1/30/08
Mr. Christopher Myer
Project Manager
California Energy Commission
1516 9th Street
Sacramento, CA 95833

RE: Application for Certification for the Chula Vista Energy Upgrade Project: Docket No. 07-AFC-4

Please include this letter as a response to response to oral comments made by Theresa Acerro, President of Southwest Chula Vista Civic Association on 11/29/07 at the Public Hearing by MMC Energy on 1/14/08. We are very concerned about the inaccurate information that MMC Energy insists upon putting forward to confuse what is a simple issue. Their upgrade is proposed in a totally unsuitable location in violation of a clear mandate in out 12/05 General Plan and in close proximity to an Environmental Justice community that already suffers a disproportionate burden of air and land pollution for the region. They need to acknowledge that their increase in pollution becomes significant when added to all the existing cumulative impacts we are bearing. They are also proposing to increase the blight in the area by continuing a use that is detrimental to the new commercial uses to the east, which depend upon client visits.

1. **Land Use**:

The land use issue here is that the new General Plan clearly states that no new or repowered power plants will be sited within 1,000 feet of sensitive receptors. The existing plant should never have been approved because the Montgomery Specific Plan was in effect at the time of approval and it clearly states that any new development must be shown to be consistent with this plan, which calls for the rectification of the inappropriate proximity of industrial and residential uses in the Main Street neighborhood. The homes that are within 350 feet are zoned residential and have always been residential. They are NOT in a redevelopment area. They are NOT part of the General Plan Update. There is NO plan to change their zoning or use. This is an establish three generation community. This is NOT an area of transition.

Indeed diesel emissions are attributed by APCD to 70% of known cancer risk from air pollution. We know this well. This exhaust already in our neighborhood disproportionably impacts us, which is what makes any additional pollution significant. In case MMC has not noticed we already have truck yards, distribution centers, and the MTS bus terminal on Main Street or just off Main Street (Chicken plant on Hilltop) in close vicinity to this site. Any additional stationary pollution source **is** significant.

2. **Noise:**

The existing plant clearly does not meet the noise requirements it agreed to meet-60 decibels at south property line and variously stated as 70 and 60 at other property lines. It has not run again during the day so that we could use an actual noise meter, but we are sure it is way over these standards. If we cannot trust company to comply with existing required standards why should we trust them to do so in the future. As soon as the county is able to measure the noise the plant will need to stop operations do a new noise report and make whatever adjustments are necessary to comply. The people living on the hill across the river complain about the noise when it operates. The residents to the west can here a low whine at night, which interferes with their enjoyment of their homes and the peace, and quite they relish after all the daytime noise from the surrounding businesses and the road. This is a quality of life issue. A 24-hour a day 7 day a week noise hotline with the number personally provided to all residents and businesses within 900 feet would easily get calls whenever plant operated.

This plant should be required to reduce its noise threshold by 5 decibels, because of the type of noise it makes:

19.68.030 Exterior noise limits.

B

3. In the event the alleged offensive noise, as judged by the enforcement officer, contains a steady, audible sound such as a whine, screech or hum, **or contains a repetitive impulsive noise such as hammering or riveting, the standard limits set forth in** Table III shall be reduced by five dB.

These are some of the ailments that one can expect people would develop as a result of the noise for which the city and MMC will be held responsible. It is not necessary for the noise levels to exceed arbitrary standards just to be of the annoying nature of a power plant. "Even low-level office noise can increase health risks and lower task motivation for workers, Cornell researchers find" http://www.news.cornell.edu/releases/Jan01/noisy.offices.ssl.html.

Events that disturb and harm our physical, emotional, and mental health are called stressors. Stressors can lead to the body initiating the fight-or-flight adrenaline response. The body gets ready to fight a stressor, or flee a stressor. Boom cars, with their high-intensity/low-frequency sounds and infrasound, are a known stressor that can lead to specific, negative events in the body....

Dr. Luther Terry, a former U.S. Surgeon General, noted, "excessive noise exposure during pregnancy can influence embryo development."

"Growing evidence suggests a link between noise and cardiovascular problems. There is also evidence suggesting that noise may be related to birth defects and low birth-weight babies."

"The U.S. study in Los Angeles found that, in addition to greater incidence of low birth weights, there was also a greater incidence of birth defects such as clefts of the lip or palate, and spinal malformations."

(Source: The Environmental Protection Agency's NOISE EFFECTS HANDBOOK)

Even chronic, low-level traffic noise at 50 - 60 dB can adversely affect children. It can cause a rise in blood pressure, heart rate, and stress hormones. In addition, it also reduces task motivation and learning. Elevations of stress hormones are linked to the adult illnesses of "high blood pressure, elevated lipids and cholesterol, heart disease and a reduction in the body's supply of disease-fighting immune cells." (Source: http://www.newscientist.com/news/ - Ithaca, NY, 5/22/2001

Bursts of Noise: "One burst of noise, as from a passing truck, is known to alter endocrine, neurological, and cardiovascular functions in many individuals; prolonged or frequent exposure to such noise tends to make the physiological disturbances chronic. In addition, noise-induced stress creates severe tension in daily living and contributes to mental illness." (Source: NOISE POLLUTION, Electric Library presents Encyclopedia.com)

"Research shows that intermittent and impulsive noise is more disturbing than continuous noise." (Source: League for the Hard of Hearing's NOISE & HEALTH FACT SHEET)

Hospital noise has been shown to slow healing." (Source: THE SOUND AND THE FURIOUS, by Corinne Asturias)

"Disturbances may occur even though the sound pressure level during exposure is below 30 dBA.

" Low-frequency noise will penetrate walls and barriers more readily than high frequency noise. (Source - GUIDELINES FOR COMMUNITY NOISE: ADVERSE HEALTH EFFECTS OF NOISE)

An Introduction to Sound Basics. This "... document is useful to persons interested in finding out more about what Noise Pollution is and what its effects are, as well as how they may accurately measure the amount of noise in their environment." Article Online Source: Noise Pollution Clearing House

The 1999 report from the Census Bureau, titled AMERICAN HOUSING SURVEY FOR THE UNITED STATES, stated that noise is America's number one complaint about their neighborhoods. It is also the main reason for wanting to move to another location. Noise levels have increased 6 fold in major U.S. cities in the last 15 years. Automobiles are the largest source of noise.

Noise: A Health Problem.. This 1978 document "... is a somewhat dated but still very helpful EPA document about noise and health." Article Online Source: Noise Pollution Clearing House

Uninterrupted sleep is known to be a prerequisite for good physiological and mental functioning of healthy persons. Whereas sleep disturbance is considered to be a major effect of environmental noise, data on the effects of environmental noise on sleep are limited. Recent research on sleep disturbance has been conducted for aircraft noise, road traffic, and railway noise. For example, road traffic noise in excess of 30 dB disturbs sleep. The probability of being awakened increases with the number of noise events per night. When background noise is low, noise exceeding 45 dB should be limited; for sensitive individuals, an even lower level is preferred. ...

Other factors that influence the problem of night-time noise include its occurrence in residential areas with low background noise levels, combinations of noise and vibration such as that produced by trains and heavy duty vehicles, and sources with low-frequency components which are more disturbing, even at very low sound pressure levels. These low-frequency components have a significant detrimental effect on health. ...

Mental health is defined as the absence of identifiable psychiatric disorders according to current norms. Environmental noise is not believed to be a cause of mental illness, but it is assumed to accelerate and intensify the development of latent mental disorders. The adverse effects of environmental noise on mental health include the following catalog of complaints; anxiety, emotional stress, nervous complaints, nausea, headache, instability, argumentativeness, sexual impotency, changes in mood, increase in social conflicts as well as neurosis, hysteria, and psychosis. Population studies have suggested associations between noise exposure and mental health indicators such as rating of well being, symptom profiles, use of psychoactive drugs and sleeping pills, and mental hospital admission rates. There may be great differences in the ability of various populations to cope with noise pollution; particularly vulnerable groups may include, children, the elderly, and those with preexisting disease, especially depression."

http://www.nonoise.org/library/whonoise/whoresponse.htm

3. **Health Risks from Air Pollution:**

The health risks are due to **cumulative impacts**. This community is already forced to bear a disproportionate share of the region's negative air quality emissions. The existing peaker is discharging natural gas into the air every night for 5-10 minutes in violation of its air permit. The emissions of the current plant were never analyzed for cumulative impacts or one would hope it never would have been approved.

The Hanson Cement Plant located in the river bottom barely a mile to the west of the plant adds significant particulate matter to the air. Homes and mobile homes close to Main Street and on Connolly Court to the north east of this plant are directly downwind and receive significant amounts of visible particulates that adhere to outdoor surfaces and cars. If you can see the pollution the damage done to the lungs and the negative health effects of the tinier particles can be assumed to be significant. Chromium (a component of cement manufacture) is of particular concern due to its know negative health effects:

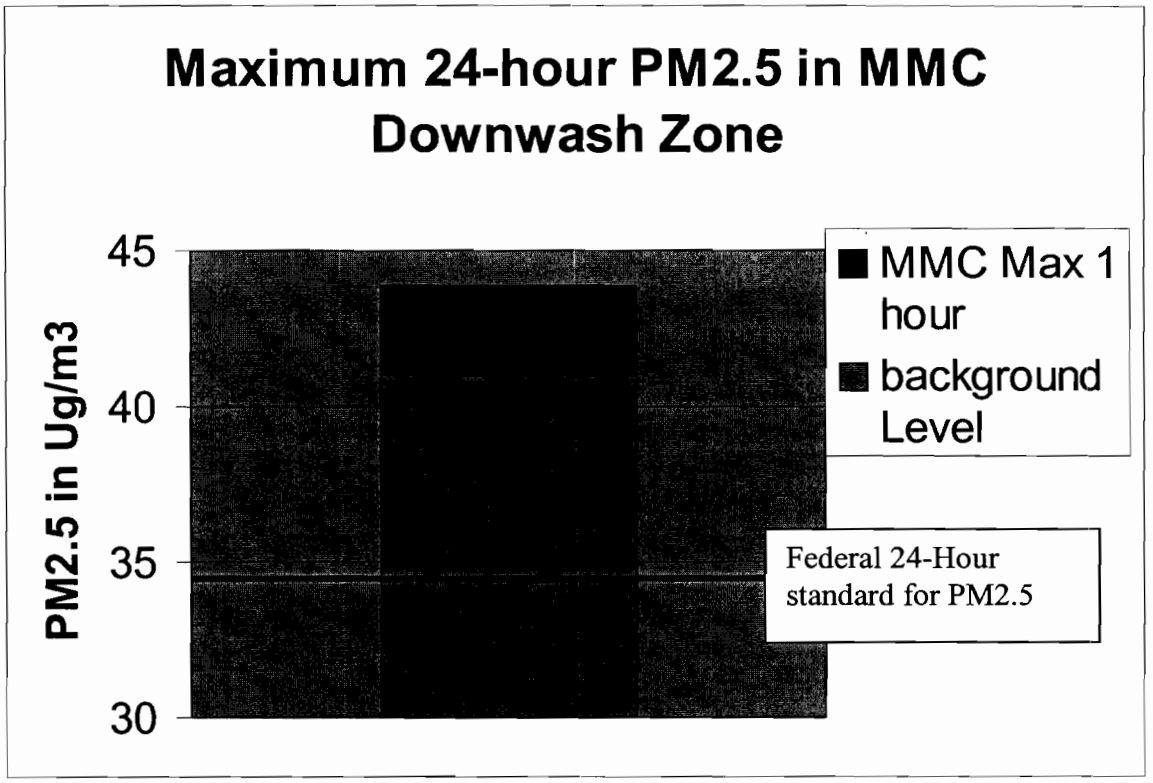
SOx
http://www.ncbi.nlm.nih.gov/pubmed/8542133?ordinalpos=42&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVDocSum

Health effects of outdoor air pollution. Committee of the Environmental and Occupational Health Assembly of the American Thoracic Society.

[No authors listed]

Particles, SOx, and acid aerosols are a complex group of distinct pollutants that have common sources and usually covary in concentration. During the past two decades, the chemical characteristics and the geographic distribution of sulfur oxide and particulate pollution have been altered by control strategies, specifically taller stacks for power plants, put in place in response to air pollution regulations adopted in the early 1970s. While the increasing stack heights have lowered local ambient levels, the residence time of SOx and particles in the air have been increased, thereby promoting transformation to various particulate sulfate compounds, including acidic sulfates. These sulfate particles constitute a large fraction of the total mass of smaller particles (< 3 microns in aerodynamic diameter). Epidemiologic studies have consistently provided evidence of adverse health effects of these air pollutants. Particulate and SO2 pollution were strongly implicated in the acute morbidity and mortality associated with the severe pollution episodes in Donora (Pennsylvania), London, and New York in the 1940s, 1950s, and 1960s. There is new evidence that even current ambient levels of PM10 (30 to 150 micrograms/m3) are associated with increases in daily cardiorespiratory mortality and in total mortality, excluding accidental and suicide deaths. These associations have been shown in many different communities, as widely different in particle composition and climate as Philadelphia, St. Louis, Utah Valley, and Santa Clara County, California. It has recently been shown in a long-term prospective study of adults in the United States that chronic levels of higher PM10 pollution are associated with increased mortality after adjusting for several individual risk factors. Daily fluctuations in PM10 levels have also been shown to be related to acute respiratory hospital admissions in children, to school and kindergarten absences, to decrements in peak flow rates in normal children, and to increased medication use in children and adults with asthma. Although some epidemiologic studies suggest that acid aerosols are an important toxic component of PM10, other studies do not support this hypothesis. Dockery and Pope (408) recently reviewed the epidemiologic literature for adverse effects, assuming that reported associations can be attributed to acute particle mass exposures. Combined effects were estimated as percent increase in comparable measures of mortality and morbidity, associated with each 10 micrograms/m3 increase in daily mean PM10 exposure (Table 7). While total mortality increased by 1% for each 10 micrograms/m3 increase in PM10, respiratory mortality increased by 3.4% and cardiovascular mortality increased by 1.4%. Hospital admissions and emergency department visits increased approximately 1% for all respiratory complaints, and 2% to 3% for asthma. Exacerbation of asthma increased by about 3%, as did lower respiratory symptoms. Small decreases in lung function, approximately 0.1%, have also been observed. This review suggests that the epidemiologic studies of adverse morbidity measures are coherent with the mortality studies showing quantitatively similar adverse effects of acute exposures to particulate pollution. Despite these epidemiologic findings for acute and chronic adverse health effects from air pollution associated with relatively low levels of inhalable particles, there are no complementary data from toxicologic studies or from acute human exposures to similar levels of respirable particles. Thus, controlled human exposures to various particles, including H2SO4, at relevant levels (< 150 micrograms/m3) have not identified significant alterations in respiratory function in healthy individuals.(ABSTRACT TRUNCATED)

This plant is too close to too many sensitive receptors many of whom do not have healthy respiratory function now. This chart shows the significance of the addition of PM2.5 from the proposed plant to the current ambient state:



The current state of the air quality due to the acknowledged by the applicant and his representative significant truck traffic and diesel exhaust exposure make even a tiny addition significant. No mitigation in the form of solar, changing vehicles to zero emission, etc. will mitigate for the people who live or go to school in close vicinity to this plant. Mitigating for the region and not the individuals is unacceptable and a further violation of environmental justice principles, because it is compounding the existing disproportionate burden borne by these residents, workers, and school children.

This disproportionate burden already exposes these receptors to the dangers highlighted in these articles:

The most comprehensive study of urban toxic air pollution ever undertaken shows that motor vehicles and other mobile sources of air pollution are the predominant source of cancer-causing air pollutants in Southern California. Overall, the study showed that motor vehicles and other mobile sources accounted for about 90% of the cancer risk from toxic air pollution, most of which is from diesel soot (70% of the cancer risk). Industries and other stationary sources accounted for the remaining 10%. The study showed that the highest risk is in urban areas where there is heavy traffic and high concentrations of population and industry.

South Coast Air Quality Management District. Multiple Air Toxics Exposure Study-II. *March 2000.*

The luA study was conducted in Munster, Germany to determine the relationship between truck traffic and asthma symptoms. In total, 3,703 German students, between the ages of 12-15 years, completed a written and video questionnaire in 1994-1995. Positive associations between both wheezing and allergic rhinitis and truck traffic were found during a 12-month period. Potentially confounding variables, including indicators of socio-economic status, smoking, etc., did not alter the associations substantially.

Duhme, H., S. K. Weiland, et al. (1996). The association between self-reported symptoms of asthma and allergic rhinitis and self-reported traffic density on street of residence in adolescents. Epidemiology *7(6): 578-82.*

http://www.sdearthtimes.com/et0603/et0603s21.html ;

http://www.sdearthtimes.com/et1002/et1002s21.html

Air pollution fatalities now exceed traffic fatalities by 3 to 1

by Bernie Fischlowitz-Roberts, Earth Policy Institute

The World Health Organization reports that 3 million people now die each year from the effects of air pollution. This is three times the 1 million who die each year in automobile accidents. A study published in The Lancet in 2000 concluded that air pollution in France, Austria, and Switzerland is responsible for more than 40,000 deaths annually in those three countries. About half of these deaths can be traced to air pollution from vehicle emissions.

In the United States, traffic fatalities total just over 40,000 per year, while air pollution claims 70,000 lives annually. US air pollution deaths are equal to deaths from breast cancer and prostate cancer combined. This scourge of cities in industrial and developing countries alike threatens the health of billions of people.

We also must bear the negative impacts of the Southbay base load electrical plant. People report that whenever it operates there is a film of dirt upon their windowsill and on outdoor furniture and cars. There is an oily substance in their swimming pools; air filters in air cleaning devices are full of a white substance. These cumulative effects have to be considered.

Adding any amount of additional particulate matter, Sox and VOC acknowledged by this plant significantly increases the health risks to the people living within a mile of this plant due to the existing negative air quality.

Looking at the charts in the General plan Update one can also see there are a significant number of leaking under ground tanks and brown fields in the area around this proposed new plant. All of these add to the significant health risks already borne by the residents, school children and workers in this area and make any additional pollution and/or health risk unacceptable.

When the three closest zip codes to this plant are looked at it can be seen that this area already has a significant problem with criteria and toxic pollution. We should not be forced to bear the burden of ANY additional pollution.

Chula Vista (91911)

http://www.voiceofsandiego.org/multimedia/pollution/91911.php

Pounds of toxic pollution emitted in 2004: 30,286.90 (County average was 7,974.80)

2004 Toxic Pollution Comparison

Pounds of criteria pollution emitted in 2004: 3,057,877 (County average was 38,239.5)

2004 Criteria Pollution Comparison

Median income in 2000: $38,601 (County average is $48,634)

Top emitters of criteria pollution in this zip code:

- Romans Truck Body & Paint (2513 Main St.)
- El Dorado Cleaners (868 3rd Ave.)
- ARCO #06133 (800 Palomar St.)
- Optimart/Best Mart (1450 Third Ave.)
- Scheib Earl of California-Chula Vista (951 Broadway)
- ARCO #05410 (1725 Broadway)
- Costco Gasoline Facility #781 (1144 Broadway)
- ARCO #9597 (1401 S. Hilltop Dr.)
- Texaco #121647 (902 Broadway)

Top emitters of toxic pollution in this zip code:

- Duke Energy-South Bay Power Plant (990 Bay Blvd.)
- Pacific Recovery Corp. (Otay Landfill)
- Hanson Aggregates-Otay Valley Road (5330 Otay Valley Road)
- Hanson Aggregates (7th and Main streets)
- Cosctco Gasoline Facility #781 (1144 Broadway)
- Romans Truck Body & Paint (2513 Main St.)
- Optimart/Best Mart (1450 Third Ave.)
- ARCO#06133 (800 Palomar St.)
- ARCO #1925 (3190 Main St.)
- ARCO #05410 (1725 Broadway)

**Under the Clean Air Act of 1971, six pollutants that are common throughout the United States and known or strongly suspected of being harmful to human health or the environment are defined as criteria pollutants. Nearly 190 other harmful air contaminants are defined as toxic pollutants.*

Sources: San Diego Air Pollution Control District, San Diego Association of Governments

Chula Vista (91910)

http://www.voiceofsandiego.org/multimedia/pollution/91910.php

Pounds of toxic pollution emitted in 2004: 33,330.80 (County average was **7,974.80**)

2004 Toxic Pollution Comparison

Pounds of criteria pollution emitted in 2004: 1,285,353 (County average was **38,239.5**)

2004 Criteria Pollution Comparison

Median income in 2000: $43,031 (County average is **$48,634**)

Top emitters of toxic pollution in this zip code:

- Anthony's Auto Center (305 E. St.)
- Davis Auto Body (55 Broadway)
- Arya Cleaners (750 Otay Lakes Road)
- Costco Wholesale (895 E. H St.)
- Chevron-H Street (695 H St.)
- ARCO #05497 (407 E St.)
- ARCO #9568 (401 Telegraph Canyon Road)
- ARCO #05409 (798 3rd Ave.)
- A&P Cleaners (48 Broadway)

Top emitters of criteria pollution in this zip code:

- Otay Landfill Inc. (1700 Maxwell Road)
- Rohr Industries (850 Lagoon Dr.)
- World Oil-Chula Vista (685 H St.)
- Chevron-Plaza Court (770 Plaza Ct.)
- ARCO #05397(407 E St.)
- ARCO #9568 (401 Telegraph Canyon Road)
- ARCO #05409 (798 3rd Ave.)
- ARCO #1914 (720 H St.)
- Chevron-Bonita Road (95 Bonita Road)

San Diego (92154)

http://www.voiceofsandiego.org/multimedia/pollution/92154.php

Pounds of toxic pollution emitted in 2004: 15,159.40 (County average was 7,974.80)

2004 Toxic Pollution Comparison

Pounds of criteria pollution emitted in 2004: 81,300 (County average was 38,239.50)

2004 Criteria Pollution Comparison

Median income in 2000: $43,627 (County average was **$48,634**)

Top emitters of toxic pollution in this zip code:

- Greenwald's Autobody & Frameworks (2285 Manya St.)
- Sunsett Paint & Body Works (7025 Manya Cir.)
- La Cima Oil Co. Inc. (Otay Mesa Road)
- Rector Truck Bodies (6747 Gateway Park Dr.)
- Chevron-Coronado Avenue (2432 Coronado Ave.)
- ARCO #05411 (2255 Palm Ave.)
- ARCO #1725 (2290 Coronado Ave.)
- Shell Oil-Palm Avenue (1881 Palm Ave.)
- Coronado Shell (2485 Coronado Ave.)

Top emitters of criteria pollution in this zip code:

- Greenwald's Autobody & Frameworks (2285 Manya St.)
- Sunsett Paint & Body Works (7025 Manya Cir.)
- La Cima Oil Co. Inc. (Otay Mesa Road)
- Calpeak Power Border Llc. (2060 Sanyo Ave.)
- Rector Truck Bodies (6747 Gateway Park Dr.)
- Chevron-Coronado Avenue (2432 Coronado Ave.)
- ARCO #05411 (2255 Palm Ave.)
- ARCO #1725 (2290 Coronado Ave.)
- Shell Oil-Palm Avenue (1881 Palm Ave.)
- Coronado Shell (2485 Coronado Ave.)

4. **Environmental Justice**

Environmental Justice is totally relevant here since this neighborhood already is disproportionably bearing the burden of numerous toxic and criterion pollutants to a larger degree in 91911 than in the two neighboring zip codes, while its median income is lower. The one-mile circle around the power plant is 81% people of color and 16% below poverty level. (These figures show this one-mile area is more of an environmental justice community than the 91911 and 92154 zip codes it is in.)

Looking at the latest sitting material on line for peaked plants it is obvious that nowhere else is a peaked being proposed this close to residential or this many schools. Encroachment issues are irrelevant. Also when the distance to actual homes is computed in many of the encroachment cases the actual plant is further from people's homes. This is a tiny lot and the plant is too close to businesses, homes and schools. In Inland there was a home 350 feet away and the applicant was going to buy the home when and if the project was approved. In Fresno there was a 5 plex with 500 feet and the applicant proposed to relocate the farm workers before the plant was built. Not that what exists elsewhere is relevant, because these other neighborhoods do not have the number of existing sources of criterion and toxic pollution that this site has. The cumulative impacts to this community are already disproportionate.

5. Conditional Use Permit:

There is no precise plan now nor will there be in the future. **The land use issue here is that the new General Plan clearly states that no new or repowered power plants will be sited within 1,000 feet of sensitive receptors.** The existing plant should never have been approved because the Montgomery Specific Plan was in effect at the time of approval and it clearly states that any new development must be shown to be consistent with this plan, which calls for the rectification of the inappropriate proximity of industrial and residential uses in the Main Street neighborhood. The homes that are within 350 feet are zoned residential and have always been residential. They are NOT in a redevelopment area. They are NOT part of the General Plan Update. There is NO plan to change their zoning or use. This is an establish three generation community. This is NOT an area of transition. The plant requires a SUP. The findings should never have been made in the past, because the proximity of residential was totally ignored in 2000.

A SUP cannot be issued for this use either:

The findings cannot be made for these reasons:

"That the proposed use at the particular location is necessary or desirable to provide a service or facility which will contribute to the general well being of the neighborhood or the community."

This "particular" location is neither necessary (see video of engineer's testimony 11/29/07) nor desirable. The Otay area of Chula Vista was in the county originally. It developed until 1966 without any zoning regulations. The Montgomery Specific Plan in 1986 strove to protect residential areas from incompatible uses such as this. The new General Plan 12/05 clearly strives to protect stable single-family neighborhoods such as the one within 350 feet of this proposed use.

This use will not provide a use or service of benefit to the southwest community. The electricity generated here will go into the grid. Solar collectors could generate the 65 MW that Chula Vista uses, if placed on the buildings in the area. In fact the two warehouses on either side of the current peaker have flat roofs that would be perfect for large scale solar installations such as HP and Goggle have recently undertaken. The amount to be invested in this new peaker could buy a huge amount of reliable clean solar energy.

This particular location is inappropriate for a gas-fired plant. There are at least 3 other locations that would be much better and further away from sensitive receptors.

The proposed plant with its two 70 foot stacks would contribute to the **visual blight** of the area. They would be clearly visible from the homes on the southern cliff, Montgomery Adult, Montgomery Head Start, Beyer Blvd. and Montgomery High, as well as from the homes on Holiday and Festival Courts. This would cause a reduction in home values. MMC did an incorrect analysis of visual impacts that ignored the higher viewing areas that surround the site. I live off of Hilltop and can see the roof of the existing building. I am sure I will be able to see a substantial part of the two 70 foot stacks. The part of the site to the north actually appears to be at least three feet higher than the existing site, which would make the stacks even more prominent.

That such use will not, under the circumstances of the particular case, be detrimental to the health, safety or general welfare of persons residing or working in the vicinity, or injurious to property or improvements in the vicinity.

This use would be detrimental to the health, safety, and general welfare of the people working at Heartland Meat, Modello Designs, Sir Speedy and other neighboring businesses as well as the residents living within 1,000 feet of the peaker plant as the current facility is, which is why it should be ordered removed.

There is the issue of ammonia slip. There appears to be no monitoring program to prevent this. If such a program exists the data from it needs to be provided. The fact of the matter is that the current plant was used so little that the data would not adequately reflect the risk from a new plant with longer operating hours.

There needs to be a plan made available to residents and businesses to deal with the accidental spillage of ammonia, the transport of ammonia, since the tank will need refilling approximately every 320 hours of operation, the route of trucks, safety precautions, and the consequences of an explosion or spill (These things have occurred elsewhere. See data that follows). Would there be a toxic cloud of pollution generated? How far would it drift? How toxic would it be? What are the negative health effects of the 5 or more ppm that will be part of the normal exhaust from the peaker?

The current plant's emission of 10 ppm appears to be an illegal amount. There does not currently appear to be any steel reinforcement of the tank, any attempt to disguise its location, or any special security or safety precautions. The things listed by MMC in their response are not apparent. There is also the significant exposure of the near-by workers and residents to the risk of a terrorist attack since the security is virtually non-existent.

That the granting of this conditional use will not adversely affect the General Plan of the City or the adopted plan of any government agency.

The General Plan specifically has wording to protect the integrity of the OVRP adjacent to this plant. The current plant is practically in the river bottom. Even tearing down the existing plant and moving a new one to the north will still leave the view of 70 foot tall stacks with heat/pollution waves coming out of them for most of the summer. This was the case with the existing plant for its first years of operation. Moving the facility will put the ammonia tank in an even more accessible and visible location.

The General Plan mandates a 1,000-foot buffer for new or repowered power plants from sensitive receptors. This plant cannot comply with this provision, so it must be found to be inconsistent with the General Plan. The General Plan also is supposed to protect established single-family residential uses. This use would not be consistent with this provision. The existing plant is also inconsistent with these parts of the General Plant and needs to cease operation.

6. Safety and Security:

Where is the risk management plan? Why is it not available for evaluation? It does not matter how many regulations there are for the transport and handling of ammonia. Accidents happen and have happened. Past history in California just indicates that in the past there were few peaker plants and that the odds of an accident occurring increase with each new plant. This plant is too close to sensitive receptors. The risk is too high.

The tank does not appear to have adequate safe guards or a secondary containment structure. It also is not protected or shielded from sight in any way. It is just a big target. The gates are kept open when the plant is occupied. Most of the time no one is there. This is a terrorist's dream opportunity. These things do NOT belong near residential neighborhoods. There is an alternative to using ammonia, which could be mandated.

Why is there such a discrepancy between the Larkspur Plant's evaluation of ammonia spillage risk and this plant's? There is a smaller tank at Larkspur.

Ammonia Spills in New York State 1993-1998

Hazardous Substances Emergency Events Surveillance Project

A copy of the Ammonia Spills in New York State (1993-1998) is available in Adobe's Portable Document Format (PDF, 150KB, 12pg.).

Key Points

- **Of 2,415 reported releases of hazardous substances, 107 (4.4%) involved ammonia.**
- **Of the 814 people injured during releases of hazardous substances, 61 (7.5%) were injured following ammonia events.**
- **Equipment failure caused 58% of the ammonia releases and injured 38 people.**
- **Most ammonia releases involved piping (44%).**
- **44% of injured people were employees, 41% were members of the general public, and 15% were responders.**
- **7 of the 9 injured responders sustained chemical burns.**
- **39% of the ammonia releases required an HAZMAT response.**
- **More than 1,889 people were evacuated following 107 ammonia releases.**
- **Most ammonia releases occurred in food/beverage processing (29%) or chemical/metal/equipment manufacturing (27%).**

This fact sheet is produced by the Hazardous Substances Emergency Events Surveillance (HSEES) project staff to protect human health and the environment by preventing future releases. HSEES is investigating events to learn the causes and contributing factors associated with releases. An understanding of the root causes, sharing the lessons learned and integrating these lessons into training and maintenance can be a major part of a prevention plan.

Ammonia is a corrosive, colorless toxic gas with a sharp odor. It is generally not flammable, but mixtures of ammonia and air will explode when ignited under certain conditions. Pure ammonia is usually stored as a liquid under high pressure in steel cylinders. It is also known as anhydrous ammonia. Safe storage requires specially-designed and well-maintained equipment. Ammonia readily mixes with water to form ammonium hydroxide, a highly caustic solution.

Ammonia is widely used in large quantities for a variety of purposes. In 1999, anhydrous ammonia ranked third by weight (Chemical and Engineering News, 78(26), 50-56 (June 26, 2000)) for all chemicals produced in the U.S. More than 80% of the ammonia produced in the United States is used in agriculture; less than 2% is used for refrigeration. Important uses of ammonia include the manufacture of dyes, drugs, synthetic fibers, plastics and explosives; for large-scale cooling of fruits, vegetables and meats; as a component in cleaning materials; to control nitrogen oxides emissions at power plants; and to freeze water in ice rinks.

Hazard Awareness

Exposure to ammonia is extremely irritating to eyes, nose, throat, lungs, skin and mucous membranes. Exposure to high levels of ammonia can cause dizziness and central nervous system symptoms, chemical burns and death. Liquid ammonia has a boiling point of minus 28 degrees Fahrenheit. At this temperature, it can cause freezing burns or frostbite very quickly.

The Occupational Safety and Health Administration (OSHA) has set a Permissible Exposure Limit (PEL) for the workplace of 50 parts per million (ppm, 35 mg/m^3) time weighted average. The IDLH (immediately dangerous to life and health) level has been set at 300 ppm. Most people smell ammonia before it causes health effects. Generally, people will detect ammonia at 5 ppm and will become uncomfortable by 100 ppm. People who work near this chemical, particularly if it is under pressure, are at risk of serious injury if a release occurs.

Liquid anhydrous ammonia expands 850 times when released to ambient air and can form large vapor clouds. These clouds are normally lighter than air and will rise. However, liquid anhydrous ammonia may also form an aerosol which means that some of it may form small liquid droplets. As an aerosol, the droplets of ammonia are heavy and sink toward the ground. Anhydrous ammonia may also cause water vapor to condense in the air forming a visible white cloud. Therefore, when anhydrous ammonia is released to the air, it may rise and disperse as a gas or it may be heavy and travel along the ground as an aerosol or because it has trapped water vapor. In either case, the cloud may remain low instead of rising into the air. This behavior may increase the risk of exposure and injury for workers and the public. Being aware that ammonia may persist near the ground may help prevent injury in future ammonia releases.

Although pure ammonia vapors are not flammable at concentrations of less than 16%, it may explode or catch fire at concentrations between 16 and 25%. Ammonia contaminated with lubricating oil from a system, however, may catch fire or explode at concentrations as low as 8%. Ammonia cooling systems such as those for foods or ice rinks may be at risk due to oil contamination.

Anhydrous ammonia is a key ingredient in the illegal production of amphetamines. Illegal drug makers may steal ammonia from areas where it is stored and used. When stolen, the toxic gas may be released accidentally in unexpected locations, and may injure law enforcement personnel, emergency responders and the public, particularly because the location is unexpected.

Ammonia Releases in New York State

This fact sheet[1] summarizes information on 107 ammonia spills investigated by the New York State Department of Health for the Hazardous Substances Emergency Events Surveillance (HSEES) project. This state-based project is funded by the Agency for Toxic Substances and Disease Registry to describe and evaluate the public health consequences of spills involving non-petroleum hazardous substances.

Table 1. Summary of Accidental Ammonia Releases

Number of Ammonia releases[1]	107
Fixed facility	101
Transportation	Road – 5 Rail – 1
Range of amounts released[2]	1-850 gals. 1-4,000 lbs.
Number of events with injury	21 (19%)
Number of injured persons and fatalities Employees Responders General Public	61 27 9 25
Maximum number of persons injured in one event	13
Number of releases with hazmat response	49 (46%)
Number of events involving an evacuation	42 (39%)
Number of persons evacuated[3]	>1,889
Maximum number of persons evacuated in one event	500
Duration of all evacuations (person-hours)[4]	>8,452

[1]Two threatened and 105 actual ammonia releases.

[2]A release may be reported in pounds or in gallons, not both. For spills reported in gallons, the median was 18 gallons and the average was 128 gallons. For spills reported in pounds, the median was 202 pounds and the average was 530 pounds.

[3]This number is a minimum count. For some events, no data were recorded because the evacuation time or the number of evacuated persons were unknown and could not be estimated from available information.

[4]Person-hours is calculated by multiplying the number of persons evacuated by the length of the evacuation for each event, and summing the results for all events.

Since 1993, the HSEES project has recorded information on 105 actual and two threatened ammonia releases (Table 1). A threatened release qualifies for inclusion in the project if it leads to a public health action that protects people (such as an evacuation or a road closing). Most ammonia events (101) occurred at fixed facilities; six releases were during transportation. The quantities of ammonia released ranged in volume from one to 850 gallons, and in weight from one to 4,000 pounds.

Twenty-one events (19%) resulted in injuries to 61 people, one of whom died. The fatality was a forklift operator on the second floor of a produce cold storage facility. The forklift broke through the wooden floor and ruptured the ammonia pipes on the floor below. The trapped operator died from inhaling ammonia. Forty-nine of the releases (46%) required a hazmat response.

Forty-two events (39%) led to evacuations totaling more than 1,889 people. The evacuation data are minimum numbers since only confirmed data are included. For example, if an evacuation involved more than 50 people but no one knew how many more, then staff recorded only 50 in the project database. Similarly, if the evacuation time was at least two hours but no one knew how much longer, then staff recorded the time as two hours. For some events, no data were recorded because the evacuation time or the number of evacuated persons were unknown and could not be estimated. The duration of known evacuations totaled >8,452 person-hours.

On-Site Locations

Injuries and Medical Treatment

Figure 2 (A complete copy of the Ammonia Report is available in Adobe's Portable Document Format (help for PDF) - file size is approximately 150 KB.) summarizes the injury data collected for 61 people injured in 21 events. The injury total exceeds the number of injured persons because some people sustained more than one injury. The predominant injuries associated with releases of ammonia were respiratory irritation (54%), eye irritation (26%) and dizziness/central nervous systems effects (24%). Respiratory irritation was the most common symptom reported by both employees (52%, 14/27) and the general public (68%, 17/25); the symptom most frequently reported by responders was chemical burns (78%, 7/9).

Table 2. Medical Treatment Provided to Persons Injured During Accidental Ammonia Releases

Medical Treatment	Number of injured persons			
	Employee	General Public	Responder	Total
Treated at the scene	9	12	1	22
Transported to the hospital for observation	2	0	3	5
Transported to the hospital, treated and released	13	11	4	28
Transported to the hospital and admitted	1	2	1	4
Seen by private MD within 24 hours	1	0	0	1
Fatality*	1	0	0	1
Total	**27**	**25**	**9**	**61**

* One death occurred when a forklift operator on the second floor of a building broke through the wooden floorboards and ruptured the ammonia pipes below. The trapped operator died from inhaling ammonia.

Data on medical treatment (Table 2) indicate that 46% of injured people (28/61) were transported to the hospital, treated and released, and that 36% (22/61) were treated at the scene. Five people (8%) were released from the hospital after observation and 4 people (6%) were admitted. One fatality was caused by ammonia exposure following an accident in a cold storage facility.

In the project, an injured person can be classified as using up to four different pieces of personal protective equipment (PPE). A review of PPE worn by people injured during accidental ammonia releases (Table 3) shows that the majority of injured people (64%, 39/61) wore no PPE. Among the injured people without any PPE, the majority were general public (25/39), but thirteen were employees and one was a responder. PPE worn by injured responders included Level B suits (4) and firefighter turnout gear (8).

Table 3. Personal Protective Equipment Worn by 61 Persons Injured* During Accidental Ammonia Releases

Personal Protective Equipment (PPE)	Employees	General Public	Responders	Total
None	13	25	1	39
Gloves	3	0	0	3
Eye protection	2	0	0	2
Hard hat	1	0	0	1
Steel-toed shoes	2	0	0	2
Firefighter turnout gear**	0	0	8	8
Level B***	0	0	4	4
Unknown	10	0	0	10
Total PPE	**31**	**25**	**13**	**69****

* Employees (27), general public (25) and responders (9).
** Firefighter turnout gear: fire resistant outerwear including coat, boots, gloves and helmet with face shield. SCBA or a supplied-air respirator is used, as needed.
*** Level B protection: encapsulating suit which does not have to be vapor tight: same level of respiratory protection as Level A.
**** Number of PPE (69) exceeds number of injured people (61) because some people wore multiple PPE.

Four of the injured responders wore firefighter turnout gear and, later, Level B protection. This occurred in two events because members of the fire department were also members of the hazmat team. The responders first entered wearing firefighter turnout gear and then re-entered in Level B as part of the hazmat team. In one incident, the newly-established hazmat team was responding to its first event and one firefighter was burned by ammonia trapped inside his entry suit. In the other incident, three firefighters sustained burns to the groin (1), ears and ear lobes (2). These injuries indicate the need for improved training and education of employees and responders on the hazards of ammonia and the importance of appropriate PPE. Of the 27 injured employees, nearly half (13/27, 48%) wore no PPE and others wore items such as gloves or steel-toed shoes that did not provide respiratory protection.

Table 4. Causes of Ammonia Releases: Associated Injuries

Cause	Number of events	Events with injuries	Injured persons
Equipment failure	62	10	38
Operator error	15	4	4
Improper mixing	4	2	4
Improper filling	2	0	0
Beyond human control	1	0	0
Power failure	1	0	0
Dumping	3	0	0
Deliberate action*	1	0	0
Transportation	6	1	1
Other**	8	3	11
Unknown	4	1	3
Total	**107**	**21**	**61**

* Deliberate action: Illegal activity such as theft, vandalism, or assault.
** Other: fire (5), structural collapse (3).

Causes

Table 4 summarizes the causes of ammonia releases and the associated injuries. The most commonly reported causes for ammonia releases were equipment failure (62 events, 58%) and operator error (15 events, 14%). Ten events with equipment failure as the cause resulted in 62% of the injured people (38/61). The eight events with cause listed as other (fire, 5; structural collapse, 3) resulted in 18% of the injured people (11/61).

Table 5 summarizes the causes of ammonia releases and associated evacuations. The most commonly-reported cause of ammonia releases was equipment failure (62 events, 58%) which resulted in more than half of the evacuations (22 events, 52%). These 22 evacuations displaced more than 1,210 people for more than 5,221 person-hours. Operator error resulted in 17% of the evacuations (7 events) which effected more than 250 people for more than 316 person-hours.

Table 5. Causes of Ammonia Releases: Associated Evacuations

Cause	Number of events	Events with evacuation	Number of people evacuated	Evacuation time (person-hours)
Equipment failure	62	22	>1,210	>5,221
Operator error	15	7	>250	>316
Improper mixing	4	2	40	50
Improper filling	2	0	0	0
Beyond human	1	0	0	0

control				
Power failure	1	0	0	0
Dumping	3	1	3	3
Deliberate action*	1	0	0	0
Transportation	6	2	>15	>300
Other**	8	4	246	2,040
Unknown	4	4	125	522
Total	**107**	**42**	**>1,889**	**>8,452**

* Deliberate action: Illegal activity such as theft, vandalism, or assault.
** Other: fire (5), structural collapse (3).

Industry-Specific Analysis

An analysis of the number of injured people by facility type (Figure 3 - (A complete copy of the Ammonia Report is available in Adobe's Portable Document Format (PDF, 150KB, 12pg) shows that most people (51%) were injured in food/beverage processing. Similar numbers of ammonia releases (Table 6) took place in the categories of chemical/metal/equipment manufacturing (29) and food/beverage processing (31), but the number of injuries was much lower in the manufacturing sector (1) than in the food/beverage processing industry (31).

Table 6. Injuries Following Accidental Ammonia Releases at Various Facilities

Industry Type	Number of events	Events with injuries	Injured persons
Chemical/metal/equipment mfg.	29	1	1
Food/beverage processing	31	7	31
Warehouse/storage	9	2	8
Grocery/retail	3	0	0
Child care	3	1	2
Private homes/hotels/motels	4	1	1
Transportation	2	1	5
Ice rinks/sheets	5	3	5
Other*	14	4	7
Unknown	7	1	1
Total	**107**	**21**	**61**

*Other: paper/printing (4), other metal products (1), sanitary services (3), research and development (2), Public order/safety (1), agricultural services/productions and livestock (2), and construction(1).

An examination of the causes of ammonia releases in these two industries (Table 7 - (A complete copy of the Ammonia Report is available in Adobe's Portable Document Format (PDF, 150KB, 12pg.) shows that equipment failure was the major cause in each: 69% (20/29) in manufacturing and 84% (26/31) in food/beverage processing. Within the category of equipment failure, a significant number of releases involved piping: 12/29 in manufacturing and 17/31 in food/beverage processing. Far fewer releases were due to operator error: 14% (4/29) in manufacturing and 10% (3/31) in food/beverage processing. An analysis of causes by industry for the 21 ammonia events associated with injury (Table 8 - (A complete copy of the Ammonia Report is available in Adobe's Portable Document Format (help for PDF) - file size is approximately 150 KB.)) shows that equipment failure was the predominant factor, particularly in the food/beverage processing sector.

Table 9. Evacuations Following Accidental Ammonia Releases at Various Facilities

Industry Type	Number of events	Events with evacuations	Persons evacuated	Person-hours evacuated
Chemical/metal/ equipment mfg.	29	4	92	190
Food/beverage processing	31	17	1,112	4,852
Warehouse/storage	9	5	285	>2,163
Grocery/retail	3	9	0	0
Child care	3	2	35	50
Private homes/hotels/motels	4	3	36	42
Transportation	2	1	3	3
Ice rinks/sheets	5	2	115	Unk.
Other*	14	6	196	952
Unknown	7	2	>15	>300
Total	**107**	**42**	**>1,889**	**>8,104**

*Other: paper/printing (4), other metal products (1), sanitary services (3), research and development (2), public order/safety (1), agricultural services/productions and livestock (2), and construction (1).

Evacuations

Table 9 summarizes evacuations by industry type. More than 60% of the evacuations following ammonia releases occurred in the food/beverage processing industry (40%, 17/42) and in grocery/retail (21%, 9/42). Nearly three-quarters of people evacuated due to ammonia (Figure 4 - (A complete copy of the Ammonia Report is available in Adobe's Portable Document Format (help for PDF) - file size is approximately 150 KB.)) were in the food/ beverage processing industry (1,112 people, 59%) and in warehouse/storage (285 people, 15%).

Case Studies

The following are examples of ammonia events that are included in the data:

- >Late one Wednesday evening, a lone workman wearing no personal protective equipment was repairing a compressor at a college ice rink. After adding oil to the system, he accidentally punctured a line carrying anhydrous ammonia and 1,000 cubic feet of the liquid refrigerant was rapidly released. Hot oil contaminated with ammonia sprayed his face and caused eye injuries which required hospitalization. Firefighters who responded to the incident were concerned about the potential for an explosion and used large exhaust fans to vent the sports facility.
- Two young male employees were overcome by chemical fumes and the entire floor of an office building was evacuated (approximately 20 people for one hour) after a half gallon of ammonium hydroxide spilled in an engineering consultant's office. The chemical was used to operate the company's blueprint machine and spilled when a shelf broke. The injured men were treated at the hospital for respiratory irritation. Although the amount seems small, the chemical soaked the carpet and powerful fumes circulated throughout the floor. The fire and police departments evacuated all second floor occupants including an oral surgery clinic. Firefighters cut the portion of the carpet where the chemical spilled and removed it in a metal container for disposal as hazardous waste.
- Twenty-five pounds of ammonia were released at a commercial blue print shop when the protective domed cover on a 100-lb tank sheared the valve as it was being opened. During the evacuation, one

woman fell down the stairs and broke her leg. As a result, she was exposed to the ammonia vapors, suffered dizziness and respiratory irritation, and required hospitalization. One hundred and fifteen people were evacuated for four hours.

- A relief valve on a refrigeration unit at a bottling plant malfunctioned in the open position and released 200 gallons of ammonia. Employees were exposed when they were evacuated into an area downwind of the plume. Eleven employees sustained injuries including eye and respiratory irritation, headache, chest tightness, sore throat and dizziness. Nine employees received on-scene first aid and two were transported to the hospital for treatment. Thirty-five people were evacuated for about four hours from other facilities located downwind.
- An inmate at a correctional facility generated a noxious gas by mixing bleach and ammonia. The inmate and two facility employees sustained respiratory irritation. The employees were treated and released at a local hospital and the inmate was treated at the facility health clinic. Ten people were evacuated for about 1.5 hours.

The HSEES Study

The Hazardous Substances Emergency Events Surveillance (HSEES) is an on-going, state-based project to collect data on spills involving non-petroleum hazardous substances. It is funded by the Agency for Toxic Substances and Disease Registry (ATSDR). In 1992, the New York State Department of Health joined the project that now includes sixteen states. (Other states participating in the study are Alabama, Colorado, Iowa, Louisiana, Minnesota, Mississippi, Missouri, New Jersey, North Carolina, Oregon, Rhode Island, Texas, Utah, Washington and Wisconsin.

The goal of this project is to reduce morbidity (injury) and mortality (death) resulting from hazardous substance emergency events by identifying risk factors in the spill data and providing the information to appropriate audiences such health and safety officers or emergency responders. Measures to reduce morbidity and mortality may include improved employee training, improved use of appropriate personal protective equipment, improvements in equipment maintenance or, perhaps, a process change. The objectives of this surveillance are:

- Describe the distribution and characteristics of hazardous substance emergencies in New York State.
- Describe the morbidity and mortality experienced by employees, responders and the general public that result from hazardous substance emergency events.
- Identify risk factors associated with morbidity and mortality from the release of hazardous substances.
- Identify or develop prevention strategies that might reduce future morbidity and mortality associated with hazardous substance releases.

This factsheet summarizes HSEES data on ammonia releases in New York State from January 1, 1993, to December 31, 1998. For the HSEES project, a reportable event is defined as: an uncontrolled or illegal release or threatened release of hazardous substances excluding petroleum products which involves substances that need to be removed, cleaned up or neutralized according to federal, state or local law.

Health Department staff collects spill data through several means. Most spills are identified by the New York State Department of Environmental Conservation Spill Hotline or the New York City Department of Environmental Protection. Other notices are from the New York State Emergency Management Office and the New York State Office of Fire Prevention and Control. To gather information about each incident, Health Department staff also contacts the people involved: company representatives, responders or medical personnel. Information about each release or threatened release is entered into a database maintained by ATSDR.

Although the HSEES data are useful in generating information that can be used to prevent future releases of hazardous substances and the injuries they cause, the data have limitations. One major limitation is that the HSEES database does not capture every spill, i.e. if a homeowner breaks a thermometer or spills some pesticide. A second limitation is that the analyses are limited by the specific information collected about the spills. For example, identifying causes are limited to "equipment failure" or operator error" without additional details.

The success of this project depends on the cooperation of the people with information. If you are contacted, please provide the information requested. If you have any questions or comments, please

call HSEES staff at 1-800-458-1158, ext. 2-7810, or (518) 402-7810. You can also visit us at our website:
www.nyhealth.gov/environmental/chemicals/hsees/

[1](This fact sheet was supported by Cooperative Agreement Number 296968 from the Agency for Toxic Substances and Disease Registry (ATDRS), U.S. Department of Health and Human Services. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of ATSDR.)

Additional Reading

- U. S. Environmental Protection Agency and Office of Solid Waste and Emergency Response. 1998. Hazards of Ammonia Releases at Ammonia Refrigeration Facilities. EPA 550-F-98-017.
- U. S. Environmental Protection Agency and Office of Solid Waste and Emergency Response. 2000. Chemical Accident Prevention: Site Security. EPA-K-550-F00-002.
- U. S. Environmental Protection Agency and Office of Solid Waste and Emergency Response. 2000. Anhydrous Ammonia Theft. EPA-F-00-005.

Revised: January 2007

http://www.health.state.ny.us/environmental/chemicals/hsees/ammonia.htm

Toxiocology and Poisoning, Ammonia

Toxicology and Poisoning

Ammonia

http://www.mednets.com/index.cfm/fuseaction/articles_ammonia_poisoning_and_exposure_toxicology-Ammonia

Ammonia NH(3) CAS: 7664-41-7: UN 2672 (between 12% and 44% solution); 2073 (>44% solution); 1005 (anhydrous gas or > 50% solution)

Synonyms include ammonia gas, anhydrous ammonia, liquid ammonia, aqueous ammonia, ammonia solution and ammonium hydroxide.

- Victims exposed to only ammonia gas do not pose a significant risk of secondary contamination to personnel outside the Hot Zone. However, victims whose clothing or skin is contaminated with liquid ammonium hydroxide can secondarily contaminate response personnel by direct contact or through off-gassing ammonia vapor.
- Ammonia is a gas that dissolves readily in moisture to form an alkaline, corrosive solution. It can result in fatalities if inhaled.
- Ammonia's pungent odor and irritating properties usually provide adequate warning of its presence; however, olfactory fatigue may occur.

Description --
At room temperature, anhydrous ammonia is a colorless, highly irritating gas with a pungent, suffocating odor. It is lighter than air and flammable at high concentrations and temperatures. It is easily compressed and forms a clear,

colorless liquid under pressure. Ammonia dissolves readily in water to form ammonium hydroxide--an alkaline, corrosive solution. The concentration of aqueous ammonia solutions for household use is typically 5% to 10%, but solutions for commercial use may be 25% to 30% or more.
Routes of Exposure --
Inhalation -
Exposure to ammonia may be fatal if it is inhaled. Ammonia's odor threshold is sufficiently low to provide adequate warning of its presence; however, olfactory fatigue or adaptation can occur, making its presence less detectable.
Skin/Eye Contact -
Even fairly low airborne concentrations of ammonia produce rapid eye and nose irritation. Contact with concentrated ammonia solutions, such as some industrial cleaners, can cause serious corrosive injury. Contact with liquefied ammonia may cause frostbite.
Ingestion -
Ingestion of ammonia solution occurs occasionally.
Sources/Uses --
Ammonia is manufactured by reacting hydrogen with nitrogen. It is among the five most abundantly produced chemicals in the world. About 80% is used in fertilizers; it also is used as a refrigerant gas, and in the manufacture of plastics, explosives, pesticides, detergents, and other chemicals. Small amounts of ammonia occur naturally from decomposition of organic matter.
Properties of Ammonia --
Appearance: Clear, colorless gas at room conditions; easily liquefied; readily dissolves in water to form caustic solutions.
Warning properties: Sharp, pungent odor at = 5 ppm; eye and throat irritation at = 20 to 50 ppm
OSHA STEL (Short Term Exposure Limit) = 35 ppm
NIOSH IDLH (Immediately dangerous to life or health) = 500 ppm
Molecular weight = 17.0
Boiling point (760 mm Hg) = -28 degrees (F), -33.4 degrees (C)
Vapor pressure 67.1 degrees (F) = > 6000 mm Hg
Vapor density = 0.59 (air = 1)
Water soluble (34 g/100 mL)
May burn, but does not ignite readily

Health Effects

- Ammonia vapor is highly irritating to the eyes and upper respiratory tract. Upper airway obstruction, bronchospasm, and noncardiogenic pulmonary edema may occur.
- If skin contact is prolonged (more than a few minutes), ammonia causes severe burning pain and corrosive injury.

Acute Exposure --
Ammonia gas dissolves in moisture to produce an alkaline solution. Exposure to ammonia gas or an aqueous solution of ammonia can result in corrosive injury to the eyes, skin, or gastrointestinal tract.
Respiratory -

Even fairly low concentrations of ammonia produce rapid onset of eye, nose, and throat irritation; coughing; and bronchospasm. More severe clinical signs include immediate laryngospasm and laryngeal edema resulting in upper airway obstruction. Pulmonary edema can occur.
Dermal -
Dilute aqueous solutions (less than 5%) rarely cause serious burns but are moderately irritating. Exposure to concentrated vapor or solution can cause stinging pain, erythema, and vesiculation, especially on moist skin areas. Skin contact with compressed, liquid ammonia causes frostbite injury; severe burns with deep ulcerations may result.
Ocular -
***Even low concentrations of ammonia produce rapid onset of eye irritation.** Contact with high gas concentrations or with concentrated ammonium hydroxide may cause conjunctival edema and corneal erosion.
Gastrointestinal -
Swallowing ammonium hydroxide causes immediate burning in the mouth and throat. Concentrated solutions cause severe pain in the mouth, chest, and abdomen with swallowing difficulty, drooling, and vomiting. Perforation of the esophagus or stomach may occur.
Potential Sequelae -
Survivors of severe inhalation injury often suffer residual chronic lung disease. In cases of eye contact, ulceration and perforation of the cornea can occur after weeks or months, and blindness may ensue. Cataracts and glaucoma have been reported in persons acutely exposed.
Chronic Exposure --
Repeated exposure to ammonia may cause chronic irritation of the respiratory tract. Chronic bronchitis and airway hyperactivity have been noted in several case reports. Chronic irritation of the conjunctiva also has been reported.
Ammonia is not considered to be carcinogenic. At doses that do not cause maternal toxicity, ammonia is not likely to have adverse reproductive and developmental effects. If maternal pulmonary function becomes severely compromised because of irritation or corrosion, there is a possibility of nonspecific effects on the unborn.

Prehospital Management

- Ammonia muses rapid onset of a burning sensation in the eyes, nose, and throat, accompanied by lacrimation, rhinorrhea, and coughing. Upper airway swelling may lead to airway obstruction.
- Ammonia gas or solution can cause serious corrosive burns on contact.
- There is no specific antidote for ammonia poisoning. Treatment consists of supportive measures.

Potential for Secondary Contamination. Victims exposed to only ammonia gas do not pose a significant risk of secondary contamination to personnel outside the Hot Zone. However, victims whose clothing or skin is contaminated with liquid ammonium hydroxide can secondarily contaminate response personnel by direct contact or through off-gassing ammonia vapor.
Hot Zone --

Rescuers should be trained and appropriately attired before entering the Hot Zone. If the proper equipment is not available, or if rescuers have not been trained to use it, call for assistance from a local or regional hazmat team or other properly equipped response organization.

Rescuer Protection -

Rescuers in the Hot Zone should wear self-contained breathing apparatus (SCBA). Chemical-protective clothing and gloves are required if contact with anhydrous ammonia gas or concentrated ammonium hydroxide is possible.

ABCs -

Quickly establish a patent airway. Stabilize the cervical spine with a collar if trauma is suspected. Administer supplemental oxygen and assist ventilation with a bag-valve-mask device if necessary.

Victim Removal -

If victims can walk, lead them out of the Hot Zone to the Decontamination Zone. If a victim is unable to walk, remove him or her on a backboard or gurney. If there is no means of transport, carefully drag the victim out.

Decontamination Zone --

Victims with exposure to only ammonia gas and with no skin or eye irritation do not need decontamination. They may be transferred immediately to the Support Zone. For all others see Basic Decontamination on the following page.

Rescuer Protection -

Rescuers in the decontamination zone should wear self-contained breathing apparatus (SCBA) and chemical-protective clothing and gloves if they will be caring for victims with ammonia-soaked clothing or skin. If the proper equipment is not available, or if rescuers have not been trained to use it, call for assistance from a local or regional hazmat team or other properly equipped response organization. If the decontamination area is outdoors and has good natural ventilation, a lesser level of respiratory protection may suffice.

ABCs -

Quickly establish a patent airway in the patient. Stabilize the cervical spine with a collar if trauma is suspected. Administer supplemental oxygen
if available. Evaluate the need for an intravenous line, cardiac monitor, and life support.

Basic Decontamination -

Rapid skin decontamination qs critical. Remove and double-bag contaminated clothing while flushing exposed areas. Patients who are able and cooperative may remove their own clothing and assist with basic decontamination.

Flush liquid-exposed skin and hair with plain water for at least 5 minutes.

Flush exposed or irritated eyes with plain water or saline for 3 to 5 minutes. Remove contact lenses if present.

In case of ammonia ingestion, do not induce emesis. If the patient is conscious and able to swallow, administer 1 to 2 glasses of plain water to dilute stomach contents.

Transfer to Support Zone -

As soon as basic decontamination is completed, move the patient to the Support Zone.

Support Zone --

Be certain that patients have undergone basic decontamination (see Decontamination Zone above). Patients who have undergone proper

decontamination or have been exposed to only vapor pose no serious risk of causing secondary contamination. Support Zone personnel require no specialized protective gear in such cases.

ABCs -

Quickly establish a patent airway. Stabilize the cervical spine with a collar if trauma is suspected. Watch for signs of laryngeal edema and airway compromise such as progressive hoarseness, stridor, or cyanosis. Administer supplemental oxygen and assist ventilation with a bag-valve-mask device as needed. Evaluate the need for an intravenous line, cardiac monitor, and life support.

Advanced Treatment -

Intubate the trachea if necessary (severe respiratory distress or coma). When endotracheal intubation cannot be performed due to airway obstruction, perform cricothyroidotomy if equipped and trained to do so.

Treat hypotension and seizures in the conventional manner. Treat bronchospasm with aerosolized bronchodilators.

Additional Decontamination -

If skin or eyes remain irritated, continue flushing with plain water or saline until pain is relieved or definitive medical treatment is obtained. Remove contact lenses if present.

In case of ammonia ingestion, do not induce emesis. If the patient is alert and able to swallow, administer 1 or 2 glasses of water to dilute stomach contents. Charcoal is ineffective.

Transport to Medical Facility -

Report to the base station and receiving medical facility the condition of the patient, treatment given, and estimated time of arrival at the medical facility.

If a patient has ingested ammonium hydroxide, prepare the ambulance for possible vomiting of toxic material. Have ready several towels and opened plastic bags to quickly clean up and isolate vomitus.

Multi-Casualty Triage --

If possible, consult with the base station physician or regional poison control center for advice regarding triage of multiple victims.

The following persons exposed to ammonia should be evaluated at a medical facility: those with persistent upper respiratory irritation or other acute symptoms of severe inhalation exposure, persons with eye or skin burns that cover a large surface area, and persons who have ingested ammonia. Persons who have been exposed to only ammonia gas and are currently asymptomatic are not likely to develop complications. After recording their names, addresses, and telephone numbers, they may be released from the scene with follow-up instructions. (See Ammonia Patient Information Sheet.)

Emergency Department Management

- Inhaling ammonia causes rapid onset of a burning sensation in the eyes, nose, and throat, accompanied by lacrimation, rhinorrhea, and coughing. Upper airway swelling may lead to airway obstruction.
- Ammonia gas or solution can cause serious corrosive burns on contact.
- There is no antidote for ammonia poisoning. Treatment consists of supportive measures.

Potential for Secondary Contamination. Hospital personnel in an enclosed area can be secondarily contaminated by vapor off-gassing from heavily soaked clothing. Patients do not pose a contamination risk after contaminated clothing is removed and the skin and hair is washed.

Decontamination Area --

Patients exposed to only ammonia gas and with no skin or eye irritation do not need decontamination. They can be transferred immediately to the Critical Care Area. Other patients will require rapid decontamination as described in Basic Decontamination below.

ABCs -

Evaluate and support airway, breathing, and circulation. Watch for signs of laryngeal edema and airway compromise. Monitor cardiac rhythm.

Treat seizures in the conventional manner. Manage hypotension and shock with IV fluids; pressor agents may be required.

Basic Decontamination -

If the patient has not been decontaminated, perform the decontamination procedure immediately. Patients exposed to only vapor do not require decontamination unless they have skin or eye irritation.

Since contacting clothing or skin wet with ammonium hydroxide may cause burns, ED staff should don chemical-resistant jumpsuits (e.g., of Tyvek*, Saranex*) or butyl rubber aprons, rubber gloves, and eye protection. After the patient has been decontaminated, no special protective clothing or equipment is required for ED personnel.

If the patient's clothing is wet with ammonia solution, quickly remove and double-bag the contaminated clothing and all personal belongings while cleansing the skin. A water wash using copious water (preferably under a shower) should be instituted without delay.

Remove contact lenses and irrigate exposed eyes with water for at least 15 to 30 minutes. An ophthalmic anesthetic, such as 0.5% tetracaine, may be necessary to alleviate blepharospasm, and lid retractors may be required to allow adequate irrigation under the eyelids.

Critical Care Area --

Be certain that appropriate decontamination has been carried out. See Basic Decontamination above.

ABCs -

Evaluate and support airway, breathing, and circulation as above. Continuously monitor cardiac rhythm.

Assess and treat hypotension, seizures, and ventricular dyshythmias in the conventional manner. Patients with significant and persistent CNS depression should be evaluated for the presence of intercurrent disorders (e.g., trauma, hypoglycemia, and drug intoxication).

Inhalation Exposure -

Observe patients carefully for 6 to 12 hours for signs of upper airway obstruction. Administer supplemental oxygen by mask to patients with respiratory complaints. Patients who have received severe exposure may develop noncardiogenic pulmonary edema.

Skin Exposure -

If ammonia solution or ammonia gas was in contact with the skin, chemical burns may result.

Eye Exposure -
If eye irritation or injury is evident, test visual acuity and examine the eyes for corneal damage using a magnifying device or a slit lamp and fluorescein staining. Small corneal defects may be treated with topical ophthalmic antibiotic ointment or drops and analgesic medication. Immediately consult an ophthalmologist for patients with severe corneal injury.
Ingestion -
Give water or milk by mouth to dilute stomach contents. Do not induce emesis because the patient is at risk of abrupt seizures or coma. Do not administer activated charcoal. Gastric lavage with a small nasogastric tube is recommended to remove caustic material from the stomach and to prepare for endoscopic examination.
Antidotes and Other Treatments -
There is no specific antidote for ammonia poisoning. Although administration of corticosteroids is favored by many toxicologists in an attempt to limit esophageal scarring, this treatment is unproven and may be harmful in patents with perforation or serious infection. Hemodialysis is ineffective.
Laboratory Tests -
Chest radiography and ABGs are recommended for severe inhalation exposure or if pulmonary aspiration is suspected. There are no blood levels specific for ammonia exposure that indicate degree of ammonia toxicity.
Disposition and Follow-up --
Consider hospitalization for patients with evidence of respiratory distress or significant skin burns or who have ingested ammonia solution.
Delayed Effects -
Pulmonary injury may continue to evolve over 18 to 24 hours. Inhalation patients who are initially symptomatic should be observed carefully and reexamined periodically. Patients who develop pulmonary edema should be admitted to an intensive care Unit.
Patient Release -
Patients who are currently asymptomatic are not likely to develop complications. They may be released and advised to rest and to seek medical care promptly if symptoms develop. (For a list of symptoms, see the reverse side of Ammonia Patient Information Sheet.)
Follow-up -
Patients whose eyes have contacted ammonia but who have no signs of irritation after treatment may be released. Patients with eye injury should be reevaluated in 24 hours by an ophthalmologist.
Reporting --
If a work-related incident has occurred, you may be legally required to file a report; contact your state or local health department.
Other people may still be at risk in the setting where this incident occurred. OSHA may be contacted for assistance in evaluating workplace conditions, or an appropriate public agency can be notified if a public health risk exists. If appropriate, inform patients that they may request an evaluation of their workplace from the Hazard Evaluation Division at NIOSH.

Ammonia Patient Information Sheet

This handout provides information and follow-up instructions for persons who may have been exposed to ammonia gas or ammonium hydroxide solution.

What is ammonia?

Ammonia is a colorless, highly irritating gas with a sharp, suffocating odor. It easily dissolves in water to form a caustic solution called ammonium hydroxide. Ammonia is among the five most abundantly produced chemicals in the world. About 80% of the ammonia produced is used in fertilizers. It is also used as a refrigerant and in the manufacture of plastics, explosives, pesticides, and other chemicals. It is found in many household and industrial-strength cleaning solutions.

What immediate health effects may result from ammonia exposure? Most exposures to ammonia are by breathing the gas. Even with very short or low-level exposures, most people will notice the pungent odor and experience burning of the eyes, nose, and throat. With higher doses, coughing or choking may occur. Severe exposure can cause death from throat swelling or from chemical burns to the lungs. Skin contact with ammonia containing liquids may cause burns. Contact with rapidly escaping ammonia gas from a leaking pressurized cylinder can cause frostbite injury. Eye exposure to concentrated gas or liquid can cause serious corneal burns or blindness. Drinking a concentrated ammonia solution can cause burns to the mouth, throat, and stomach.

What is the treatment for ammonia poisoning?

There is no antidote for ammonia poisoning, but its effects can be treated and most people do recover fully. Persons who have experienced serious signs and symptoms (such as severe or persistent coughing, tearing eyes or running nose) may require close medical observation for several hours.

Are any future health effects likely to occur?

After a single, short exposure with rapid recovery, no delayed or long-term effects are likely to occur. After a severe exposure, symptoms may progress over 18 hours. Following is a list of some signs and symptoms to watch for. If any of them occur, seek medical care.

What tests can be done if a person has been exposed to ammonia? There are no specific blood and urine tests that can indicate recent exposure to ammonia. Generally, the severity of burns is the best indicator of the seriousness of the exposure. Blood tests and a chest X ray may be done to evaluate possible lung injury, but testing is not needed in every case.

If ammonia contacts the eyes, the doctor may put an orange dye in the eyes and examine them with a magnifying lamp.

Where can more information about ammonia be found?

More information about ammonia may be obtained from your regional poison control center, , your state, county, or local health department; or your doctor. If the exposure happened at work, talking with your employer and coworkers may help prevent future exposures.

These papers make it clear that even concentrations below what is in the tank at the peaker have potential negative health effects.

The following chart makes it clear that even at the solution stored on site this ammonia is explosive:

"Only when you know the hazards, can you take the necessary precautionary measures."

Ammonia, aqueous NH_3(aq) CAS No.: 1336-21-6

(approximately 30% NH_3)
Synonyms: Aqua ammonia, ammonia water, Spirit of Hartshorn, ammonium hydroxide

Physical Properties Exposure Limits

A colorless alkaline liquid with a pungent odor. Limits pertain to the vapor, CAS No. 7664-41-7, not the liquid:
Vapor pressure at 20 °C: 118 torr OSHA PEL: 50 ppm
Melting point: – 77 °C ACGIH TLV: 25 ppm
Boiling point: 36 °C STEL: 35 ppm

Hazardous Characteristics

Overall Flamma- Destructive Absorbed Sensi- Self- Incompatible with:
toxicity bility to skin/eye through skin tizer? reactive? Acids, halogens and other oxidizing agents;
3 1 3 0 No No aluminum, zinc, mercury, and other metals;
silver oxide, hypochlorite solution.*
0: None (or very low); 1: Slight; 2: Moderate; 3: High; 4: Severe.
***Reactivity Hazards**
Although generally considered a weak base, aqueous ammonia reacts violently with most acids. It forms explosive compounds with mercury, silver oxide, and other compounds of silver. It corrodes many metals, notably those in Groups IIA, IIB, IIIA, and IIIB. With the halogens it forms the shock-sensitive, explosive nitrogen trihalides. With household bleach (sodium hypochlorite solution) it forms toxic and explosively unstable chloramines. **The concentration of ammonia in the air above solutions of aqueous ammonia can be within the explosive limits for ammonia (15–28%).** See Bretherick's *Handbook of Reactive Chemical Hazards* for details and for other incompatibilities.
Cited as known to be or reasonably Identified as a reproductive toxin in Frazier and Hage, anticipated to be carcinogenic in NTP-9? No *Reproductive Hazards of the Workplace*? No
Typical symptoms of acute exposures:
Irritation of skin and eyes, which can be severe. Sore throat, abdominal pain, nausea if ingested. Coughing, labored breathing if inhaled; inhalation can result in lung edema but the symptoms often are delayed up to a few hours. Physical exertion during this period can aggravate the symptoms when they do appear. Rest and hospitalization are essential.
Principal target organ(s) or system(s):
Respiratory system, eyes, skin.

Storage Requirements

Store separately, away from acids and oxidizing agents, in a cool, dry, well-ventilated location.

Additional Remarks

In a warm environment, high pressures can develop within a closed container. The aqueous ammonia solutions sold for household uses typically contain approximately 14% ammonia along with a little soap or detergent and perfume. The formula, NH_4OH, sometimes used for aqueous ammonia solutions, is incorrect; the molecular species, NH_4OH, does not exist.
http://membership.acs.org/c/ccs/pubs/CLIPS/JCE20030024.pdf

Product Identification http://www.jtbaker.com/msds/englishhtml/a5916.htm

Synonyms: Ammonium hydroxide solutions; ammonia aqueous; ammonia solutions
CAS No.: 1336-21-6
Molecular Weight: 35.05
Chemical Formula: NH4OH in H2O

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2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Ammonium Hydroxide	1336-21-6	21 - 72%	Yes
Water	7732-18-5	28 - 79%	No

Contains between 10 and 35% ammonia.

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3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED OR INHALED. MIST AND VAPOR CAUSE BURNS TO EVERY AREA OF CONTACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White Stripe (Store Separately)

Potential Health Effects

Inhalation:
Vapors and mists cause irritation to the respiratory tract. Higher concentrations can cause burns, pulmonary edema and death. Brief exposure to 5000 ppm can be fatal.
Ingestion:
Toxic! May cause corrosion to the esophagus and stomach with perforation and peritonitis. Symptoms may include pain in the mouth, chest, and abdomen, with coughing, vomiting and collapse. Ingestion of as little as 3-4 mL may be fatal.
Skin Contact:
Causes irritation and burns to the skin.
Eye Contact:
Vapors cause irritation. Splashes cause severe pain, eye damage, and permanent blindness.
Chronic Exposure:
Repeated exposure may cause damage to the tissues of the mucous membranes, upper respiratory tract, eyes and skin.
Aggravation of Pre-existing Conditions:
Persons with pre-existing eye disorders or impaired respiratory function may be more susceptible to the effects of this material.

Ammonia, Chlorine Gases at Power Plants Hazardous if Released

WASHINGTON, DC, July 26, 2004 (ENS) - Terrorist or accidental releases of gaseous ammonia or chlorine by hundreds of power plants pose a potential danger to 3.5 million Americans that could be removed with existing technology, says a new report by an affiliation of public interest organizations known as the Working Group on Community Right-to-Know.

Dilute aqueous ammonia presents lower health and safety hazards, but does not eliminate the danger entirely, because aqueous ammonia retains limited ability to form a toxic cloud. Solid urea poses less danger because it allows utilities to generate ammonia for pollution control systems on-demand.
http://www.ens-newswire.com/ens/jul2004/2004-07-26-01.asp

7. **Visual Blight:**

The first few years the plant like the existing one will likely operate most of the summer. This is because priority goes to new plants with newer technology. The 70-foot stacks themselves without heat waves will add visual blight to a landscape that already has significant negatives. The view sights chosen for simulation are too low. The points where it will be most visible are Montgomery High School, Montgomery Adult, Montgomery Head start, the homes on the ridge, and the homes on Holiday and Festival Courts. The tiny tops peeking above the sign in the simulation are artificially masked views. People will likely see them from many angles without the sign being in the way. The terrain is not mostly flat. Hilltop Dr. (around 2,000 feet away) is significantly higher than the location on the riverbank as are places in south San Diego. There is also the question of the visibility from the trails now being built in the OVRP. At the last meeting they were estimating operation of between 500 and 1950 hours, which is significantly more than they were originally saying. My impression of the existing plant in its first years of operation was that it was operating every day in the summer months. We have not been shown the records of operating hours that the plant presumably has kept?

8. 9. **Safety & Security:**

There is not an 18-foot high metal sound attenuation wall around this plant. There is a chain link fence with slats. The gate is open when people are present. It would be easy for a terrorist to enter slap some plastic explosive on the tank and be gone before being noticed. Especially since the plant is normally unmanned. This is a terrorist's dream target. I would like to see documentation as to the thickness of the steel, because it appears to be without reinforcement of any kind. As my video shows there are no obstacles to reach the tank. The new location will leave the tank even more exposed. The chain link fence is easy to climb. There are trees that could be climbed if necessary to get a good shot. The tank does not have to be under pressure to produce irritating vapors as the articles show, even at this concentration especially if mixed with other substances on site or brought on site there could be an explosion risk and always is an inhalation risk-other business employees are less than 50 feet away. Accidents can and do happen. Unfortunately attacks can and do happen whether by terrorists or kids playing around. This site has no security at all and should not be allowed to enlarge in this close proximity to people.

Cumulative Impacts:

Not only the air quality issues are cumulative impacts. The inappropriate land use impacts caused by there being no zoning in this area until 1966 need to be considered. We have numerous leaking under ground tanks and brown fields (check the super fund site list) in this area of town. The emissions data from the existing base load plant must also be included as I have said previously and if we are using an eight mile circle CalPine and the peakers on the border as well as the maquiadoras and other polluting industries across the border, the 50,000 plus vehicles crossing the border on a daily basis, the Port of San Diego, the polluting industries in National City, the polluting industries in Barrio Logan, South San Diego and other areas of San Diego, and the substantial traffic on I-805 and I-5 as well as 54 and 905 all need to be considered as cumulative impacts.

Sincerely,

Theresa Acerro
president of
Southwest Chula Vista Civic Association