Bingham County
Planning & Zoning Department
Parcel#RP030301 & RP0304400

January 13, 2025

I ***strongly OPPOSE*** the zone change and dispute the claims made in the application, specifically in reference to section 10-15-3:E&F and its subsections and 10-4-2:B. My opposition is as follows:
10-15-3:E. a. Prime agricultural land should be used as exactly that – Prime agricultural land for the purpose of planting crops and feeding this area as well as the country and the world. Working in conjunction with the neighbors does not mean drastically reducing property values, eliminating their quiet peaceful life (sounds of industry) and causing blowing dirt, asphalt smells, the grinding of gravel, increased truck traffic, the creation of silica (lung cancer causing element such as asbestos), removing the view of the sunsets with 30 plus feet tall earthen berms. Turning this 146 acres into a gravel pit is in NO way working with the neighbors! Sellable property values from estimates from local real estate agents and the internet.sources would drop by as much as 30 to 40 percent. When done this 146 acres would pretty much be worthless ground that would never again produce another agricultural crop.
c. Yes, agriculture business is important to the county. AGAIN, this is not agribusiness; this is natural resource mining. Preserving this for agriculture purposes growing crops (such items that are found on the commodities market:- gravel is not traded on the commodities market , gravel is not a product that can feed the world, nation, state, county or city. SLT Properties has the ability to do just that as they own the ground and it is zoned appropriately for that purpose.
d. Mining is not a subject taught in an agriculture college. Agriculture activities are growing crops to feed people.The ill effects of mining for gravel is the destruction of 146 acres. The other negative impacts would be blowing dirt, noises, smells, and health hazards.
e. This property is prime agricultural land and should be used to produce agriculture. Products that would feed the hungry people of this area. Gravel will in no way help to solve the issue of feeding hungry children in our area. I don't believe that a plateful of gravel will feed and nourish hungry children. By turning this into a gravel pit,this DOES NOT "protect" the agricultural industry. This cannot truly be "reclaimed" to farmland. This will destroy its ability to ever be used as actual farmland again by draining its nutrients.
f. We already have many gravel pits within this area that provide all of the materials that will sustain the growth. What we need in the way of materials is food to feed the hungry people within this urban area. Gravel taken from this area will be used primarily to pave the interstate. When the gravel is gone the land will be useless to any other urban needs.
g. Yes a gravel pit will ensure that there will not be a population center in the area. The zoning does not need to be changed to control the population density in this area. Creating a gravel pit will in fact certainly control the population by creating a worthless piece of ground that will not ever be productive again.
h. The only way to make it commensurate with the physical characteristics is to destroy the existing characteristics and dig till there is rock. There is nothing commensurate about a thirty five foot hole in the ground that will never be productive again.
k. There is no way to protect against water and air pollution by digging into the earth. The filtration properties of the natural ground coverings, such as the aquifer, will be gone and there will be no protections . The blowing of dirt and the smells from asphalt, and the exhaust fumes from diesel engines as well as the silica that will be released into the air. There will also be noise pollution from steel tracks on equipment when equipment is used, backup alarms, the grinding of rocks and trucks. Our most concerning points are the air quality, water quality, and noise level. The air quality that these asphalt plants/gravel plants produce are silica that causes cancer and benzene that creates liver problems. This can severely alter the aquifer, creating contaminants in our water, lower our water table, and/or change

Exhibit
T-3

direction of the water flow that will greatly affect our well. The noise pollution isn't just a convenience for us. It also creates a health hazard for family members that have existing severe PTSD conditions.
10-15-3:F. There is only one of these that needs protection is the prime agricultural ground. The forestry, fiber, and minerals do not need to be protected, what you propose will totally destroy the agricultural ground, along with property values, peace of mind, our health, our quiet neighborhood, the natural sunsets (that will be hidden by large berms of dirt) and our air quality. **BRYAN SEARLE** the PRESIDENT of the IDAHO FARM BUREAU FEDERATION has stated that if the land is sold off to a developer (such as KnifeRiver) that it's never going to be production ag again, whether that's for cattle to graze on or whether that's to produce food:

> Within the last two years , the farmland preservation committee drafted a policy to slow down the loss of land. It is estimated that Idaho has lost 144,000 acres of working land within the last five years. The loss of land is a concern for farmers and a state that relies on agriculture as a major economic driver. Within the last 2 years the farmland preservation committee drafted a policy to slow the loss of land. This policy is a voluntary way to protect themselves, their way of life, and their farm ground from development. The goal is to add financial incentives for farmers, alleviating commodity prices for farmers.

10-4-2:B. The answers in the application fail to answer the part of HOW the land and public health will be protected, as well as encouraging the protection of viable farm land. The intention is to have Knife River come in and create a 35 foot deep hole over the entire 147 acres by removing the gravel, crushing it, and making it into asphalt. That would violate the protection of this agriculture ground, the compressive plan, and the local land use planning. It does not address the emissions created to a small local area caused by heavy equipment exhaust, crushing gravel, the dirt that will be picked up and moved in windy conditions, or smells and chemicals when making asphalt. It does not address the fact that the reclamation would be placing 4 inches of top in the pit throwing grass on it and that is all that would be done. The result would be the loss of another 146 acres of prime farm ground. It does not address the fact that Idaho lost more than 144,000 acres of working ground in the last 5 years.The loss of farm ground is a concern. Brian Searle, president of the Idaho Farm Bureau Federation,and a state that relies on agriculture as a major economic driver states that lost farm ground to a developer is never going to production Ag. again whether that's to feed cattle or to "produce food". Data from the 2020 census shows that Idaho is the second fastest growing state in the country. Farmers are still good at feeding the world but there are thousands of hungry people within our state and country.. Within the past 2 years the farmland protection committee drafted a policy to preserve the loss of farmland. It's known as Agricultural protection areas. It passed the Idaho Legislature this past year. It is a voluntary way for farmers to protect themselves, their way of life and their farm from development. The application said that the area will be returned to agriculture after the gravel is removed. He does not say that it will be a farmable area. Knife River said that when the gravel is gone that they will be gone also with no intention of caring for this 146 acres. I seriously doubt that SLT Properties will take care of the ground either. They will have gotten their money and will not want any responsibility for the care or the future of this now worthless piece of ground. I would suggest that the county should require a 5 million dollar bond before any zone change be permitted so that the county could take care of the ground for the next 1000 years. 4 inches of topsoil is not enough to support a productive crop of any kind. Any fertilizer put on this ground would be quickly washed into the aquifer contaminating it. This area would only support a sparse crop of grass and weeds. Another ill effect would be that most asphalt made for road construction would be that most roads are paved at night to be laid when the traffic has less volume. This means that this community would no longer be able to go to bed with their windows open due to noise, smells, and dust blowing.
The public health and safety aspect was also ignored entirely.

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Risk Assessment in Cement Manufacturing Process

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Abstract:- **Cement is the basic material used for construction activities. The Cement manufacturing process mainly can be divided in to ten stages. From limestone loading to dispatching of cement various hazards takes place which causes harm. The purpose of this project to minimize the risk by using Risk assessment techniques and methods and provide safety control measures, health and safety environment built up and healthy environment create beneficial for human activities. Hazard was properly identify, analysis and assess qualitative and quantitative methods of risk evaluation and risk estimation can be done. Proper recording, documentation process and review from time to time to proper control the cement manufacturing activities.**

KeyWords: Identification of hazards, estimation of hazards, evaluate the hazards, Records and findings, safety control measures, Risk assessment techniques.

1. INTRODUCTION OF RISK ASSESSMENT

Risk assessment is a techniques to properly assess the risks. It is simply a careful examination of the work place to prevent any harm.You have enough precautions to prevent any harm coming to the workers. The aim of risk assessment if no one can injured at the workplace.Accident and ill health at work place of the workers, which affects our business and output is lost.In some countries you are legally required to assess the risks in workplace

2. LITERATURE REVIEW

Alvear- Galindo, Mendez- Ramirez, suggest that when working in cement industry, industrial workers are prone from hazards. Various stages of manufacturing process every stages hazards related personal protective equipments, unsafe condition for doing work. Workers are exposed to hazards in their workplaces affects the health [1]

R. Hamdy, suggest that Hazard faced in each and every stage mining, crushing, stacking and reclaiming, grinding, calcination stage, cooling, material, storage and transportation system. In that production process high risk and hazard created affects industrial workers. Hazard faced in our working environment is noise dust, vibration and emergency response to highlight the impact of changing environment pattern on the level and growth of productivity and efficiency in the industry[2]

Ishak, S. and Hashim, explained that Moreover health safety policy statement should contain its aim. These following points considered safety policy.

1) Safety precautions can be taken from time to time.
2) Personal protective equipment is necessary each and every stage at production process.
3) Standard operating procedure is maintained.
4) Health and safety program conducted.
5) Supervision, training program conducted, risk assessment, information gather these are the basic requirements of health and safety.
6) To use a safety committee.
7) Safety welfare program be conducted, the aims should cover health and safety and environmental issues.[3]

Jousi A., Risk engineering is an important role in cement manufacturing process to eliminate the hazards, examine the performance, to analysis the losses, identify the hazards, providing recommendation, proper record keeping maintained (previous records), Risk engineering. Control all the tasks such as guarding information, behavior of works to mining the risk and provide safety measures.[4]

Bartolozi, L. Castiglione, explains that Continuous improvement day by day to increase the efficiency, In cement manufacturing process to eliminate all wastages. In cement manufacturing process raising etc. quality of product, the cost should be minimize, improving delivery of product, reducing wastages.

Implementation of cement industry day by day to increase the productivity beneficial for our future. New technique be developed to proper control cement manufacturing process. To proper continuous improvement of production process. Input, output and process control management.[5]

Lesliam suggest that to control risk in cement manufacturing plant our working operation should be safe and reliable without any disturbance. Risk evaluation is access any from time to time to provide safety and beneficial for future development our work should be safe and reliable and easily handling of manufacturing process by using simple techniques and easy procedure maintained to provide proper satisfaction.[6]

Occupation health and safety point of view, in the cement plant health and safety environment created to provide proper satisfaction among the workers.

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Winston, H.H and D. Joan suggest that In cement industry pollution prevention is necessary to provide safe and healthy environment built up. To control cement manufacturing process pollution free system should be developed and various safety precautions and guidelines conducted.[7]

3. PROCESS INVOLVED

Cement manufacturing Process divided in mainly in 10 stages:-

1. Mining.
2. Crushing.
3. Stacking and reclaiming.
4. Grinding in V.R.M.
5. Preheating in pre-heater.
6. Burning in kiln.
7. Cooling in cooler.
8. Grinding clinker with gypsum and fly ash.
9. Packing in packers.
10. Dispatch products

Methods :-

1. Risk identification.
2. Consequence analysis.
3. Quantitative, quantitative probability estimation.
4. Assessing the effectiveness.
5. Estimation the level of risk.
6. Risk evaluation.

Using following techniques for my current project work:- Major prone areas such as kiln heating, conveyor belt – raw material movement, dust and suspended particle, material sampling. This technique can be used in my project work.

1. Brainstorming- Generate new ideas and solutions (supervisors, workers etc)
2. Checklists – Documentation of the task
3. Hazard and operability study – proper evaluation, control measures
4. Failure mode and effect analysis- qualitative and quantitative methods used.
5. Fault tree analysis- Identify potential causes of system failures.
6. Preliminary Hazard Analysis- Identifying apparent hazards, assess the severity.
7. Swift if technique- corrective action created and standard operating procedure.
8. Toxicity assessment- Is the process of evaluating whether the possibility exists.

3.1 Types of risk

Likelihood	Low	**Risk Low**
Consequence	Low	
Likelihood	High	**Risk Medium**
Consequence	Low	
Likelihood	Low	**Risk Medium**
Consequence	High	
Likelihood	High	**Risk High**
Consequence	High	

There are five step to conduct risk assessment which are as follows :-

1. List the work task
   (a) Location (location change – risk is change)
   (b) People (Worker unexperienced, not competent)
   (c) Work activity (Different work has different risk)
   (d) Equipment (ladder, scaffold, machinery etc.)
2. Identify the risk
   (a) What are the hazards? (fall of man)
   (b) Who might be harmed? (Workers, visitors, engineer, manufacturer, supervisor).
   (c) How might they be harmed? (due to lack of safety harness- worker may fall)
3. Estimate the risk
   The below figure shows the estimation of risk.

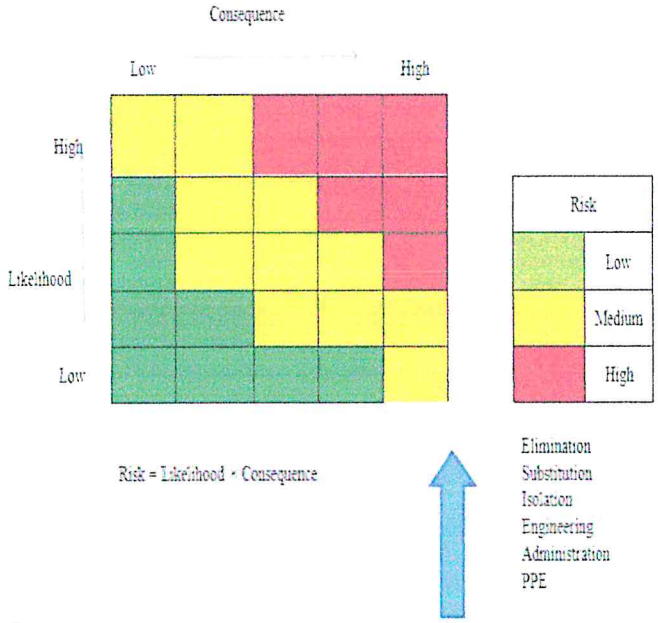

Figure 1 : Estimation of risk

You need to consider two things:-

(a) How likely is it that something could go wrong? (likelihood- possibility of risk)
(b) How serious would the outcome be?

Risk = likelihood × consequence

4. Evaluate the risk
   Likelihood
   5- Very likely
   4- Likely
   3- Fairly likely
   2- Unlikely
   1- Very unlikely
   Consequences
   5- catastrophic (death)
   4- major (big outcome)
   3- moderate
   2- minor
   1- insignificant

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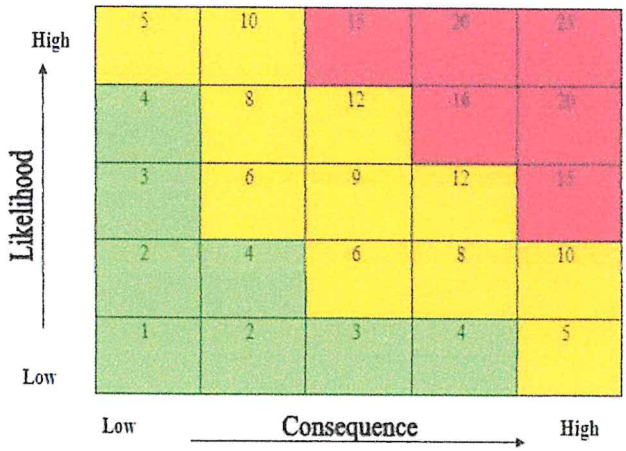

Figure 2 : Evaluating risk

1-4 Low risk (acceptable)
5-14 Medium risk (tolerable for little work)
15-25 High risk (Take immediate action)

5. Record your findings
   (a) The location, activity and equipment
   (b) Being assessed
   (c) Hazard and risk levels (evaluation)
   (d) Risk controls
   (e) Assessor's details
   (f) Date and time
   (g) Review date (1 year, worker change, location change, equipment change review is necessary not wait for the year)

Calculation :-

Risk = L × C

Risk Rating = N × L × C

Where,

N = Number of workers,

L = Likelihood,

C = Consequence

4. VARIOUS HAZARDS

Hazard faced in cement manufacturing process:- Various hazards take place are as follows:-

1. Exposure to dust – Transferring of material as well as storage of material excessive dust create major problems.
2. Unclean platform – To do work in presence of unclean surfaces high risk should be created.
3. Poor supervision – Travelling over and under the transportation system.
4. Electrical hazards – Electrical parts such as cables, some time shocks and vibration possibility.
5. Exposure to noise – In crushing operation excessive noise created.
6. Falling of material – Falling of material at certain height.
7. Hurling of mill parts – From the mill platform high risk built up.
8. Kiln thermal load hazards – Thermal disturbance which affects the surface property.
9. Use of manual work equipment – Handling of material not be proper by poor operating condition of equipments.
10. Work in confined space – Interior work on the basis of clinker production system.
11. Untrained drivers – Drivers are not properly trained they are carelessly in driving position.
12. Inadequate brakes – lack of maintenance possibility.
13. Hit by fly rocks – Bodily injuring during blast operations.
14. Storage of explosive – Exposure to over pressure.
15. Noise and vibration – During drilling operations noisy and vibrating surfaces affects the production processes.
16. Boulder accidents – During blasting operation, Fly rocks and boulder accidents.
17. Accidental fire – Some time fire accident in the transportation of materials.
18. Conveyor hazards – conveyor moving parts contact with people.
19. Mechanical hazards – Mechanical equipment failure.
20. Use of lifting – Lifting equipments have high risk from loading of materials.

4. RESULT

1. To determine the acceptable level of risk by using risk assessment techniques and methods and provide safety control measures. High risks range (15- 25) , to reduce this risk to take immediate action is required using safety control measures. Risks should be minimized as an acceptable level to manage it (1-4).
2. To minimize the risks, risk control can involve monitoring, re- evaluation, and compliance with decisions.
3. Proper action is necessary to implementing risk evaluation decisions at time to time.
4. It is good practice to review assessment for particular time to time (1 years) to be done. The level of documentation on the basis of legislated requirements.
5. To minimize major prone areas risk by using five basic steps to conduct risk assessment and provide safety measures.

Air borne dust :- R= L × C = 3×3 = 9 (Medium Risk).

To minimize this risk control measures apply such as PPE, Dust suction system etc. So R= 1 ×1= 1, this type of protective measures activities the overall risk is to be reduced. Similarly other prone hazards area of high risks is minimized by using risks assessment techniques and methods to provide control measures.

5. CONCLUSION

In this project we study about cement manufacturing process & identification of hazards at each and every stages of cement manufacturing process. major prone areas working that part using risk assessment techniques and methods to minimize the risks and control measures.

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6. FUTURE SCOPE

Furthermore, the research push the management to adopt best practices to remove the waste of the overall process. The application will be extended to different cement companies taking in consideration the impact of maintenance practices on productivity .In addition, it will consider establishing a reference guideline of a standard procedure based on the process of maintenance protocol development for cement companies.

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ONE BREATH PARTNERSHIP

You don't want to live near a concrete batch plant. But TCEQ lets it happen too easily.

August 11th, 2020

There are at least 188 concrete batch plants in Harris County, more than any other county in Texas. Photo: Allyn West.

By Allyn West

"Literally," Texas state representative Armando Walle says, "you can't breathe."

The residents the Houston Democrat has represented since 2008 in House District 140,

which includes the city and parts of unincorporated Harris County between Loop 610, Beltway 8, Highway 290 and the Eastex Freeway, tell him that the dust that blows from concrete batch plants covers their roofs, their cars, their barbecue pits. They can't go outside. They can't have friends over.

The dust, they tell him, is everywhere.

That dust, a kind of air pollution called particulate matter that can penetrate deep into the lungs, is just one part of the problem that concrete batch plants present. Because the Texas Commission on Environmental Quality (TCEQ) grants them 24-hour permits, heavy diesel trucks line up as early as 2 a.m. to idle noisily on local streets, waiting to pick up as many as 150 loads every day, emitting even more pollutants like black carbon and nitrogen dioxide. These trucks, Walle says, tear up yards, drainage ditches and other infrastructure governments have to repair. Even attempts to water down the dust end up creating an ugly muddy slurry that tracks all over the community.

That's why, earlier this year, Walle and 280 residents showed up at a meeting to demand answers from a company seeking a permit for a new plant near hundreds of homes in Aldine. It was heated, Walle says, until the owner slipped TCEQ a note to withdraw the request in the middle of the meeting. That came just one week after a company seeking a permit for a new plant next door to a couple's home and a park in Acres Homes agreed, after years of residents' pressure, to build it somewhere else.

Keeping these plants out were wins for the health of these communities. But there are

already eight concrete batch plants in Aldine. On the other side of I-45, in District B, which includes Acres Homes, there are more than a dozen. Environmental Protection Agency data compiled by the Houston Chronicle show that there are at least 188 plants in Harris County alone, the most in Texas.

And there are more in Texas than any other state. Though they produce one of the ubiquitous materials of cities, the concrete we pour for everything from sidewalks to stormwater pipes to skyscrapers, the unique combination of Houston's lack of zoning, the region's relentless outward growth and an overly permissive state environmental agency means that too many concrete batch plants are making it too hard to breathe.

What happens at concrete batch plants?

Behind the fences, mountains of sand and rock and aggregate are loaded around the clock into the drums of the trucks. That, says Corey Williams, research and policy director for Air Alliance Houston, is the largest source of the dusty, gritty pollution that Rep. Walle has heard so much about.

That's also the only place, Williams says, where the plants are required to control the pollution. A vacuum system is supposed to suck the dust into a baghouse, which is supposed to filter out the particulate matter.

The problem, Williams explains, is that baghouses have to be maintained and emptied regularly. When they're not, or when that's done improperly, they end up making even more of a mess. It's like when you forget to

change the vaccum cleaner bag at home — except, in Texas, no one's coming to remind you.

TCEQ, Williams says, rarely returns to plants once permits are granted to inspect the baghouses and other operations. Companies are expected to clean up after themselves. "Nobody's checking," Williams says, "unless somebody from the community is vocal and makes complaints about emissions."

But, without air monitors, residents might not know about those emissions. It's dusty, but they might not know that they're breathing one of the deadliest kinds of air pollution. Particulate matter is linked to serious health conditions, including reduced lung development in children, higher rates of asthma, bronchitis, heart disease and cancer. The most recent data, compiled from a range of sources, including satellite imagery, show that, in Houston in just 2015 alone, particulate matter was linked to 5,200 premature deaths.

Volatile organic compounds (VOCs) are also a problem at concrete batch plants, Dr. Latrice Babin, director of Harris County Pollution Control, says. VOCs can irritate the eyes and respiratory system and cause shortness of breath, headaches, fatigue, skin problems and impair the memory. Higher concentrations of VOCs, she says, can even damage the liver, kidney and brain.

"Living near these facilities," says Fern Uennatornwaranggoon, air quality policy manager with Environmental Defense Fund (EDF), "you are exposed to higher levels of harmful pollution." Even inside a community, the pollution from a concrete batch plant can

be comparable with the pollution along a congested freeway.

The findings of new research from EDF, which drove 32,000 miles in 22 Houston neighborhoods with air monitors mounted on Google Street View cars, Uennatornwaranggoon says, "confirm communities' lived experience. They've always known where these problematic facilities are." In Houston, almost one-third of the concrete batch plants in the city are located a short walk from a school or daycare.

The health impacts of this pollution are profound, and they are disproportionately borne. Because land has been cheapened by redlining, disinvestment, restrictive covenants and environmental racism, polluters concentrate unevenly across the region, often intentionally in communities of color and low wealth, compounding other issues and creating entrenched disparities, almost all of which are being exacerbated by the coronavirus pandemic. Those who are exposed the most to pollution are the least responsible for it.

Fifth Ward, on the other side of the freeway from Acres Homes, has four concrete batch plants and 10 metal recyclers — and has higher rates of COPD, coronary heart disease and stroke than the city average. Asthma rates edge close to 11 percent, compared with 7 percent in River Oaks — where there are stormwater pipes and sidewalks and skyscrapers, but not a single concrete batch plant.

What can be done?

As residents in Aldine and Acres Homes prove, relentless community organizing can keep new concrete batch plants out — if the community knows when one's coming in. TCEQ requires companies to post signs at proposed sites and print notices in a local newspaper to get their permits, but that's "the bare minimum," Williams says. The state is burdening the communities threatened by these plants to protect themselves. Unless you drove by or scoured the fine print, you'd never know.

Dr. Bakeyah Nelson, Air Alliance Houston's executive director, has said that permits should also consider the context of the site and the cumulative impacts of exposure to many sources of pollution. The permit, she said, shouldn't be based only on what is supposed to happen inside the fence.

What's needed most going forward is a reevaluation of the entire permitting process. "The issue is lax enforcement from the state, and I think it's by design," Walle says. "I can't remember the last time TCEQ rejected a permit."

He says he has filed bill after bill in recent legislative sessions to require more protections. Right now, for example, plants are required to maintain a buffer zone only of 440 yards from the nearest school, home or church. He thinks that should be increased. He thinks TCEQ should conduct more inspections. He thinks the agency should scrutinize permits more closely. He thinks the state should be more creative, he says, and give local health agencies and pollution control more authority.

He'd like to see TCEQ have the budget to hire more full-time employees who can focus on this particular problem, he says.

The bills, he says, go nowhere. "Industry kills them."

But pollution is killing Texans. It's inconvenient for industry and those in power to listen to people in communities like Aldine and Acres Homes, but that's who we need to listen to, and work together, so everyone can breathe clean air.

"Do you want to live next to a concrete batch plant?," Walle says he has asked the owners of companies who are seeking permits that, right now, don't always lead to plants that are good for the health of the community. "I'm not saying they're bad people," he says. "I'm saying, Be better neighbors."

West is a senior communications specialist for the Environmental Defense Fund. You can follow him on Twitter @allynwest.

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9 Hazards from chemical reactions and flammable materials in batch reactor operations

R. ROGERS

9.1 Introduction

Many of the chemicals used in industry can present safety, health and environmental problems, particularly if either their inherent hazards or those arising from specific operations have not been identified, evaluated and a basis for safe operation of the process developed and implemented. This chapter is primarily concerned with chemical reaction and fire and explosion hazards that may arise during batch or semi-batch processing. The underlying cause of such hazards is associated with energy release and is thus intrinsically linked to the balance between the rate of heat generation, be it from a runaway reaction or an incipient flame kernel in a flammable mixture, and the rate of heat loss.

Safety in chemical production requires not only a knowledge and understanding of the hazardous properties of the materials being handled but also an appreciation of how these are affected by the equipment or process in which they are being used. In contrast to physical chemical properties, hazard data are often not inherent characteristics of a substance, but rather depends on and are changed by the interaction of the substance with the plant situation. This influences not only the experimental methods used to measure these properties but also the interpretation of the data obtained and its relationship to plant-scale operations.

The hazards arising during the operation of reactors can arise from two main areas:

- Uncontrolled chemical reactions, i.e. chemical reaction hazards.
- Ignition of flammable atmospheres, i.e. operational hazards.

It is important that any possible operational or chemical reaction hazard that could arise is considered at an early stage of reactor design. This is not only to ensure provision of an effective basis of safety, but also in order to design a reactor system such that the hazard is prevented from occurring. This minimizes other expensive additional systems needed to protect against the consequence of the hazard.

The hazards from batch reactor operation can arise both from the hazardous properties of the materials being handled, e.g. flammability,

P. N. Sharratt (ed.), *Handbook of Batch Process Design*

explosibility and also from the reactions themselves. A systematic procedure is therefore required to identify and evaluate any potential hazards and also to develop a safe method of operation or 'basis of safety'.

9.2 Hazard identification

Batch chemical manufacture usually involves the production of relatively small quantities of (kilograms to hundreds of tonnes per year) of chemicals that are designed and produced for their effect, e.g. pharmaceuticals, agrochemicals, dyestuffs, etc. The process chemistry is often complex, sometimes incompletely understood and requires multistage synthesis. This invariably leads to a high frequency of change as processes are improved and developed and, in order to be economic, the plants are necessarily reusable or multiproduct. Naturally, to meet marketing requirements a rapid response to change is required. A systematic procedure to ensure safe manufacturing in a manner that is compatible with production, engineering, financial and marketing requirements needs to be used. The systematic procedure should assess the hazards that may arise from both chemical reactions and process operations. The essential stages of a hazard assessment include:

- Characterization of materials.
- Identification of sources of hazard.
- Assessment of the risk in the specific manufacturing process.
- Definition/design of safety measures most appropriate to the process.

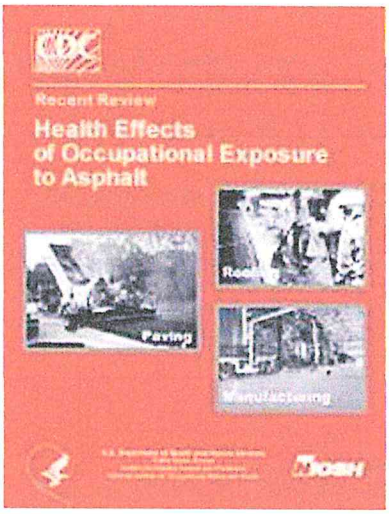
In response to this problem ICI Fine Chemicals Manufacturing Organization developed such a procedure over a period of 10–15 years [1–3]. This procedure, which is carried out in addition to and interrelates with other hazard studies, e.g. hazard and operability studies [4], provides a technical evaluation and understanding of the hazards of a process and ensures that safety measures are precisely but simply specified and implemented.

The systematic assessment procedure relies on three key elements: a defined procedure, selective technical examination and specification of a 'basis of safety':

- *A defined procedure.* This specifies the what, when and how of the assessment and details the responsibilities for the various stages.
- *Selective examination.* This involves the technical assessment of the hazards of the process leading to a specified safe envelope or boundary for its operation.
- *Specification of a basis of safety.* The basis is specific to the proposed plant and operation conditions.

This assessment procedure is applicable to the evaluation of both chemical reaction and fire and explosion hazards of batch reactor operation.

Asphalt can be toxic to humans[123]. The fumes emitted from asphDHHS (NIOSH) Publication Number 2001-110



As part of its mandate to "provide a safe and healthful workplace for working women and men," the National Institute for Occupational Safety and Health (NIOSH) critically evaluates the scientific data on potentially hazardous occupational exposures or work conditions and makes recommendations that address measures for minimizing the risk from the hazard. This document, Hazard Review: Health Effects of Occupational Exposures to Asphalt, is an evaluation of the health effects and other relevant data that have become available since publication of the 1977 NIOSH document Criteria for a Recommended Standard: Occupational Exposure to Asphalt Fumes. It includes an assessment of chemistry, health, and exposure data from studies in animals and humans exposed to raw asphalt, paving and roofing asphalt fume condensates, and asphalt-based paints. Most important, the document serves as a basis for identifying future research to reduce occupational exposures to asphalt.

The complex chemical composition of asphalt makes it difficult to identify the specific component(s) responsible for adverse health effects observed in exposed workers. Known carcinogens have been found in asphalt fumes generated at work sites. Observations of acute irritation in workers from airborne and dermal exposures to asphalt fumes and aerosols and the potential for chronic health effects, including cancer, warrant continued diligence in the control of exposures.

alt can cause skin irritation, lung irritation, and burns[1]. Additionally, known carcinogens have been found in asphalt fumes generated at work sites, which may lead to chronic health effects, including cancer[2]. Asphalt plants are also sources of air pollution that emit dangerous pollutants[3].