals, since the potential health risk is based on both the exposure concentration and the chemical-specific toxicity. If neither exposure concentrations nor toxicity values are available for all of the detected chemicals, it

is not possible to make definitive statements regarding the presence or absence of potential chronic health risks.

- The chronic analysis used only modeled Intel emission data to estimate exposure concentrations, as opposed to data obtained from actual measurements or modeling based on actual measurements. While the modeled data are significantly less than the average values from the 10-18 day FTIR average data, this may reflect either error in the modeling or that certain air contaminants are primarily coming from non-Intel sources. This determination of the source of any contaminant detected is beyond the scope of this analysis. However, use of the modeled concentrations to estimate exposure would require additional evaluation.

- The analysis only considered the exposure pathway of direct inhalation of chemicals. While many of the chemicals are volatile, and thus have a primary exposure from inhalation, it was not assessed whether other pathways associated with deposition from the air onto the ground or plant surfaces represent a significant exposure potential. (These pathways could include other exposure routes such as incidental ingestion of soil by children, deposition onto leaves or uptake by garden produce or ingestion of soil and pasture grass by livestock.) It would be helpful to have an assessment of the other potential routes of exposure.

- The risk assessment did not assess the health complaints reported by area residents. Although the task of conducting this assessment comprehensively would involve additional health surveys beyond the scope of the risk assessment conducted by Gradient, some consideration of assessing the possible correlation of the detected chemicals and the complaints seems appropriate.

- Comprehensive evaluation of the combined effects of the multiple chemical exposures would require additional investigation beyond that presented in the assessment, including consideration of the 55 detected chemicals not included in the chronic assessment. Although a thorough evaluation of chemical interaction is beyond the scope of this assessment, the Gradient report describes the possibility that this is a significant uncertainty, and could therefore affect the extent of conclusions.

4. Conclusion:

Due to these uncertainties, particularly related to assessing actual exposure concentrations and because the chronic risk assessment included only a subset of the detected chemicals, it is not possible to make definitive conclusions from the data analyzed with regard to the potential for chronic health effects due to all pollutants detected in the Corrales airshed.

It should be noted that chronic health risk assessments are often not conclusive, even with more complete data. Based on available data, it cannot be concluded that there are or are not health risks associated with air quality in Corrales/Rio Rancho.