[redacted]-Process Improvement Engineer-Repeat tests-Routine.

I informed Drs. Kotin and Blalock that I needed the retest results on the above prior to June 10, 1974 or sooner. They are working to complete all of these and get the results back immediately.

Since Dr. Kotin is leaving the area and we are near the end of our preliminary testing program, it might be a good idea to have a meeting with Dr. Kotin, Dr. Adams, Mr. Carey, Mr. Barr and yourself to bring everyone up to date on what has been accomplished and to answer everyone's questions.

EMS*fgs

cc: T. L. Carey

EMPLOYEE NAMES REDACTED

Stewart-Todd Associates, inc.

H. L. WATSON

RECEIVED
JUL 2 1974
R. FLEMING, V. P.

MEMORANDUM

TO: Howard Watson

FROM: Alan S. Todd

SUBJECT: Report on Calvert City and Pensacola Plant Environmental Health Program

DATE: 17 June 1974

Status report resulting from the May 28th and 31st plant familiarization trip. Suggested program additions and/or modifications are included for your consideration and comment.

CALVERT CITY PLANT

Vinyl Chloride

The monitoring program for vinyl chloride exposure done by continuous GLC sampling is performed correctly with appropriate calibrations. Air concentrations typically range from 10 - 30 ppm with an average of approximately 20 at this time. Personal air sampling (TWA) previously done appears to be in good agreement with the results from the continuous TLV. The somewhat lower values reflect time spent away from operating areas at lunch, etc.

Recommendations

The weekly leak testing program should be reinstituted if air levels are to be further reduced below the 20 ppm average. Personal dosimetry should be initiated as soon as the sipin pumps on order are received. Additional efforts should be made to ascertain the sources of excursions above the 30 ppm which appear to occur approximately 20 - 30% of the time.

Ventilation

The dilution ventilation system which consists of wall fans on all levels is performing satisfactorily. Additions or modifications to this system will not have a large impact on total vinyl chloride levels in the plant, but may be helpful in reducing levels in some areas. The reactor ventilation system currently consists of two copus blowers. A new system now on order should be more effective. This, coupled with the system for ventilating through the tank bottoms should help reduce some of the excursions noted above. These systems and a local flexible exhaust system for use adjacent to common leak sources could be expected to reduce vinyl chloride levels in the operating areas to approximately 10 ppm. The blend tank exhaust systems recently installed with a corrosion resistant fan should

be checked to see if the air flow through the man entry is in excess of 100 feet per minute (FPM).

Recommendations

All exhaust systems should be checked at installation and periodically either through the plant process engineering group and/or the safety engineering to see if they perform initially at design capacity and continue to do so, on at least a semi-annual basis.

PVC Warehouse

The Beckman GLC monitoring system was not operating on the day of the inspection. Previous data appears to indicate average levels of approximately 10 ppm. This is in agreement with known levels in similar installations. The warehouse is not equipped for local or dilution ventilation.

Recommendations

To reduce levels to 5 or less ppm, dilution ventilation and a vacuum pickup system should be considered. You might anticipate, with a properly designed ventilation system and good housekeeping, maintenance of levels of 5 ppm or less. in the warehouse.

PVC COMPOUNDING PLANT

All personnel entering the lead compounding area are currently required to wear approved respirators. Organic lead exposures occur during manual bag dumping into blender tanks and from empty bag disposal. Organic tin compounds are poured into containers for transfer to the blenders. The material spilled on the floor probably results both in inhalation exposures and through absorption from contaminated shoes. Blood lead analysis is conducted on 30 men every two to three months. The most recent results indicate all personnel are within normal limits. Previous assays reflected the potential for overexposure which was first indicated by industrial hygiene surveys conducted by Air Products and Liberty Mutual Insurance Company. A blender ventilation system for lead and tin compound additions is being installed. The design engineer stated that the system was to have an air flow velocity of not less than 100 fpm at the outer edge of the blender. The roll mill is currently ventilated to minimize air contamination from this source.

Recommendations

When the blender ventilation systems are installed and meet engineering specifications the requirement for respirator use should be discontinued. If proper bag disposal is implemented the masks should be returned for cleaning and later redistribution by the plant safety engineer. After installation, the blender and roll mill ventilation systems should be checked periodically for performance. The organic tin compound should be drum pumped to eliminate inhalation and absorption exposures. If air monitoring indicates control measures are effective, then blood lead assays need only be done twice annually. Blood tin assays can be discontinued after the drum pump is installed and working properly.

ACETYLENICS PLANT

The caustic flaker was not operational at the time of the inspection. Caustic dust is readily observable on supports on the building. Data on air concentrations or exposure intervals are not available. Occasional odors of alcohols or solvents are detectable in the acetylenics plant area. The process building is not equipped with ventilation at this time.

Recommendations

The caustic recovery operations can be monitored using impingers with dilute acid solutions. Air concentrations can be quantitated by back titrating the acid solutions. The Bendix C115 pump is suitable for these purposes. A limiting orifice to reduce air flow may be needed. The air monitoring should also include a complete description of the task so that approximate TWA exposures can be constructed. The alcohols, ethers and ketones as well as the unsaturated hydrocarbons in the acetylenics plant can be monitored using the Bendix pumps with small SKC charcoal tubes. Activated charcoal will effectively absorb these materials at flow rates up to the capacity of the pump. GLC is the method of choice in quantitating air concentrations. A local ventilation system for use in the process plant may be indicated, however, the design of this system should await at least the results of the initial general air monitoring. Priorities for additional personnel air sampling can only be established when sufficient toxicology data is available on these materials so that a determination of potential health effect problems can be made.

POLY VINYL ALCOHOL PLANT

The odor of methanol, methyl acetate or vinyl acetate are evident

throughout the plant. On the basis of the odor threshold of methanol it is likely that the TLV is exceeded in most areas. Limited air sampling done to date with evacuated gas bottles and the century instruments appear to confirm this subjective evaluation. Sources of air contamination are leaks, open equipment, and to some extent poor housekeeping, i.e. spilled and process materials, etc. were evident in two floors of the building.

Ventilation

Wall mounted fans are utilized for dilution ventilation. These are effective to a limited extent. Heat problems are evident on the upper levels during the warm months.

Recommendations

Dilution ventilation should be added both to reduce solvent levels and reduce the ambient temperature during the warm months on the upper levels. A local exhaust system to be used adjacent to open equipment, major leak sources, etc. should be considered and design of the system can be determined upon completion of the initial surveys. Prompt removal of waste materials etc. would further reduce the environmental solvent levels. With the addition of improved housekeeping, local ventilation and modified dilution ventilation levels below TLV can be readily obtained. General air monitoring can be initiated with the Bendix pumps and charcoal tubes which are suitable for quantitating both area and personnel exposures. This can be followed by personal dosimetry using either Bendix or sipin pumps.

POLY VINYL CHLORIDE EMULSIONS PLANT

Air monitoring has been conducted utilizing large charcoal tubes with Bendix pumps for personal and area monitoring supplemented by use of the century equipment for general air levels and leak detection. The plant in general has fewer problems than most of the vinyl chloride operations. The sources of the vinyl chloride are fewer and more readily controlled. Air concentrations average approximately 10 ppm. GLC monitoring equipment is on order but was not received at the time of the inspection. Other materials in plant such as stabilizers, fungicides, etc. appear to be handled properly and at this time they are lesser problems since they are commonly conveyed by drum pump, thereby minimizing exposures and direct contact. Evaluations of these materials should await control of vinyl chloride in this plant.

Recommendations

Local ventilation may be needed at sites of common leak sources. Design of this system should be considered only after sufficient data is obtained from the GLC system to be installed. Levels of 5 ppm or less probably can be obtained in this plant with continuous monitoring and local ventilation. Dilution ventilation additions may not be necessary.

Further evaluation of exposures to other materials used in the plant should await control of vinyl chloride. Sufficient toxicology data would then be on hand to make an assessment of hazard potentials.

CATALYSTS PLANT

The facility which is in the final stages of completion has no exposure history or data at this time. Toxicology information appears to be limited to sensitization from platinosis and most dates back prior to 1942. Information available appears to indicate that the potential problem is associated with direct skin contact. Exposures to the platinum salts in this plant should only occur either in making up solutions in the 20 gallon containers in which it is received and/or from spillage of the coated pellets during processing.

Recommendations

Coated pellets can readily spill from the conveyor system immediately below the blenders. Curbing and/or pans should be placed around these to retain the wetted pellets so that they are not scattered over the floor resulting in contact when they are cleaned up. Additionally, a vacuum system for pellet recovery should be installed. The cost of the system should more than be offset by the value of the recovered material which can be returned to process. All direct contact with the coated pellets should then be minimized. Additional data, if available on the potential environmental health impact of the platinum salts will be obtained.

SUMMARY OF FINDINGS AND RECOMMENDATIONS (CALVERT CITY PLANT)

Vinyl chloride levels in the polymerization plant can probably be effectively reduced 10 ppm with the local exhaust systems now on order and/or being installed. With well controlled housekeeping, leak detection, etc. perhaps levels of 5 ppm might be attained. More realistically, levels of this order of magnitude probably can be maintained only after some process and/or equipment changes occur over the next two to three years. Vinyl chloride levels in the warehouse and the emulsions plant can be effectively reduced to the 5 ppm by use of ventilation, clean up and appropriate leak control. Air monitoring should be initiated in the acetylenics plant areas and in the poly vinyl alcohol plant. Exposures in the poly vinyl alcohol plant can be readily controlled with proper housekeeping, leak detection and improvements in the ventilation system. Assessment of potential health problems in the acetylenics plant will have to await the compliation of air sampling data and toxicology information on materials to which employees are exposed. The catalysts plant can be

run so as to minimize exposure to platinum salts thereby precluding sensitization problems. Ventilation systems should be checked periodically either by the safety engineer or a centralized plant process group. Respiratory protective equipment should be better controlled both in terms of distribution, maintenance, cleaning and storage. The current status of the medical program was reviewed with the plant nurse and this information has been turned over to Dr. Stewart to assist him in advising you on the medical program.

PENSACOLA PLANT

Vinyl Chloride Plant - Monitoring Program

GLC sampling is done at three points on each of the three floors of the reactor building. An additional head on the third floor is used for monitoring prior to tank entry. Trend monitoring equipment is located on the upper two floors for tank cleaning purposes. The data reviewed appeared very similar to the environmental levels at the Calvert City plant i.e. typical level of 10 - 30 ppm. Reactors lack catalyst charge pots and are washed down after each batch. Therefore, reactor openings have a greater potential for contributing more monomer to the atmosphere than is the case at Calvert City. Tank purging and washdown appears to be approximately equivalent to that used at Calvert City. Three of the reactors are chemically clean and therefore don't normally require tank entry. A continuous leak detection program is pursued and most of the sources of high excursions have been ascertained.

Ventilation

The plant has an elaborate dilution ventilation system part of which was not functioning the day of inspection. A large fan not working on the third floor probably would make a significant difference both in terms of monomer levels and air temperature. A local exhaust system for tank cleaning and entry purposes was in the process of being installed. This system is reported to have the capacity to provide 500 cfm to each of the reactor openings. The second system for the bottom of the reactors has been ordered and is expected to be installed within the course of the next two months. With the addition of these and local exhaust for use at leak points levels of 10 ppm can be attained.

Recommendations

The three systems currently on order should be checked after installation to see that they meet design specifications. Semi-annual measurements of air flow characteristics on these systems should be done through the safety or plant processing engineering group. Levels of 5 ppm in the plant may not be attainable until reactor replacements are made. To reach this level it would probably be necessary to have chemically cleaned reactors with catalysts charge pots included as part of the hardware. The maintenance and storage etc. of respiratory protective equipment should be carefully controlled since the GLC data indicates frequent excursions above the 30 ppm level. Additions or modifications to the ventilation systems should await compilation of data as to the effectiveness of equipment currently on order or being installed.

Vinyl Chloride Warehouse

Vinyl chloride monomer levels in the warehouse are approximately 10 ppm. Air monitoring is by GLC. The primary monomer source appears to be the large quantities of poly vinyl chloride throughout the building. Ventilation is very limited. The upper levels tend to be hot during the summer months. However, the limited occupancy precludes the necessity for cooling at this time. Cyclones have been ordered for improving the bag house air cleaning effectiveness and a vacuum system is being purchased to remove accumulated poly vinyl chloride throughout the warehouse.

Amines Plant

Exposures in the amines plant can consist of any of the nine primary amines from methyl, butyl and the isomers, the alcohols, methyl to butyl including the isomers and ammonia. A characteristic odor is readily detectable both within and outside of the amine plant perimeter. This, however, is not indicative necessarily of over-exposure since most of these compounds have an odor threshold of less than 1 ppm. Limited air monitoring done using the century instruments and a few impinger samples indicate levels of from a few to as high as 50 ppm. The higher levels were obtained with the century instrument, which does not differentiate amines from other atmospheric contaminants. TLVs on the amines being produced range from a low of 5 to a maximum of 25 ppm. They are based on lung irritation from acute exposure. From observations and discussions with plant personnel it is likely that exposure levels approaching or exceeding TLV are common only adjacent to leaks, and I would expect these involve primarily maintenance personnel. Exposure to material from the tower bottoms and pyridine compounds can occur where they are flushed from the units in an open waste water system. In addition, occasional ammonia odor is readily detectable. I would estimate on the basis of odor threshold that levels are approximately 25 ppm or less.

Recommendations

General air monitoring in this plant should be initiated. Bubble sampling with dilute HCL can be used to quanitate total air concentration of the amines and ammonia. Since there can be amine mixtures present it may be necessary to identify the specific amine if the levels exceed 5 ppm in the general air because of the five fold difference in TLV and the ammonia calibrations. Personal dosimetry should only be considered initially for maintenance people or operating personnel working adjacent to or on leaks. Air monitoring for the alcohols can be done with charcoal tubes. It is recommended that the initial data be reviewed before considering additions and/or modifications to the air monitoring program. Limited air monitoring for the

pyridine compounds might be necessary adjacent to the waste water stream. Alternate means for quantitating amine levels could be by use of a portable GLC instrument or extraction and gas chromatographing bubbler samples. Limited method development with either method may be necessary. Toxicology information on the amines will be abstracted for your review. I would not expect long term effects from the aliphatic amine assuming TLV was not exceeded, however, the TLV documentation is admittedly very scanty at this time.

Nitric Acid Plant

Two potential exposures exist in the plant. One from acid which would be primarily a skin contact problem and NO_x which leaks or is vented at various places in the plant. Air monitoring has not been conducted to date.

Recommendations

NO_x should be monitored in the operating area initially. After general levels are quanitated, sources of high levels should be identified, if the data indicated potential for an acute or long term environmental health problem. Teflon gas bags can be used to obtain one cubic foot composite air sample. From these 5 - 10 ml of air can be withdrawn for assay by the modified saltzman procedure. In duplicate or triplicate this procedure will quantitate accurately the general ambient air levels where composite samples are used. A review of the EPA data on NO_x exposures to establish an estimated TLV for short and long term exposures is suggested.

Ammonia Plant

Occasional strong odors of ammonia are present in the plant. Localized areas approaching TLV are present, very likely adjacent to leaks. Data is not currently available on either general plant air levels and/or levels adjacent to leak sites. It is suggested that general air sampling be started using bubblers with dilute acid solution. Since there should be little interference from other air contaminants and ammonia is a simple respiratory irritant more elaborate methodology is not indicated. The exposure of maintenance personnel working adjacent to leaks should be documented.

Methanol Plant

Odor is detectable in the plant area. Air sampling data was available at the time of inspection. On the basis of the odor threshold, I would expect levels approaching or exceeding TLV may occur at least in some areas of the plant.

Ammonia Nitrate Plant

There are three potential problems in the ammonia nitrate plant:

1. The odor of ammonia is readily detectable in some areas of the neutralizer towers.
2. The operator dumping the clay bags into a hopper which feeds the prill coating equipment would normally be exposed to nuisance dust levels exceeding TLV except for the fact that he is utilizing a dust foe respirator.
3. The operator of the frontend loader in the bulk storage warehouse is exposed in excess of the nuisance dust level to a combination of ammonia nitrate and clay dust.

Recommendations

Ammonia levels in the neutralizer tower area could be evaluated as indicated earlier by the use of bubblers. The occupancy in this area is relatively limited and it may be primarily a problem with personnel and/or operators who work adjacent to leaks. The hood ventilation system where the clay bags are dumped should be checked for performance. If the system performs adequately and used bags were properly disposed of, it should not be necessary to use a dust mask for performing this task. The high dust concentration in the bulk warehouse can not be reduced by engineering or ventilation. A system of protecting the operator is needed since he does this for relatively long periods of time on a routine basis. The use of conventional air supplied equipment is precluded since the operator must be mobile and it is very likely that the blower can not have a cab built on it because of visibility problems associated with the high dust concentrations in this facility. If respiratory protective equipment is used it will be necessary for it to have excellent air flow characteristics since the operator must wear it for long periods of time in a relatively hot and dusty environment. Additionally, it would be necessary to indoctrinate him as to the frequency of cartridge change and the necessity for good personal hygiene and cleaning of this equipment to avoid skin irritation problems.

SUMMARY OF PENSACOLA PLANT

The vinyl chloride monitoring program at Pensacola is adequate and properly conducted. Additions to the local ventilation should reduce the concentrations by an estimated factor of two. To obtain levels of 5 ppm or less it may be necessary to replace or modify process equipment over a 2 - 3 year period. Levels in the warehouse can be reduced by a large factor with the addition of the indicated vacuum systems and cyclones in the bag house. Monitoring of exposures

in the other plants at Pensacola should be initiated with the following priorities. First, the methanol, amines and the NO_x monitoring should be done in terms of general air area levels. The ammonia and ammonia nitrate and clay dust exposures can be given second priority. Personal dosimetry should await the results of the general air monitoring before being initiated. All ventilation systems installed, particularly local ventilation, should be checked periodically either through a central process engineering group or safety group. The use of respiratory protective equipment and/or emergency equipment must be carefully controlled directly or indirectly by the plant safety group.

ESCAMBIA PLANT

DECEASED EMPLOYEES

NAME	BIRTH DATE	DATE HIRED	DATE DECEASED	JOB HISTORY FROM	TO	DEPT.	TITLE
[redacted]	11/20/13	10/3/55	8/28/68	10/3/55	12/19/55	Ammonia	Operator
				12/19/55	11/8/56	Ammonia	Sr. Operator
				11/8/56	2/1/57	Ammonia	Acting Shift Super
				2/1/57	6/23/63	PVC	Shift Supervisor
				6/23/63	10/1/63	Ammonia	Shift Supervisor
				10/1/63	7/12/64	MMA	Shift Supervisor
				7/12/64	3/1/68	MMA	Day Supervisor
				3/1/68	8/28/68	PVC	Day Supervisor

Cause of Death: Astrocytoma, Malignant, Left Cerebral Hemisphere

EMPLOYEE NAMES REDACTED

AP0002806