

Personal Mail

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Sent: Sunday, May 10, 1998 6:04 PM
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Subject: Global Project list



projects.doc

Attached is a Word 97 file that summarizes the projects for consideration of the VEC, ECVI and VI coordination group. Bob asked me to compile the list with VEC and ECVI input. I recognize that some of the projects are minor in nature but included for information purposes

If you have any changes or corrections, please let me know. I do want to point out two projects for consideration. ECVI is aware of the IARC update of their epidemiology study on VCM. I do not believe this study was one of the studies that Doll particularly referenced in his study and conclusions on the health effects of VCM, possibly for various technical reasons. Neil, is there anyone familiar with the IARC effort and do we need to get closer to this one. Also please note the study on low temperature combustion at the University of Kyoto. I discussed this project with Dr. Koie when in Europe and indicated that

the work could be problematic. He indicated that Japanese EPA requested this study to be done. We may want to have Dr. Magee interface with the University of Kyoto researchers. D"lane could you relay this message and file to Lou maresca, I do not have his E-mail.

PROJECTS

HEALTH STUDIES

1. MEMORANDUM OF UNDERSTANDING (MOU) WITH THE AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (ATSDR) • the Vinyl Chloride Health Committee (VCHC) signed the MOU with ATSDR in lieu of a TSCA Section 4 testing requirement. The study, which is currently being conducted, will fill a number of data gaps regarding the reproductive and developmental toxicity of vinyl chloride.

Cost: \$700,000 U.S. dollars

2. UPDATE OF MORTALITY AMONG VINYL CHLORIDE WORKERS – This epidemiology study is updating mortality information among US vinyl chloride workers for the years 1983 through 1992. The original study and first update focused on the time periods 1942-1972 and 1973-1982, respectively. Earlier studies have shown vinyl chloride to be associated with hepatic angiosarcoma among exposed chemical workers. K. Mundt is the principle investigator.

Cost: \$500,000 U.S. dollars

3. BRAIN CANCER STUDY – Since the discover of an association between vinyl chloride workers and hepatic angiosarcoma, there has been speculation on the relationship of vinyl chloride with other cancers. The VCHC and K. Mundt are working with investigators at the University of Louisville to examine the possible relationship between vinyl chloride and brain cancer among exposed chemical workers.

Cost: \$150,000 + U.S. dollars

4. MOLECULAR CARCINOGENESIS SATELLITE STUDIES – The VCHC is supporting a series of a study at the University of North Carolina on the formation and repair of DNA adducts to elucidate the mechanisms of vinyl chloride carcinogenesis.

Cost: \$220,000 + U.S. dollars

5. INTERNATIONAL LIFE SCIENCES INSTITUTE ON NON-TUMOR DATA — The VCHC joined with a number of other sponsors to underwrite a project by the International Life Sciences Institute (ILS) to use non-tumor data to quantitatively estimate cancer risk.

Cost: \$10,000 U.S. dollars

6. PHYSIOLOGICALLY-BASED PHARMACOKINETIC (PBPK) MODELING – The VCHC hired a consultant to meet with the Environmental Protection Agency to discuss the use of PBPK modeling for vinyl chloride.

Cost: \$6,000 U.S. dollar

7. **CANCER RISK FACTOR** ----- Review of the technical literature and development of a cancer risk factor for low level exposure to VCM by the sensitive population, i.e. children. Study contractor is the ChemRisk Corporation. *Cost. \$20,000 US dollar*

8. **STUDIES ON THE HEALTH EFFECTS AND POTENTIAL INDUSTRIAL EXPOSURE TO TETRAHYDROFURAN** --- The VI is participating in studies on the health effects and exposure to tetrahydrofuran (THF), a solvent used in the assembly of PVC piping systems. Primary funders for the research are the THF producers, the solvent cement producers and pipe producers through PPFA.

9. **ECETOC DUST STUDY**. Will set PVC dust in context of other material dusts (Results expected in 99)

10. **ASL(ANGIOSARCOMA OF THE LIVER)/VCM-International Association For Cancer Research (IARC) update study-**"Mortality and Cancer Incidence". Study on 12000 workers (Results expected end 98). Supported by ECVI.

11. **CYTOTOXICITY STUDY** (Pr. Nemery , K.U.Leuven). Influence of PVC dust exposure on lung cells (additives' dusts included) . 3 years study. Supported by ECVI.

12. **MAINTAIN THE ASL REGISTRY**----Registry of ASL cases reported in vicinity of manufacturing facilities is being maintained by the APME medical group.

TECHNICAL STUDIES

1. **DIOXIN CHARACTERIZATION** --- Study of the dioxin emissions from the US VCM/PVC manufacturing process. This has been a multi-year project with studies on wastewater, stack gases, wastewater treatment solids, and products coming to completion in 1998. Additional minor emissions vectors will be examined in 1999.

2. **LONG-TERM BEHAVIOUR OF PVC PRODUCTS UNDER SOIL-BURIED AND LANDFILL CONDITIONS** .

(Technical University of Hamburg-Harburg) .

Polymeric degradation of PVC, release of additives, degradation of additives.

3 years study. Results expected end 98.

3. **US CONTRIBUTION TO LANDFILL STUDY** (above) --- Samples of rigid and flexible PVC stabilized with tin stabilizers were added to the original project. The additional samples are being co-funded by the VI and ORTEPA. Also a US expert in the design of US landfills has been contracted to review the landfill project to assess applicability to US waste management practices.
4. **PROCESS EMISSION STUDIES** --- The VI and Uni-Bell PVC Pipe Association has completed studies on the identification and quantification of emissions from the extrusion of typical US pipe compounds. The study has been included in a SPI submittal to the US EPA for development of a government guideline on plastic processing emission estimation. Additional studies on flexible calendered compounds and medical extrusion compounds are in progress. Additional market specific studies are anticipated.
5. **HEAVY METALS IN TOYS** --- A study summarizing the US and Canadian government studies and Greenpeace allegation on the use and exposure from heavy metals in toys was completed by the Environ Corporation.
6. **KYOTO UNIVERSITY** --Incineration test of MSW in a laboratory, with and without PVC, at 200C, 300C, 400C, 500C, and 600C.

LIFECYCLE PROJECTS

1. **LIFECYCLE ASSESSMENT OF INSTRUMENTAL PANEL SKIN OPTIONS** --
A study comparing the environmental profiles of an automotive instrumental panel made from Thermoplastic Olefins (TPO) and Vinyl. The study investigates several ends of life waste management scenarios.
2. **POST-INDUSTRIAL VINYL RECLAIM**-----This is a study of the quantities and type of post industrial reclaim activities in the US market. Study contractor is Principia Partners.
3. **UPDATED APME/ECVM PVC ECOPROFILE REPORT**, with new data related to energy, ethylene and chlorine(to be published in June 98)
4. **COMPLETE REVISION OF APME/ECVM PVC ECOPROFILE REPORT**, with some data related to PVC additives, allowing the interested readers to calculate the basic LCA values concerning PVC compounds (to be published early 99)
5. **EUROCHLOR VCM RISK ASSESSMENT** (to be published in June 98)

FEEDSTOCK AND ADVANCED RECYCLING PROJECTS

1. FEEDSTOCK RECYCLING-----the VI has contributed to the ECVI project on this topic.
2. PAX ROTTERDAM PROJECT (Texaco-gasification process for treatment of mixed plastic household waste). Maximum 10% PVC in a design feedstock of 40000 T/y.
3. FEEDSTOCK RECYCLING PROCESSES DESIGNATED FOR "PVC-RICH" WASTE STREAM (supported by ECVI):

A. Gasification in a slag bed gasifier

Linde KCA Germany is offering a process to gasify waste materials in a slag bath. The basic technology was developed in the 50ies for gasification of lignite and coal. Today it is practised as part of the RCP process in Switzerland to treat MSW. The basic technology seems similar to the molten metal process.

A pressurised reactor filled with slag is heated up to 1400°C. PVC, sand, oxygen and water are fed into the reactor according to the process conditions. The process is exothermic. Resulting products in this reducing atmosphere are a syngas containing HCl and a slag. HCl is stripped with water from the syngas. The resulting contaminated hydrochloric acid has to be purified and distilled from heavy metals, other halogens, sulphur and organics. The syngas needs conditioning according to a specification from the user of the syngas.

B. Pyrolysis in a circulating fluidised bed system:

Akzo Nobel is evaluating a process where PVC is pyrolysed in a circulating fluidised bed (CFB).

The process itself consists of two CFB reactors. In the first reactor PVC waste is dehalogenated and decomposed in a hot sand bed and steam at 700-900 °C. Circulation of the sand is started with steam. Once the reaction has started, the decomposition gases then act as sand carriers, and the amount of steam is reduced to a level sufficient to convert the carbon in PVC to CO and to convert the Cl into HCl. Conditions are set to leave sufficient carbon on the sand for combustion in the second reactor in order to maintain the required sand temperature.

The main constituents of the gas from the first reactor are HCl, CO, H₂, CH₄ and, depending on the feedstock composition, other hydrocarbon

C. High temperature pyrolysis with subsequent incineration:

KEU offers a process where pelletised or granulated waste PVC is pyrolysed in a patented vertical reactor at 900-1000°C. The resulting products are pyrolysis gas and coke. Dust is separated and the gas is partially condensed. HCl is stripped from the pyrolysis gas with

water. The remaining gas is burned together with the flue gas from the coke incineration. The resulting waste heat is recovered in a boiler which produces 40 bar steam. The graphite like pyrolysis coke is burned in a rotary drum incinerator at 1250°C. The resulting slag/ash is vitrified in a special oven at 1500°C.

4. NKT PROJECT (DENMARK). Process for treatment of PVC building waste: NKT Research Center (NRC) has in laboratory and semi-pilot scale developed a process for recycling of PVC cable waste. The objective is to investigate if the NRC process can be further developed for treatment of other types of PVC building waste. The products from the PVC recycling process are : CaCl₂, lead concentrate, coke, organic condensate carbon dioxide and water.

5. FEEDSTOCK RECYCLING OF PLASTIC COATING FROM WIRE AND CABLE SCRAP.

Funded by the Wire and Cable Industries and the MITI. Development of :

- a.. Dechlorination technology from PVC cable
- b. Lead removal technolgy from electrical cable scrap
- c. Copper-removal technology from electrical cable scrap

Budget for the study is 600 million Japanese Yen for two years. VEC is considering a share in the fund at a maximum 50 million Japanese Yen for the study. (app \$400,000 US)

6. NKK PROCESS - De- hydrochlorination technology so that PVC can be used as a reducing agent instead of coke in an iron furnace. Note. NKK is major iron manufacturing company in Japan.

When PVC waste is heated up to 400 C in a closed rotary kiln, hydrogen chloride is produced by the decomposition. Dechlorinated PVC is used as a reducing agent in an iron furnace and the hydrogen chloride is used as a acid wash agent.

NKK will start up a test plant for the dechlorination of PVC included in MSW on March 26, 1998. The test plant has a capacity to dechlorinate PVC waste at 1000ton/year. NKK will complete a performance evaluation of the test plant by July 1998.

7. RECYLING OF PVC RICH PLASTIC WASTE. (A joint R&D with Tokuyama Corporation)

Project to include:

- a. development of dechlorination technology
- b. technical development for usage of hydrogen chloride
- c. technical development for usage of residual hydrocarbon as fuel in the cement kiln

This project includes the construction of a test plant with a 500t/year capacity.

8. **COMPREHENSIVE SURVEY OF NORTH AMERICAN INTEREST** --- This is the second phase of investigation of the feasibility of using ASR as a reductant and fuel for steel blast furnaces. A review of North American steel making capacity and economics of use of ASR in blast furnaces will be considered. This project is being managed by the American Plastic Council (APC) and co-sponsored by the VI , CCC, EPIC and Industry Canada..

GOVERNMENT STUDIES

EU Studies (tenders):

The behaviour of PVC in landfill (Results expected in 99)

Influence of PVC on quantity and hazardousness of flue gas residues from incineration (Results expected in 99).

COMMENTS : Of course, there are many other studies related to vinyl which are underway in Europe. It is very difficult to provide with an exhaustive list.
