



Evaluation of

The Rapid Environmental Impact Assessment Reports

for the

Proposed PVC Project at Krishnapatnam, Andhra Pradesh

and the

Captive Marine Terminal Facility near Krishnapatnam

Prepared by:

Mark Chernaik, Ph.D.
Staff Scientist
Environmental Law Alliance Worldwide, U.S.

November 2003

This document expresses the opinion of its author and not necessarily the opinions of the U.S. office of the Environmental Law Alliance Worldwide or other individuals or organizations affiliated with the Environmental Law Alliance Worldwide.

At the request of the **Capt. J. Rama Rao I.N. (Retd) of SAMRITI**, I evaluated the Rapid Environmental Impact Assessment Reports (REIAR) for the *Proposed PVC Project at Krishnapatnam, Andhra Pradesh* and the REIAR for the *Proposed Captive Marine Terminal Facility near Krishnapatnam*, submitted respectively, by Jacobs H&G Ltd and L & T - Ramboll Consulting Engineers Limited on behalf of Chemplast Chlorochemicals Ltd (Chemplast).

The REIARs contain the following, serious deficiencies.

1. The REIAR for the proposed PVC plant fails to assess how water use will impact the availability of clean water to households within the project area

The proposed PVC plant would consume copious amounts of water: 5000 cubic meters per day initially, increasing to 7500 cubic meters per day when capacity of the proposed PVC plant is expanded in the future.¹ Section 6.4 of the REIAR states, without any further discussion “there will be marginal burden on groundwater in the area and on the existing water resources.” This unsubstantiated conclusion is inconsistent with the uncertainty of the source that would provide the proposed PVC plant with sufficient water to fulfill its daily needs.

Although the REIAR claims that the Sarvepalli Reservoir would be the main source of water for the proposed PVC plant, this claim is refuted by the admission that the Sarvepalli Reservoir does not provide a continuous supply of water.² Hence, Chemplast, which has already approached the Deputy Director of the Nellore District groundwater department, would likely attempt to fulfill its daily water needs by tapping into the local aquifer (groundwater).³ To this end, Chemplast promises that “before tapping ground water [a] detailed and integrated hydrogeological and geophysical study will be conducted at site.”

However, granting environmental clearance and then allowing Chemplast to conduct a detailed hydrogeological study of its possible groundwater use would defeat the fundamental purpose of the environmental impact assessment process, which is to assess environmental impacts before clearance is granted. If there is a realistic possibility that Chemplast might attempt to fulfill its daily water needs by tapping into the local aquifer, then it must conduct a detailed study of doing so as part of the EIA for the proposed PVC plant and before environmental clearance is granted.

2. The REIAR for the proposed PVC plant would emit toxic chemicals in excess of international standards

Vinyl chloride monomer (VCM) is one of the most potent carcinogens known to human health experts. According to the State of California Air Resources Board, lifetime exposure to as little

¹ REIAR, section 4.6.2.

² REIAR, section 5.7.1, page 5-14.

³ REIAR, section 6.7, page 6-6.

as 1 part per billion by volume (ppbv) of VCM causes an additional case of cancer in each 5,000 exposed individuals: “ ... Using the best estimate of cancer unit risk, an estimated 200 cancers may occur in one million people exposed to 1 ppbv of vinyl chloride for a 70-year lifetime.”⁴

Page 6-23 of the REIAR (Table 6.7 – Summary of Plant Emissions and Source Data Inputs for Modeling) shows that the proposed PVC plant would emit 0.29 grams of VCM per second from its major process source, dryer exhaust. This is equivalent to a VCM emission rate of more than 1,000 grams (1 kilogram) of VCM per hour!

This rate of emissions would greatly exceed that permitted by international standards. For example, under standards promulgated by the State of California South Coast Air Quality Control District: “The owner or operator of the air pollution control equipment specified in this rule shall at all times operate such equipment at an efficiency sufficient to limit the total amount of vinyl chloride in the discharge of all such control equipment at less than 50 grams per hour for polyvinyl chloride plants and less than 50 grams per hour for both ethylene dichloride and vinyl chloride plants. Such 50 grams per hour limit shall apply to the discharge of control equipment serving all polyvinyl chloride plants on a premise.”⁵

VCM emission rates from dryer exhaust at the proposed PVC plant would exceed this standard by a factor of 20!

3. The REIAR for the proposed PVC plant underestimates toxic pollutants the plant would emit

The REIAR uses a computer model to predict ground-level concentrations of VCM that would result from the proposed PVC plant.⁶

This model assumes that there would be only two sources of VCM emissions from the proposed PVC plant: 1) Vent 1 Dryer Exhaust (more than 1000 grams per hour); and 2) Reactor Fugitive Emissions (0.36 grams per hour).⁷ To assess the validity of this assumption, I solicited input from Mr. Warren Johnson of the U.S. Environmental Protection Agency.⁸ Mr. Johnson is the U.S. EPA’s foremost expert on PVC plant emissions and headed U.S. EPA efforts to develop

⁴ California Air Resources Board Staff Report (March 1991) “Proposed Identification of Vinyl Chloride as a Toxic Air Contaminant,” <http://www.arb.ca.gov/toxics/summary/vinyl.htm>.

⁵ South Coast Air Quality Control District, Regulation XI, Rule 1163 - Control of Vinyl Chloride Emissions (Adopted June 7, 1985). <http://www.aqmd.gov/rules/html/r1163.html>

⁶ REIAR for the proposed PVC Plant, Section 6.9.4.

⁷ REIAR for the proposed PVC Plant, page 6-23.

⁸ Mr. Warren Johnson, U.S. Environmental Protection Agency, Organic Chemicals Group Emission Standards Division, Research Triangle Park, NC 27711, Tel: 1-919-541-5124, E-mail: Johnson.Warren@epa.gov

hazardous air pollutant emission standards for PVC plants.

According to Mr. Johnson, it is improper to assume that fugitive emissions from a PVC reactor would be the only source of VCM emissions from a proposed PVC plant. Such plants **also** emit fugitive emissions of VCM from **pumps, compressors, pressure relief devices, connectors and valves.**

Data from PVC plants in the U.S. (where fugitive emissions of VCM are strictly regulated) show that such plants emit far more VCM from fugitive sources than Chemplast assumes. For example, one U.S. PVC proudly reported that total fugitive emissions of VCM (of more than 20 grams per ton in 1992) improved to more than 10 grams per ton in 1999.⁹ Chemplast proposes to produce PVC at a rate of 21.25 tons per hour.¹⁰ Generously assuming that fugitive emissions of VCM from Chemplast's proposed PVC plant would also be 10 grams per ton, **fugitive emissions of VCM from Chemplast's proposed PVC plant would be more than 215 grams per hour.** This is nearly 600 times the rate of fugitive emissions assumed in the REIAR.

Because the model the REIAR uses rests on faulty assumptions, it will necessarily underestimate ground-level concentrations of VCM that would result from the proposed PCV plant.

4. The REIAR for the proposed PVC plant lacks an adequate plan for disposal of toxic solid waste

The manufacture of ethylene dichloride (EDC) and PVC generates significant volumes of highly toxic solid waste. For this reason, the U.S. EPA specifically designates that the following materials are hazardous wastes: 1) heavy ends from the distillation of EDC in EDC production; and 2) Wastewater treatment sludge from the production of EDC or VCM, unless disposed of in a landfill.¹¹ The U.S. EPA made these designations on the basis of the high dioxin content these wastes contain.¹²

The REIAR makes no mention of how Chemplast would treat and/or dispose of heavy ends from the distillation of EDC in EDC production.

⁹ OxyVinyls' Environmental Principles Guide the Way at Louisville.
http://www.chemicalguide.com/Public_Pages/What_We_Do.cfm?Params=OxyVinyls%2C%20LP%3DLouisville

¹⁰ REIAR for the proposed PVC plant, page 4-1.

¹¹ 40 C.F.R. section 261.32 - Hazardous wastes from specific sources

¹² U.S. EPA (August 25, 1999) "Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Chlorinated Aliphatics Production Wastes; Land Disposal Restrictions for Newly Identified Wastes; and CERCLA Hazardous Substance Designation and Reportable Quantities."
<http://www.epa.gov/fedrgstr/EPA-WATER/1999/August/Day-25/w20753.htm>

Also, inexplicably, the REIAR seems to propose sale of effluent treatment plant sludge from the proposed PVC plant for “non-critical applications.” It would be untenable, unlawful in the U.S., and create enormous risk to the environment for Chemplast to dispose of these solid wastes in this manner.

5. The REIAR for the proposed PVC plant lacks a life-cycle Assessment of PVC’s impact on the Environment

The combustion of PVC (for example, accidental fires in building or vehicles containing PVC) is one of the single most significant sources of dioxin emissions.¹³ Recognizing these impacts, the European Union has called for a detailed life cycle analysis of PVC manufacture and use in Europe.¹⁴

The proposed PVC plant would burden the environment of India with an additional 170,000 tons per year of additional PVC. However, the REIAR for the proposed PVC plant limits its focus to impacts on the environment in the vicinity of the proposed plant and impacts during construction and operation phases of the plant. This ignores the totality of environmental impacts resulting from the manufacture and use of PVC by society.

6. The REIAR for the proposed PVC plant lacks plans for monitoring VCM emissions and VCM ground-level concentrations

The Environmental Action Plan of the REIAR promises to monitor emissions and ground-level concentrations of conventional pollutants (e.g., particulate matter, sulfur dioxide, nitrogen dioxide, hydrocarbons and carbon monoxide).¹⁵ However, the REIAR does not require Chemplast to monitor emissions and ground-level concentrations of VCM, the single most hazardous air pollutant that the proposed PVC plant will emit.

This is contrary to international standards that require PVC plants to monitor VCM emissions and the ground-level concentrations of VCM they cause. For example, the U.S. Environmental Protection Agency requires PVC plants to conduct continuous emission monitoring of VCM emissions.¹⁶ Other jurisdictions require continuous monitoring of ground-level concentrations of VCM in the vicinity of PVC plants. Under standards promulgated by the State of California South Coast Air Quality Control District, operators of PVC plants must: “1) Provide and operate

¹³ Lemieux, P.M. et al (2000) “Emissions of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from the Open Burning of Household Waste in Barrels,” ENVIRONMENTAL SCIENCE AND TECHNOLOGY, http://pubs.acs.org/hotartcl/est/2000/research/es990465t_rev.html.

¹⁴ <http://europa.eu.int/comm/environment/pvc/>

¹⁵ REIAR, Table 7.2. - Monitoring Schedule During Plant Operation.

¹⁶ 40 CFR Part 61, Subpart F – National Emission Standard for Vinyl Chloride, Section 61.68. <http://www.tnrcc.state.tx.us/air/opd/61/F/68.pdf>

up to four air monitoring stations to continuously measure and record ambient concentrations of vinyl chloride in the vicinity of such plants. The exact number and location of such monitoring stations shall be approved by the Executive Officer; and 2) Provide and operate up to four additional air monitoring stations to continuously measure and record ambient concentrations of vinyl chloride in populated areas near such plants.”¹⁷

7. The REIAR for the proposed PVC Plant lacks an assessment of the consequences of and a plan for responding to an accidental release of VCM or toxic chlorine gas

The extreme toxicity of VCM is noted above. A leak of VCM from the proposed PVC plant would cause enormous injury to life within a wide radius of the proposed PVC plant.

The proposed PVC plant would also store and consume 6200 metric tons of chlorine gas per month.¹⁸ Chlorine possesses one the highest acute toxicities of all industrial gases. A severe but reasonably foreseeable accident, such as a large hole in, or fractures of, a liquid chlorine pipeline; or failure of a road tanker coupling, would release a toxic cloud of chlorine gas fatal to persons within 1500 of the proposed PVC plant.¹⁹

The purpose of an EIA is to provide essential information to government officials and communities about proposed projects, enabling them to decide whether the potential benefits of a project outweigh its potential risks. To fulfill this important purpose, an EIA must describe what would happen in the event of a foreseeable accident.

For example, in Australia: “Chlorine gas storage has been identified as a key target in the program to improve public safety. Concerned about the possible consequences of chlorine leakage, the Division is about to embark on a major campaign to improve safety in this area. Liquefied chlorine gas is highly poisonous, corrosive in the presence of moisture and an oxidizing agent that may cause fire when in contact with organic materials. People wishing to store chlorine gas are now required to include additional information with their application for a licence to store dangerous goods. The purpose of this additional information is to allow the inspector to better assess the potential for off-site risk posed by the chlorine storage.”²⁰

Inexplicably, the REIAR for the proposed PVC plant released in September 2003 lacks an assessment of the consequences of and a plan for responding to an accidental release of VCM or toxic chlorine gas

¹⁷ South Coast Air Quality Control District, Regulation XI, Rule 1163 - Control of Vinyl Chloride Emissions (Adopted June 7, 1985). <http://www.aqmd.gov/rules/html/r1163.html>

¹⁸ REIAR, Table 4.2 - Raw materials, their consumption and mode of transport.

¹⁹ Baxter, P.J. et al (1989) “Medical planning for toxic releases into the community: the example of chlorine gas.” British Journal of Industrial Medicine, 46:277-285

²⁰ www.doir.wa.gov.au/prodserv/pub/pdfs/exp-19.PDF

8. The REIAR for the proposed Marine Terminal Facility lacks an assessment of the harm that would result from an accidental spill of petroleum from a cargo vessel

Accidental petroleum spills from ship traffic cause significant harm to the environment. The risk of a petroleum spill is not limited to oil tankers or other vessels that specialize in the transportation of oil or fuel. The frequency of accidental releases of oil from **cargo** vessels is as great as from oil tankers.²¹ Every marine cargo vessel carries large amounts of fuel oil. Typically, marine cargo vessels use bunker fuel, a type of fuel oil that is especially dense and viscous and that can cause especially severe and long-lasting environmental impacts.

Chemplast proposes to construct a marine terminal facility to import 170,000 tons of VCM per year. As a consequence, numerous cargo vessels will enter and leave the coast near Krishnapatnam carrying many thousands of liters of transportation fuel and metric tons of chemicals. An accident involving any of these ships has the potential to release significant amounts of petroleum into the coast near Krishnapatnam, spoiling productive fishing grounds.

Inexplicably, the REIAR for the proposed marine terminal facility contains no analysis of what would happen to the marine environment near Krishnapatnam if there were an accidental petroleum spill resulting from cargo vessel traffic to and from the proposed port facility. This is a significant omission considering that fishing is a common form of employment in the area.

Environmental impact assessments of marine terminal facilities generally require an evaluation of the potential environmental impacts of accidental petroleum spills from cargo vessels. For example, the World Bank is assisting the Government of Mauritius to prepare an environmental impact assessment of a port development project. The terms of reference for the EIA require an evaluation of the environmental impacts of accidental petroleum and chemical spills from cargo vessels.²²

9. The REIAR for the proposed marine terminal facility fails to require VCM vapor recovery during unloading

The proposed PVC plant will receive all of its VCM by unloading it from cargo vessels to a pipeline. According to Warren Johnson of the U.S. EPA, emissions of VCM during the unloading of a single vessel could exceed VCM emissions from the PVC plant itself if the vessel is not equipped with an adequate vapor recovery system. In the U.S., vapor recovery systems are mandatory for vessels unloading bulk quantities of hazardous volatile liquids, including such as

²¹ Talley, W.K. (2000) "Vessel Accident Oil Spillage: Post OPA-90," <http://www.oduport.org/Talley2.htm>.

²² Environmental Impact Assessment in Port Louis (Mauritius), <http://www.worldbank.org/html/fpd/transport/ports/tor/env-bas2.pdf>

VCM.²³ Conspicuously absent from the Environmental Action Plan for the Marine Terminal Facility is a requirement that all vessels unloading VCM employ an adequate vapor recovery system.

²³ 40 CFR Part 63, Subpart Y – National Emission Standards for Marine Tank Vessel Loading Operations.
<http://www.tnrcc.state.tx.us/air/opd/63/Y/yhp.htm>