Testimony of Fred Marsh at EIB Hearing, July 14, 2000

I want to thank the Hearing Officer and Board Members for allowing me to present technical testimony. As you will see, my testimony is very relevant. All of my evidence addresses air quality issues that justify the need for additional monitors, a specific point cited in the SouthWest Organizing Project Appeal Petition.

My Objective

First let me introduce myself. I have B.S. and M.S. degrees in chemistry. I recently retired from a 39-year career as a research chemist, the last 25 years at Los Alamos National Lab. I have more than 80 publications, a patent, and have received two major awards for my work.

So that's my background. But I'm here today as a Corrales resident. I've never before given technical testimony in any kind of hearing, so this is all very new to me. However, my technical background gives me a special appreciation for the hazards of what Intel is allowed to emit under the new permit. Although I'll get into the chemistry a bit, it will be nothing someone with high school chemistry couldn't easily handle.

Everyone taking part in this hearing has an agenda of some kind. So I'd like to begin my testimony by stating what my objective is and what it is not. Like many residents, my wife and I moved to Corrales to enjoy the rural lifestyle. We expected the air would be safe to breathe. However, the more I learn about Intel activities, the more concerned I've become about the huge quantities of highly toxic pollutants Intel releases.

My objective is to replace the current flawed permit with a permit that would require Intel to use the best available technology to protect public health and the environment. Although we've often been accused of wanting to shut down Intel, that charge is completely untrue. Unfortunately, it's just part of a continuing campaign to discredit us and our legitimate concerns.

What we're asking you to decide is whether the recently approved permit adequately protects public health and the environment. I believe the information I present today will convince you that it does not, and the New Mexico Environment Department (NMED) approval should therefore be overturned. What I say may surprise you and it may shock you, but it's all true. Everything I say is thoroughly documented in my five Exhibits."

Major Source Permit vs Minor Source Permit

After operating under a major source permit for many years, Intel asked to be designated as a minor source polluter. The major source permit, under which Intel had previously operated, would require them to have an Operating Permit, which in turn could require Intel to meet standards as rigorous as those in the presumptive Maximum Available Control Technology standards for the semiconductor industry. Adherence to this standard would minimize the amounts of toxic materials Intel releases to the environment. Although it's difficult to imagine anyone opposing such a worthy objective, Intel sought a minor source permit that exempts them from using the best available technology.

1998 Permit vs. 2000 Permit

Other speakers have already made much of the fact that the new minor source permit was 5 years in preparation. One would normally assume that such an extended incubation period would lead to desirable changes, and improvements in the final version that would result in greater protection for the public and the environment. However, quite the opposite happened.

In response to Intel's request, the NMED prepared a minor source permit, dated August 20, 1998. Although we oppose Intel being designated as a minor source polluter - for many valid reasons - the 1998 draft (my Exhibit A) was a reasonable document. Unlike the rewritten version approved on March of this year (my Exhibit B), the 1998 version has some teeth.

NMED Mission

Before I compare these two documents, it's worth reminding ourselves that NMED is a regulatory agency. Its defined purpose is to protect the public and the environment. In fact, the mission statement of the NMED Air Quality Bureau reads as follows:

"The Mission of the Air Quality Bureau is to prevent the decline of air quality in areas that are presently relatively pollution free, and to direct the cleanup of the air in areas that currently do not meet minimum standards."

Well, these are noble words. Who could disagree with those objectives? Yet when we compare the 1998 version of the permit with the rewritten version approved this year, we see that NMED betrayed their stated mission and regulatory function by repeatedly making major revisions that provided Intel with the toothless document that it wanted. Here are some examples:

Example 1

The 1998 version of the permit states: "Intel shall install, operate, and maintain on each solvent Volatile Organic Compound (VOC) exhaust stack a VOC Emissions Recording System, which is a continuous monitoring system to measure the concentration of VOCs and the air flow from each stack." Moreover, the 1998 permit, on this same page, specifies that these monitors are to be calibrated at least daily, using a two-point calibration using certified gases of known concentration. Such continuous monitoring was to be done at least 75% of the time for each monitor during any calendar quarter

In sharp contract to this, the revised permit requires that total hydrocarbons and VOCs from each stack be measured only 336 hours each quarter, which works out to just one day a week. The previous requirements for continuous measurement and recording have been completely eliminated, as has the requirement for daily calibration. As if this huge concession to Intel isn't enough, the rewritten permit provides Intel with a loophole whereby even these inadequate tests may be discontinued after two years.

At least the VOCs are measured for a few days each quarter. Astonishingly, the new permit requires the stacks that release hazardous air pollutants, called HAPs, which include the most hazardous compounds to be tested only once per year!

Similarly, NMED must have thought that the once-each-year testing of the acid gas scrubbers was excessive, because the new permit allows Intel, after two years, to change from annual testing all acid gas scrubbers to testing only 1/3 of those systems each year.

Example 2

The new permit states, "When a Recuperative Thermal Oxidizer (RTO) or Bead Activated Carbon (BAC) system is not in operation, Intel will route the affected solvent exhaust stream to the back-up, if the exhaust system is equipped with an operational back-up unit."

Note the words, "if the exhaust system is equipped with an operational back-up unit." The problem is that Intel has no back-up systems, so this is meaningless verbiage. We have repeatedly asked for back-up systems, which Intel has refused to install. Nothing in this permit forbids Intel from operating without pollution treatment systems, so they continue to operate whether the abatement systems are functioning or not. Because these systems are designed to remove 95% of the pollutants, untreated emissions can be 20 times higher.

The very least Intel could do is notify nearby residents during these periods of much-higher-than-normal emissions, which would give them the option of evacuating.

Evacuation

On the subject of evacuation, Bill Westmoreland, Intel's Environmental Manager for the Rio Rancho facility, has stated that unusual atmospheric conditions sometimes cause Intel stack emissions to rapidly settle to ground level, where they are drawn into the plant air intakes. When that happens, Westmoreland admitted Intel workers have been evacuated. If Intel is concerned enough about the health hazards of its emissions to evacuate its own employees, rather than let them breathe the toxic emissions, shouldn'tthey extend the same concern to the public?

Pollution Abatement System Malfunctions

The inadequacy of the existing monitoring program was demonstrated recently when Intel admitted that one of its pollution control systems was shut down for a period of 3.5 months, during which they claim to have been unaware of the malfunction. This incident, reported in the June 1, 2000 Albuquerque Journal, reveals that one of the world's wealthiest corporations, whose business is on the leading edge of high technology, required 3.5 months to detect a serious malfunction. And when Intel finally released the information more than 5 months late (instead of the 10-day notification period required by the permit), they took credit for being open and forthright with the public.

If Intel's exhaust stacks had been continuously monitored as we have requested and as required by the 1998 permit [version] Intel would have known immediately that there was a problem. But instead, for 3.5 months Intel continued to dump untreated pollutants into the air that we, their neighbors, must breathe.

Other industries are required to shut down their operations when a pollution control system fails.

Unfortunately, Intel is under no such restriction. We recognize the economic penalty for shutting down Intel production is very high, so instead of pushing for shutdown we have asked for back-up abatement systems that could be used when the primary systems fail or are out of service for other reasons. But this very reasonable request, like many others, has been rejected by Intel.

Example 3

The 1998 permit requires Intel to duct any FAB exhaust stream that contains arsenic to a High Efficiency Particle filter. Again, I ask how anyone could object to filtering out arsenic before discharge to the environment. However, Intel must have objected because that provision was also deleted from the revised permit.

I could give you other examples of how the 1998 version of the permit was rewritten to suit Intel, but the examples I've cited clearly demonstrate that NMED side-stepped its duty as a regulatory agency to protect the public and the environment. In fact, the revised permit looks suspiciously like something Intel officials might have rewritten themselves, rather than the work of an agency whose duty is to regulate Intel operations.

328 Tons vs. 96.5 Tons

Intel's request for a minor source permit was based largely on their claims of lower emissions. To support this, Intel officials have repeatedly cited 328 tons of VOCs allowed by the previous permit versus 96.5 tons allowed by the minor source permit. However, 328 tons and 96.5 tons represent measurements at two different points in the exhaust system. This is intended to confuse people and it has succeeded all too well. Few people can see through Intel's smoke and mirrors.

Perhaps you'll find my analogy easier to understand. Consider the exhaust system of your car. The muffler on your car is a noise abatement device. If we want to compare the noise level of two cars, we would measure both with mufflers off, or both with mufflers on. To measure the noise level of one car with a muffler and compare it to the noise level of another car without a muffler would obviously be inappropriate and very misleading. Yet, that's exactly what Intel has been doing by presenting these two figures as they are comparable.

Shifting from my muffler analogy to Intel emissions, we find that Intel's after-abatement releases have been - using Intel's own figures - about 52 tons. Thus, instead of the threefold reduction claimed by Intel spokesmen, the minor source permit allows Intel to nearly double their releases from 52 tons to 96.5 tons. And if what comes out of the pollution abatement systems doubles, what Intel puts into the abatement system also doubles. So whether you compare before-treatment numbers, or after-treatment numbers, the new permit allows Intel to nearly double their previous level of toxic emissions.

This is just one more example of deliberate misrepresentation by Intel. We labeled their comparison of 328 tons to 96.5 tons as a hoax, and have already been shown to be correct. The ink was hardly dry on the new permit when Intel announced a $2 billion expansion that will increase toxic emissions by 30%. (Note: In May of 2001, the expected release of toxic emissions was revised upward to between 33% and 55%, based on the published figures of Intel executive Gary Hensley.)

Toxic Metals

Another important flaw in the minor source permit is designating toxic metals only by the generic term "compounds," rather than as identifiable chemicals. To illustrate my point, water and hydrogen cyanide (HCN) are both hydrogen compounds. One is essential for life and the other is used for gas chamber executions. Yet, following the format of this permit, both could be called hydrogen compounds.

In Table 2 of the 1998 permit, chromium trioxide is listed as one of the HAPs to be released. This table also lists an emission factor of 1.0, which means that all of this hexavalent chromium used is expected to be released into the environment. However, Table 2 in the revised permit no longer identifies chromium as chromium compounds, but only as chromium compounds.

NIOSH toxicity data reveal that hexavalent chromium trioxide is 500 times more toxic than the usual trivalent chromium. Yet the new permit allows Intel to emit 400 pounds of chromium annually.

As you can see, the specific compound can have an enormous effect on the relative toxicity. Yet, the new permit lists only "compounds" for antimony, arsenic, chromium, cobalt, lead, manganese, mercury, selenium, and nickel. Why is Intel allowed to hide behind such vague terms that do nothing to inform or protect the public interest?

Some of you may have seen the movie, "Erin Brockovich," which tells the true story of how more than 600 people suffered devastating illnesses after hexavalent chromium trioxide released by Pacific Gas & Electric poisoned their local water supply. And I remind you again that the new permit allows Intel to release 400 pounds of chromium. The 600 plaintiffs who sued PG&E received $333 million, the largest settlement ever paid in a direct-action lawsuit. This movie emphasized the David vs. Goliath aspect, in which a small law firm takes on the giant PG&E. However, the political power and wealth of Intel dwarfs that of PG&E. In fact, the market value of Intel is nearly 50 times larger than that of PG&E.

Spikes vs. Rolling Average

The rate at which toxic pollutants are released also has a major role in their risk to public health. I'll demonstrate with an example involving hydrogen cyanide (HCN), which is used in gas chamber executions. According to the Chemical Warfare

Convention, 300 mg. of HCN per cubic meter is immediately lethal. However, the NIOSH toxicity data allow workers to be exposed to a 60-fold lower concentration of HCN for a 10-hour workday.

This means that although an exposure to a 300-mg. level for 10 minutes would kill you, an exposure to a 60-fold lower concentration for 60 times as long would have no adverse effects. The total exposures to cyanide are the same in these two cases; however, a short exposure to high concentration is lethal, whereas a 60-times longer exposure to a 60-fold-lower concentration is not.

This illustrates why high-concentration spikes are especially hazardous. Yet, Intel is not required by the revised permit to report such high-concentration spike releases. In fact, if you wanted to hide such high-concentration releases, the most effectively means would be to use a long-term average, such as 12-month rolling average allowed by the revised permit.

About six years ago, as a concession to Corrales Residents for Clean Air & Water, under the "good neighbor agreement," Intel agreed to meet hourly and daily emission limits. Although the EPA advises us that this contract is still legally binding, Intel now ignores that agreement and averages its emissions over a 12-month period. Rolling-average emission limits is one more major assault on public safety that Intel requested and was granted by the NMED.

Even better than hourly reporting, of course, would be continuous monitoring, which was required by the 1998 version of the minor source permit before that provision was removed at Intel's insistence.

Hazardous Air Pollutants

Now, I want to focus the remainder of my testimony on hazardous air pollutants, called HAPs. Under the new minor source permit, Intel is allowed to release any of 82 different HAPs. The general restriction is that no more than 9 tons of one HAP, or 24 tons total HAPs maybe released per year.

Most of the toxic gases that Intel emits are colorless, and many have little or no odor. Even more insidious is the fact that most are heavier than air and settle near the ground in the air we must breathe. In the case of Intel toxic gas releases, what we can't see or smell CAN hurt us - and could even kill us.

Comparing Intel releases to service station emissions, as Intel officials have repeatedly done, is completely inappropriate and represents another cruel attempt to mislead the public. Gasoline is a fairly benign mixture. While I don't suggest that you go out of your way to breathe it, it is in no way comparable to the deadly gases released by Intel. I'll show you why.

Relative Toxicity of HAPs

Although most of the organic HAP compounds mean little to people, I want to provide some information about four HAPs listed in Table 2 of the new permit. The first is phosgene, which is easy to pronounce, unlike some of the other HAP compounds. Phosgene has been extensively used in chemical warfare because it so effectively kills people. Being much heavier than air, it collects near the ground in the breathing zone.

Phosgene is a choking agent that kills by suffocation, as its victims' lungs slowly fill with fluid, called pulmonary edema. These gruesome phosgene-caused deaths, known as dry-land drownings, accounted for 80% of the poison gas fatalities in WWI. Phosgene was also used more recently by Saddam Hussein in his war with Iran. Yet, as shown on page 31 of my Exhibit B, Intel is authorized by this permit to release 5.9 tons of phosgene per year."

The next HAP I'll discuss is phosphine. Although its name is similar to phosgene, the chemical composition is completely different. And, as shown on page 31 of Exhibit B, Intel is authorized by this new permit to release even more of phosphine, 7.9 tons per year.

Now we get into two tongue-twisters, hexachlorobutadiene and hexachlorocyclo-pentadiene. I'll say more about these later, but for the moment, I'll just tell you that Intel is authorized under the new minor source permit to release 3.9 tons, and 2.1 tons, respectively of these two HAP compounds, also shown on page 31 of Exhibit B.

If we add the amounts of these four compounds that Intel is allowed to release, the total is 19.8 tons, well below the 24-ton total they're allowed to release. However, we should be concerned not just about tonnage, but also the toxicity of what is being released.

Rather than quote absolute toxicity values, which wouldn't mean much to anyone, I chose to compare each to the toxicity value for hydrogen cyanide to obtain relative toxicity values. All toxicity values are from the National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards, NIOSH Publication No. 99-115.

The fact that hydrogen is used for gas chamber executions makes it a good standard for comparison. However, few people are aware that Intel releases many compounds that are far more deadly than cyanide.
As shown in my Table 1 of Exhibit E, of the four cited HAP compounds, phosgene and phosphine are each 13 times more toxic than hydrogen cyanide; hexachlorobutadiene is 22 times more toxic, and hexachlorocyclopentadiene is 52 times more toxic. And again, I remind you that the amount of these four HAPs Intel is allowed to release is 19.8 tons, which is well below the 24-ton total allowed by this permit.

However, when I factor in the relative toxicity of these four HAPS, also shown in Table 1 of Exhibit E, the 19.8 tons Intel is allowed to release is equivalent to 373 tons of hydrogen cyanide. So in terms of equivalent toxicity, or lethality, or killing power - or whatever term you care to use - Intel can legally release the equivalent of 373 tons of hydrogen cyanide, which would be more than 15 times above the 24-ton limit. Just one of the many flaws in the new permit is that releases are allowed on the basis of quantity, with no consideration being given to their toxicity.

Relative Lethality of HAPs
Although 373 tons of hydrogen cyanide is an impressively large number, I need to take one more step to put it into proper perspective.

The Internet is a wonderful source of information. You'll find in my Exhibit D that the few states that still have gas chambers typically use 3.3 ounces of hydrogen cyanide for each execution. That quantity of hydrogen cyanide represents a huge excess over what is actually required to cause death, but let's ignore

that for the moment. If 3.3 oz of hydrogen cyanide is used for a single gas chamber execution, then 373 tons of hydrogen cyanide is enough to perform more than 3.6 million gas chamber executions.

Let me repeat that, because I want it to sink in. If the amounts of just these four HAP compounds that Intel is allowed to release under the new minor source permit were substituted for hydrogen cyanide, they would be sufficient to perform more than 3.6 million gas chamber executions. That's twice the total population of New Mexico.

And it could be worse, much worse, because this is the low estimate. As I said earlier, gas chamber executions use a large excess of hydrogen cyanide over what is actually needed to kill someone. Forgive me for being graphic, but the states want to minimize the time the condemned prisoners are convulsing and thrashing around. According to the Chemical Weapons Convention, the amount of hydrogen cyanide used for gas chamber executions is 42 times higher that the concentration that is immediately lethal.

If I substitute that amount for the large excess used in gas chamber executions, the number of people who could be executed increases from 3.6 million to 150 million, or more than half the population of the United States.

I won't argue about which of these numbers you should accept. Nor will I pretend that releasing such lethal gases into the atmosphere is equivalent to releasing them into an enclosed chamber. The inescapable conclusion, however, is that Intel is authorized by this permit to release multi-ton quantities of some extremely lethal gases.

If you prefer a comparison to an atmospheric release instead of gas chambers, I'll remind you of the catastrophic accident that occurred in December of 1984 at a Union Carbide facility in Bhopal, India. The methyl isocyanate released afflicted about 1/3 of Bhopal's population of 800,000. (As an aside, I'll note that the population of Bhopal is essentially the same as Albuquerque's). Of the people affected by this release, 100,000 received some kind of medical treatment, 50,000 were hospitalized, and 4,000 were killed.

Although methyl isocyanate is not on the list of compounds Intel is allowed to release, I wondered how the compounds they can release compare to methyl isocyanate in toxicity. These comparisons are shown on Table 2 of Exhibit E. Hexachlorobutadiene is 21% as lethal as methyl isocyanate, yet the new permit allows Intel to release 3.9 tons of it. Hexachlorocyclopentadiene is half as lethal as methyl isocyanate, yet the new permit allows Intel to release 2.1 tons of it. Remember that we're comparing to the compound that killed 4,000 and hospitalized 50,000.

If we knew which specific toxic metal compounds Intel was releasing, we could extend this comparison. For example, if Intel is releasing mercury as organo alkyl compounds, they would be five times more toxic than methyl isocyanate. If Intel is releasing nickel as nickel carbonyl, it would be seven times more toxic. If Intel is releasing arsenic as arsine, that would be 25 times more toxic. And finally, if Intel is releasing hexavalent chromium - as was admitted in the 1998 version of the permit - hexavalent chromium is 50 times more toxic than methyl isocyanate that injured more than 200,000 in the Bhopal accident. But since Intel chooses not to tell us which toxic metal compounds they're releasing, we have to assume the worst.

Is it any wonder that so many people who live near the Intel plant are sick?

Service Station Comparison

That Intel officials have attempted to trivialize a public health risk of this magnitude by repeatedly comparing it to the emissions of three service stations is outrageous! It's worse than outrageous; it's despicable."

Sadly, however, this is just one more example of a pattern of deliberate deception and misinformation perpetrated by Intel officials.

Need for Independent Measurements

Note that the enormous public health hazards I've described would result from Intel being in full compliance with the new permit. If Intel released more than the allowed amounts, the situation would be even worse. Unfortunately, we have no way of knowing what Intel actually releases because they do their own measurements on a sporadic basis and calculate 12-month

rolling averages based on those measurements.

Amazingly, there are no independent measurements by anyone to verify the validity of Intel's claims. To allow an industrial heavy-polluter to dictate the terms of the permit that supposedly regulates it. then accept emission figures based only on Intel measurements and calculations with no independent check, is unbelievable. Yet that's exactly what this new permit allows.

Non-HAP Health Hazards

Note also that my example is based on fewer than 20 of the 24 tons of HAPs Intel is allowed to release under the minor use permit. I've totally ignored the 96.5 tons of VOCs, many of them highly toxic, that Intel is also allowed to release. Nor have I factored in the health risk of releasing - as the new minor source permit allows - 400 pounds of arsenic, 400 pounds of lead, 1000 pounds of mercury, and 400 pounds of chromium, which I remind you again was the source of the widespread poisoning described in the movie, "Erin Brockovich."

So as shocking as my example is, it still understates the full scope of the threat of Intel's emissions to public health and the environment.

Summary

To summarize, Intel operates a facility that had a non-operating pollution control system for 3.5 months without even being aware of it, they continue to operate and release untreated toxic gases into the atmosphere during extended periods when they know pollution control systems are not operating, and they're authorized by the new permit to release HAPs that have the equivalent killing power of nearly 400 tons of hydrogen cyanide that could perform millions of gas chamber executions. This does not even consider the 96.5 tons of VOCs and the huge quantities of toxic metals Intel emits. Nor does it consider carbon monoxide and other pollutants emitted from Intel's many boilers.

Clearly, the Intel facility has far overstepped the line of safe and responsible operation. And Intel officials know how toxic these emissions are, as witnessed by the fact that they evacuate their own employees when the emissions are drawn into their plant air supply.

Time after time, when we have a basis for independent verification, we find that the information released by Intel spokesmen is at least misleading, if not outright false. Yet they ask that we accept their VOC and HAP release figures based on sporadic measurements and their own calculations, which we have no way of checking. To accept such self-serving and unverifiable claims from Intel is foolhardy. Yet the new permit allows exactly that.

The NMED betrayed its mission and its responsibility to the public and the environment when it approved this flawed and inadequate permit. A terrible injustice has been done, especially to the thousands of nearby residents, who are paying with their health for this mistake.

With Intel's nearly unlimited wealth, they hardly need to be subsidized by taxpayers. Yet, as you heard from Mrs. Rice last evening, Intel benefits from a $350 million dollar corporate welfare program paid for by the taxpayers. And in this very room you see Mr. Wolf, an exceptionally capable lawyer, working alone against a huge legal team that includes multiple state lawyers working on behalf of Intel, instead of the taxpaying public who pays their salary.

I have one final point to make. Although I'm highly critical of the new permit and the way Intel has been operating, my objective is to protect the environment and the public, not punish Intel. We're neighbors, and neighbors should try to work together for

the common good.

As a first step, Intel should install air monitors in nearby residential neighborhoods, something we have requested for many years, and something Intel vows it will never do. If Intel emissions are as harmless as they claim, this is the perfect opportunity to prove it. Intel's unwillingness to measure what they put into the air we must breathe is the equivalent of taking the Fifth Amendment. One can only conclude that Intel opposes monitors so strongly because they know such monitors would confirm that the toxicity of residential air is dangerously high.

Although we continue to insist that residential monitors are an essential first step, I'll conclude my testimony with an offer. If Intel is ready to replace its campaign of deception and disinformation with a genuine commitment to protect public health and the environment, we are willing to replace confrontation with cooperation. We - as stakeholders who have a vital interest in the outcome - are willing to work with Intel and NMED to develop a new permit that meets the legitimate needs of everyone. That would be the best possible outcome for all concerned.

Before that can happen, however, you must first overturn the deplorable permit now in effect. The Environmental Improvement Board has the opportunity, the authority, and the responsibility to correct the terrible mistake NMED made when it approved the current permit. We can them replace it with a new permit that will allow Intel to meet its production goals in a manner that protects the environment and the health of its neighbors.

Which, after all, is the proper function of any regulatory permit? To do less is to invite an environmental and human health disaster of frightening proportions.