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HEALTH & SAFETY LABORATORY

# Interim report on the discharge of Vinyl Chloride Monomer from the Coral Acropora at Runcorn docks on 10th August 2004

**RAS/05/DRAFT**

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# EXECUTIVE SUMMARY


The Hazardous Installations Directorate (HID) of the Health and Safety Executive asked the Health and Safety Laboratory to model a release of vinyl chloride monomer from the ship Coral Acropora which took place on 10th August 2004. The modelling was to assist them in their investigation of the incident, carried out jointly with the Marine Accident Investigation Branch (MAIB).

**Objectives**
This interim report describes modelling work carried out with the objectives of:

- modelling the actual release of vinyl chloride monomer; and
- identify potential consequences of the release.

The modelling was carried out using DNV’s PHAST to model a near-instantaneous release of 600 kg of vinyl chloride monomer under D5 weather conditions. Footage of the release from a nearby security camera shows that the plume went some distance upwind. The upwind extent of this release was difficult to accurately reproduce. Therefore modelling of various wind strengths and of 1200 kg of vinyl chloride monomer was also carried out.

**Main Findings**

1) The modelling is believed to have captured the key processes occurring during the release. Remaining discrepancies are believed to be due to model limitations, difficulty of correlating modelling results to observations and uncertainties in wind strength and quantity released or, most likely, some combination of these.
2) HSE and MAIB should consider the release as having the potential to kill anyone outside and onshore within 50m of the mast riser in the event of a flash fire (which would require a suitable ignition source). This distance refers to people on land and the ship only as a somewhat shorter range would be appropriate directly upwind, which is over the Manchester Ship Canal. The potential for fatality will be mitigated by the 30-60s opportunity for such people to escape the hazardous zone.
3) No credible hazard from toxicity, jet fire, fireball or vapour cloud explosion was found.
4) Finding (2) is based on the best available knowledge at this time. Nevertheless, there remains some uncertainty regarding the dispersion, and thus the hazard posed by this release. Research should be commissioned to improve understanding of events of this type.

# 1 INTRODUCTION

The Hazardous Installations Directorate (HID) of the Health and Safety Executive asked the Health and Safety Laboratory to model a release of vinyl chloride monomer from the ship Coral Acropora which took place on 10th August 2004. The modelling was to assist them in their investigation of the incident, carried out jointly with the Marine Accident Investigation Branch (MAIB).. This request is reproduced in Appendix A.

The request asked for modelling, firstly, of the actual release, secondly, to investigate the potential consequences from releasing vinyl chloride monomer from the ship at dock.

This report gives interim results of the modelling of the actual release of vinyl chloride monomer and some discussion of potential consequences.

# 2 DISCHARGE AND DISPERSION CHARACTERISTICS

Based on information received (Hair, 2005; Inseal, 2005; Appendix A) the Coral Acropora was docked on the Manchester Ship Canal at Runcorn Docks when a release of vinyl chloride monomer occurred during transfer operations, via lifting of a pressure relief valve. The quantity released was estimated at 600kg of vinyl chloride through the mast riser on the ship; the mast riser acts as the vent for the pressure relief valve, which was set to lift at 9.3barg (Appendix A; Inseal, 2004). It is understood that the release is likely to have been of short duration, i.e. about two minutes maximum. It is also understood that release from the mast riser was vertically upwards with a grid or mesh type arrangement in the mast riser, which acts as a flame arrestor (Inseal, 2005). Further information on the dimensions of the pipework and mast riser was supplied by (Inseal, 2004). Figure 2.1 shows schematically what are believed to be the main characteristics of the pipework – valve arrangement.

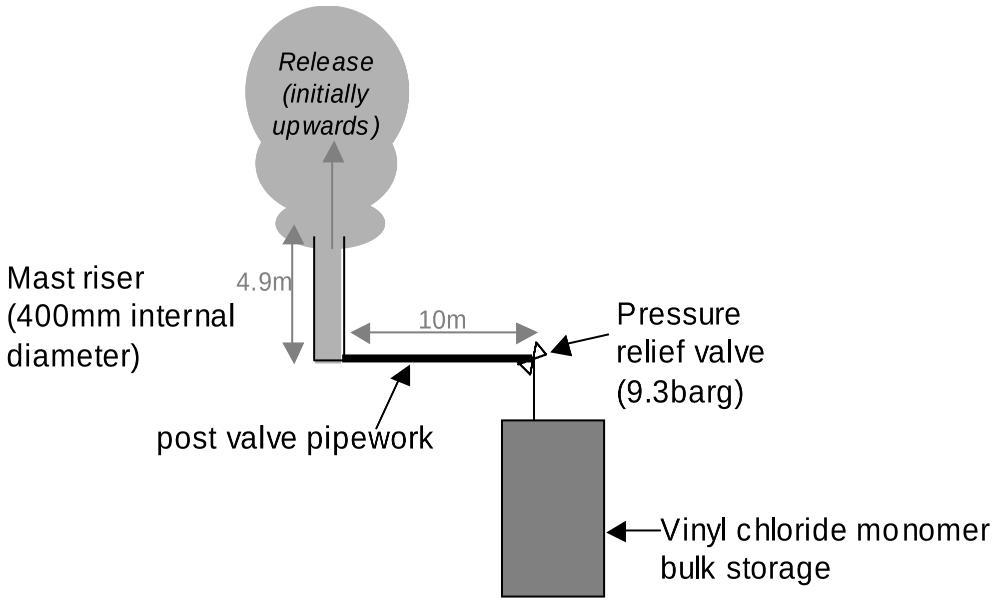



**Figure 2.1** Schematic of main pipework – valve arrangements

It is understood that shortly before the release, the wind was around 5ms$^{-1}$ (10 knots) from the north, with the ship heading at approximately 040° (Appendix A; Inseal, 2004). However a witness has described the wind at the time of the release as being light (Coleman, 2005). The orientation of the ship with respect to wind direction and surroundings (as understood from Inseal, 2004; Appendix A) are shown in Figure 2.2.

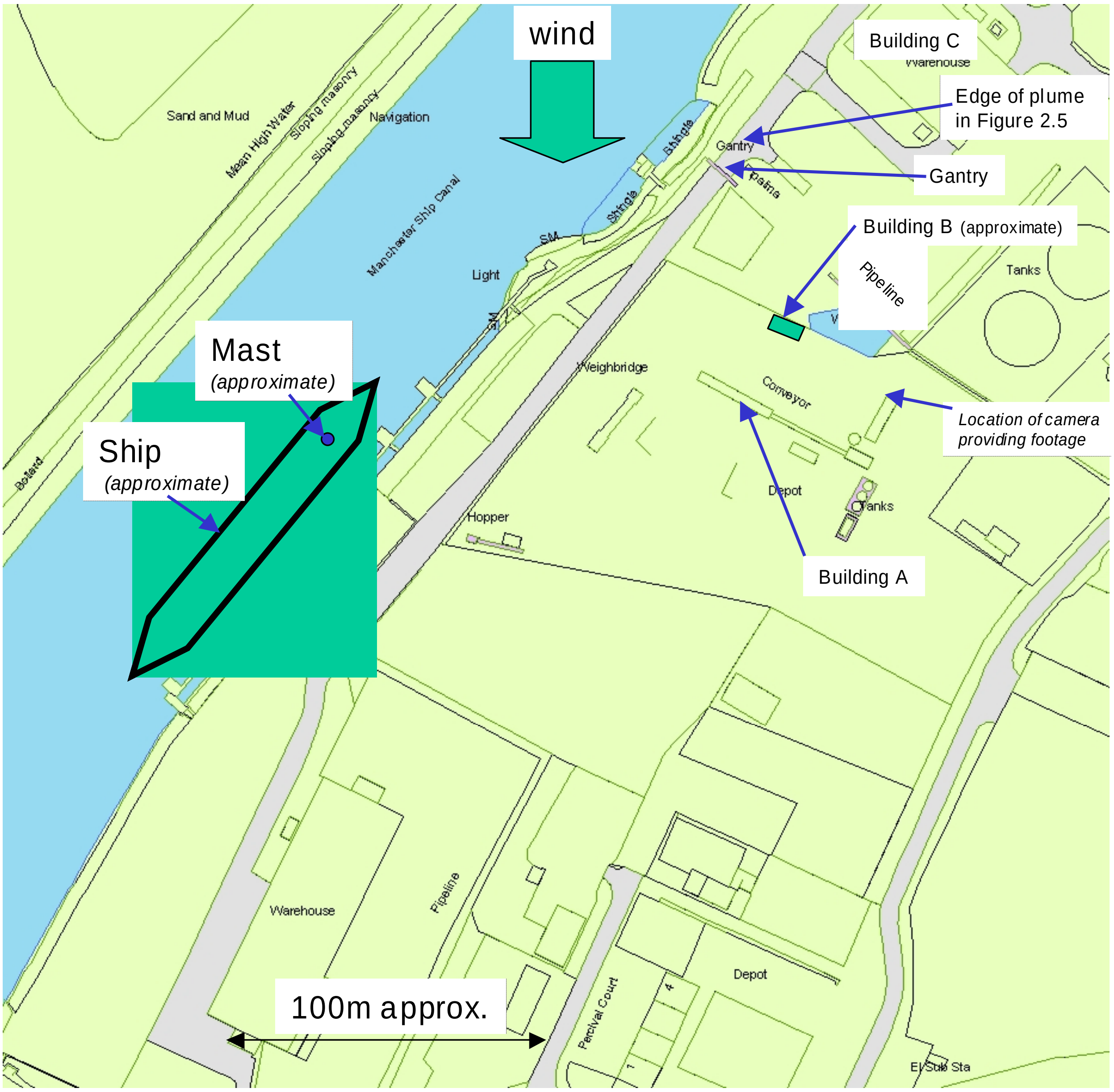



**Figure 2.2** Orientation of ship and wind in relation to other features of interest. North is at the top of the map.

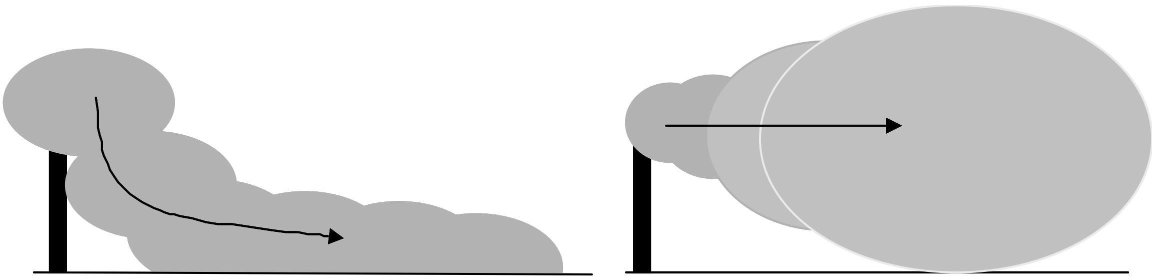
HM Specialist Inspector of Health and Safety David Hair supplied HSL with footage of the release recorded by closed circuit television from a location close to the Coral Acropora. Figures 2.3, 2.4 and 2.5 show stills from the footage; the stills are annotated to show the plume of released vinyl chloride monomer.


**Figure 2.3** Still from footage showing dispersion of plume.


**Figure 2.4** Still from footage showing vertical plume from discharge.


**Figure 2.5** Still from footage showing edge of plume beyond gantry (upwind).

A key point to note from these stills is that the plume is on the ground rather than in the air centred at around the height of release from the mast riser. The footage shows that the plume moves along the ground. This type of dispersion is known as 'dense gas' dispersion because the plume is denser than the surrounding air and, therefore, sinks to the ground. Potentially, this type of dispersion can give a greater concentration of a harmful substance than otherwise expected. This is because the gas is relatively heavy compared to the surrounding air and has a tendency to sink to the ground rather than mix (relatively) freely with the surrounding air. This difference is shown schematically in Figure 2.6 below.



(a) (b)

**Figure 2.6** Schematics of (a) dense gas dispersion (dispersing gas density greater than surrounding air); and (b) 'passive' dispersion (dispersing gas density similar to surrounding air).

This ‘dense gas’ dispersion is expected for releases of substances which are gases at normal atmospheric pressure and temperature but stored under pressure as liquids, such as vinyl chloride monomer in this case. When such a liquefied gas escapes confinement, it expands and, if there is still liquid in the escaping substance, it evaporates. Expansion and evaporation of the substance uses energy, usually at a much faster rate than is supplied from the surroundings. Therefore the substance cools, leading to a plume that is much denser than the surrounding air. Often, where there is liquid remaining, this cooling may be assumed to reduce the substance to its atmospheric boiling temperature (because below the boiling temperature there will be much slower evaporation, thus a much lower rate of energy use). At some point however enough energy is drawn in from the surroundings, or there is enough dilution with the air, that the plume has around the same density as the air and ceases to act as a dense gas and is said to undergo ‘passive’ dispersion.

What is clear from the footage is that the plume containing vinyl chloride monomer travels some distance (around 150m or more) as a dense gas, before it begins ‘passive’ dispersion in a direction consistent with a northerly wind. Figure 2.5 shows the plume passing beyond a gantry passing over the road, indicated as ‘gantry’ in the figure; this corresponds to the same feature marked ‘gantry in Figure 2.2. Thus the plume appears to have travelled upwind, based on the wind being from the north. The footage also indicates that the release from the mast riser was for at least 60seconds.

Figure 2.7 shows the estimated extent of the gas plume, based on the footage and information from witnesses (Coleman, 2005; Findlater, 2005). It appears from the footage and information from (Coleman, 2005) that the plume did not extend significantly over ‘Building A’; this is explained by the ‘dense gas’ nature of the plume preventing it from flowing over the building, which is relatively high (approximately 10m).

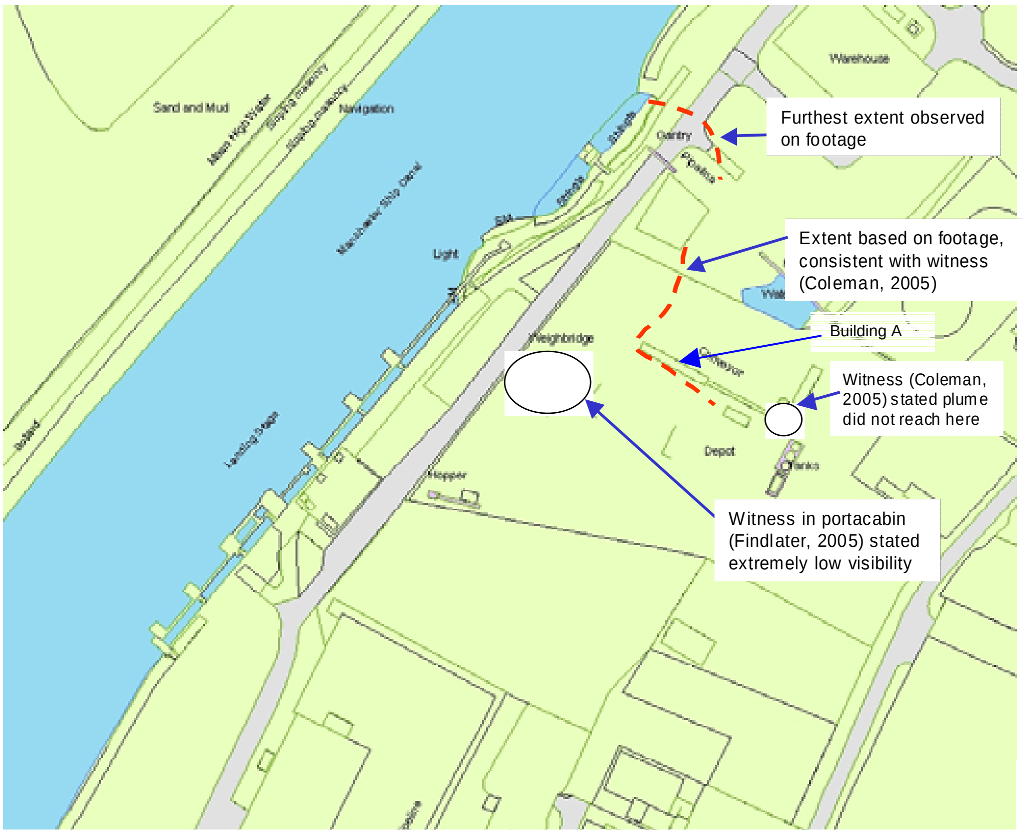



**Figure 2.7** Estimated extent of plume. North is at the top of the map.

# 3 DISCHARGE AND DISPERSION MODELLING

## 3.1 INTRODUCTION

Modelling of the release of vinyl chloride monomer was carried out using PHAST 6.4, produced by DNV. This software is widely used for modelling releases of chemicals. In particular, it models dense gas and passive dispersion, and instantaneous, continuous and time-varying releases of substances.

Despite the information available about the release and the versatility of PHAST, certain assumptions have had to be made in order to model the observed release. These are described in Section 3.2, which also describes the 'base case' scenario. Section 3.3 describes the effect of varying the quantity of vinyl chloride monomer released and Section 3.4 gives a discussion of the modelling results.

## 3.2 DEFINITION OF A BASE CASE SCENARIO

The discharge of vinyl chloride monomer appears to have lasted from around 60 to 120 seconds, based on the footage. PHAST models discharges as one of two limiting cases:

1. Continuous discharges: discharge time much longer than dispersion time, with a steady release rate so that the plume dimensions may be treated as being in a 'steady state', i.e. effects associated with the start and end of the discharge are ignored.
2. Instantaneous release: all the substance released instantaneously. In practice, a discharge with duration shorter than that of the dispersion can usually be modelled as an instantaneous release.

The release of interest here is intermediate (of a type frequently referred to as 'time varying'), which PHAST effectively models as a truncated continuous discharge initially, then changing to a corresponding instantaneous release. Since continuous releases are defined in PHAST as downwind plumes, yet the observed release clearly has a strong upwind component, the release has been modelled as a time varying release where the change to instantaneous release modelling is rapid. This gives a good representation of the basic processes occurring during the dispersion of vinyl chloride monomer but may be expected to overestimate the concentration of vinyl chloride monomer (since it is released more rapidly than was the case in reality).

A 'user-defined' discharge was used to model the release, which requires the user to input a number of discharge parameters: the discharge rate (kg $s^{-1}$), the discharge time, the discharge velocity of the substance (from the mast riser), liquid fraction on discharge, aerosol diameter and initial entrainment of air (on exit from the mast riser).

The base case scenario was taken to be a uniform release of 600kg of vinyl chloride monomer over 10 seconds. Although this is shorter than the actual release, this produced a release which was rapidly modelled as an instantaneous release. Using this approach, rather than a straightforward instantaneous release, allowed results in the vicinity of the mast riser to be examined e.g. flammability ranges and vertical extent of the plume.

Since it is understood that the release was caused by pumping excess liquid vinyl chloride monomer into a storage vessel (Inseal, 2004), it is assumed that the discharge through the pressure relief valve may be treated as a liquid release. As the vinyl chloride monomer was stored as a liquid under pressure, a portion of it will have evaporated very rapidly, also resulting in the discharge cooling as it travelled through the post-valve pipework and mast riser. The release was calculated to have a liquid fraction of around 87.5%, on release from the mast riser.

The discharge parameters were adjusted such that the plume reached around 20-25m above the mast riser, estimated to be the height of the plume in the footage. The pre-dilution entrainment of air was taken to be five times the rate of vinyl chloride monomer discharge (i.e. 300 kg $s^{-1}$). This parameter may be expected to vary from around 1 to 10 times the discharge rate (HID, 2005d). A discharge velocity of $1ms^{-1}$ was used.

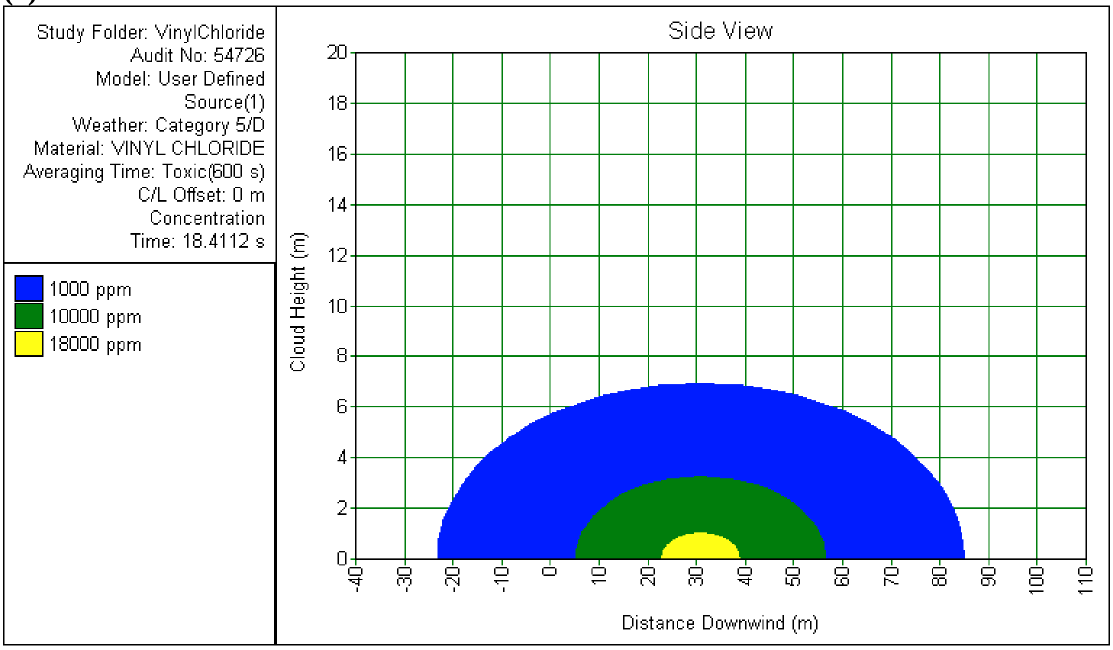
The weather conditions were set for a wind of speed of $5ms^{-1}$ (based on the reported wind speed) and a stability category (indicating the rate of turbulent mixing) of 'D'; this stability category is regarded as typical of UK daytime conditions (HID, 2005e).

Modelling results are shown in Figure 3.1 for the base case, illustrating the distance to half of the lower flammable limit of vinyl chloride monomer (Figure 3.1a) and the furthest range of the plume (Figure 3.1b). Figures 3.2 and 3.3 show the corresponding results for $3ms^{-1}$ and $1.5ms^{-1}$ wind speeds, respectively. Results for dispersion in the vicinity of the mast riser, before transition to instantaneous modelling of the release, are not presented here but suggest that there was a flammable mixture in the vicinity of the mast riser.

It is not known how the level of visibility correlates to the concentration of vinyl chloride monomer, since the observed 'mist' is likely to be largely water vapour condensed by the cold discharge which has been entrained in the plume. Anecdotal observations suggest that the extent of the mist very crudely correlates to the lower flammable limit of the plume for liquified petroleum gas (Roberts, 2005), i.e. a concentration of substance of the order of 10000ppm. Therefore a level of 1000ppm has cautiously been chosen here to represent the plume extent.

The range for certain flammable hazards is taken in this work to be the distance at which half the lower flammable limit is reached, except where stated otherwise. This is because the modelling results are time averaged whereas in reality turbulence can give 'tongues' of flammable mixture. Using the (time averaged) half lower flammable limit concentration makes allowance for this difference and has been adopted elsewhere (HID, 2005b; online help in PHAST 6.4) for flash fires.

(a)




(b)

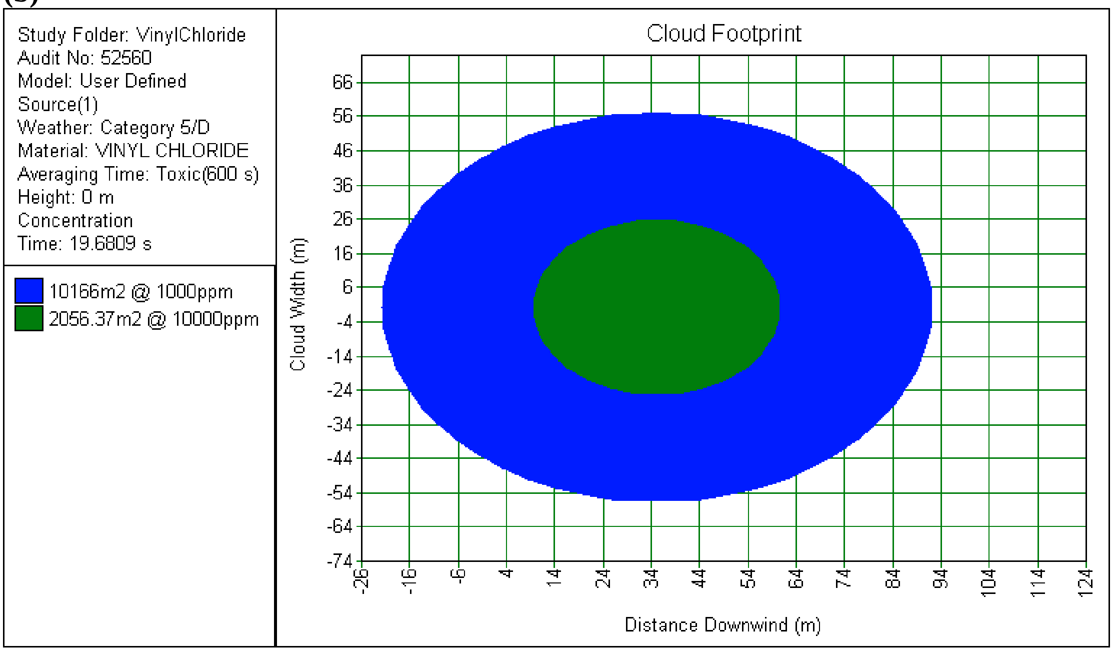
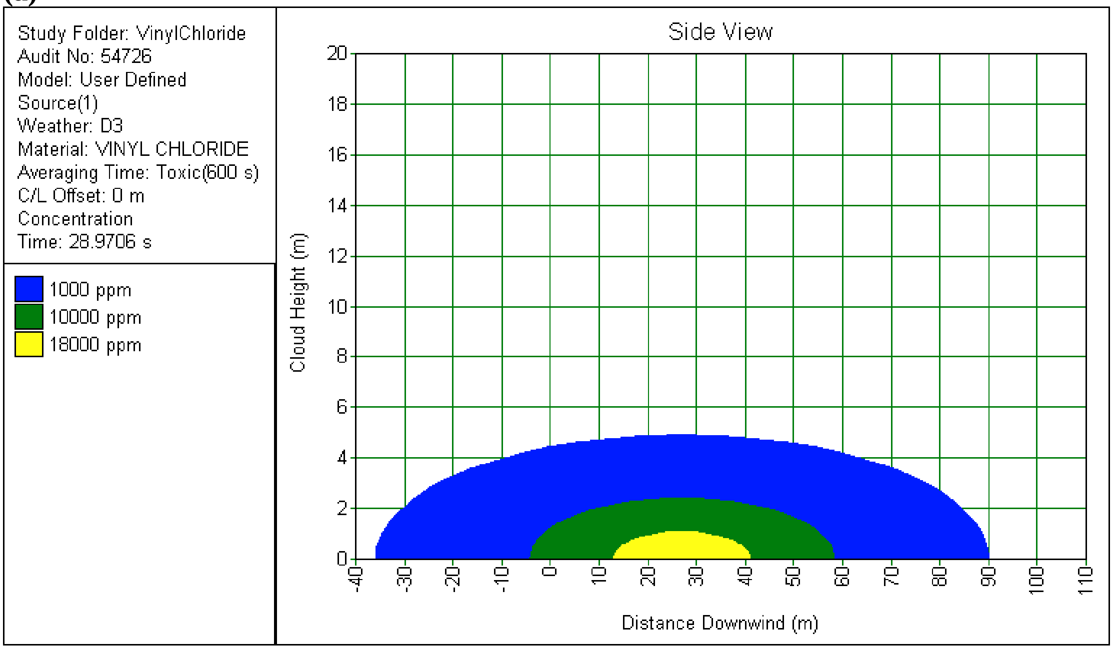
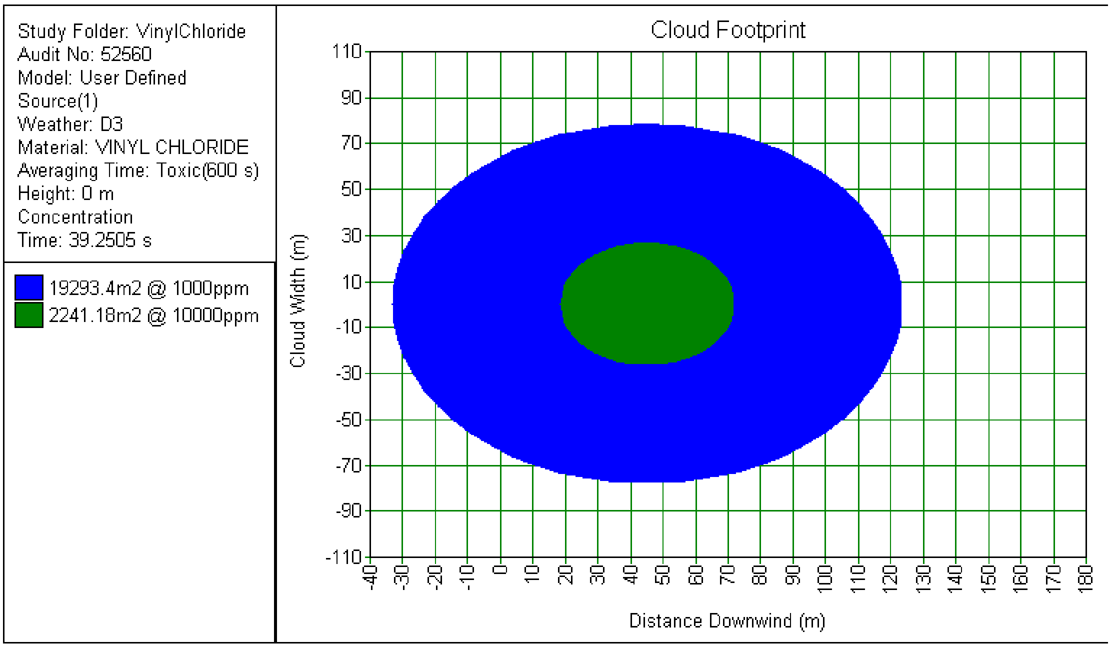



**Figure 3.1** Base case modelling results (a) sideview up/down wind (b) plume footprint (furthest extent in direction of interest; north is on the left). Note: 18000ppm corresponds to half the lower flammable limit of vinyl chloride monomer

(a)




(b)

**Figure 3.2** As for base case modelling results, with 3ms$^{-1}$ wind speed (a) sideview up/down wind (b) plume footprint (furthest extent in direction of interest; north is on the left). Note: 18000ppm corresponds to half the lower flammable limit of vinyl chloride monomer

**(a)**

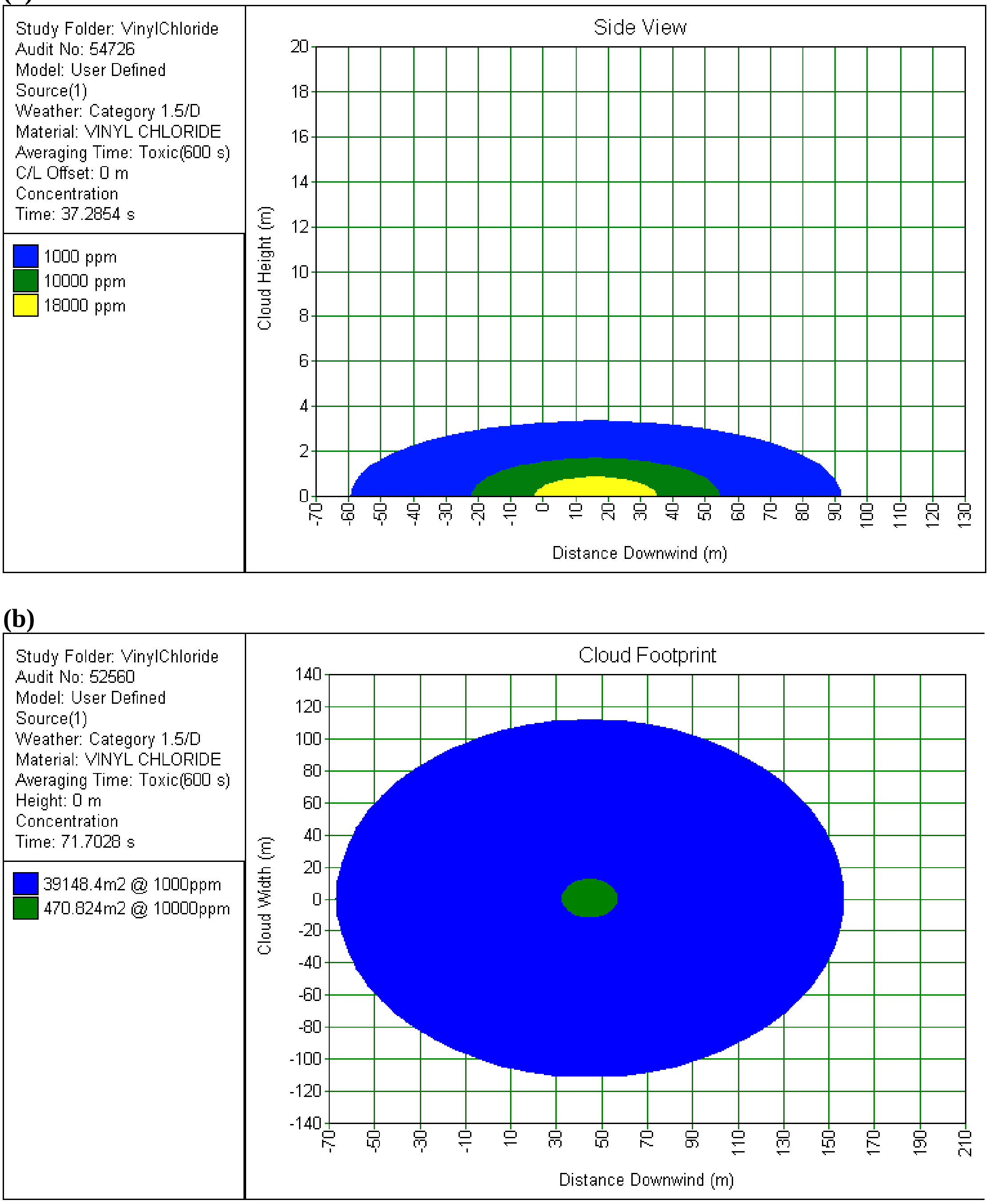



**Figure 3.3** As for base case modelling results, with 1.5ms$^{-1}$ wind speed (a) sideview up/down wind (b) plume footprint (furthest extent in direction of interest; north is on the left). Note: 18000ppm corresponds to half the lower flammable limit of vinyl chloride monomer

Figures 3.1 to 3.3 qualitatively represent the behaviour of the actual plume but vary in quantitative terms. The edge of the plume shown beyond the gantry in Figure 2.5 is approximately 150-160m from the mast riser. Figures 3.1 and 3.2 do not show the plume reaching sufficient distance in the direction of interest (approximately 45º) but for a low wind speed, as is shown in Figure 3.3, the range is closest, being approximately 90m.

## 3.3 VARIATION OF QUANTITY RELEASED

It is understood the quantity of vinyl chloride monomer released was estimated and is therefore subject to some uncertainty (Inseal, 2005; Hair, 2005). Since the results above tend to predict that the extent of the plume in the direction of interest is too low, release inventories above 600kg were investigated. Figure 3.4 shows results for a release of 1200 kg of vinyl chloride monomer, released over 20 seconds, with other parameters as for the base case. Figures 3.5 and 3.6 show analogous results for wind speeds of $3ms^{-1}$ and $1.5ms^{-1}$ respectively.

The results show that a larger release inventory produces a larger plume but the dependence on this parameter is not as great as on wind strength. The results indicate that for a wind speed of $1.5ms^{-1}$ the plume reaches a distance of approximately 120m in the direction of interest.

## 3.4 DISCUSSION

As discussed, PHAST does not have an 'off the shelf' solution which models the observed incident, introducing some uncertainty into the results. However, the modelling work presented is believed to represent the key processes occurring during the release. The results show a plume of vinyl chloride monomer moving along the ground, with a substantial upwind component, followed by drifting back as a dilute plume in the direction of the wind. Therefore, the modelling results should not be expected to reproduce exactly what was observed but are believed to give a good indication of what happened.

The modelling carried out may be expected to overestimate the concentration of vinyl chloride monomer, since the discharges modelled were much shorter than in the real incident. However, when compared with observations the modelling results still appear to under-predict the distance reached by the plume for $5ms^{-1}$ wind speed and a 600kg release. In all cases the modelled plume travels less distance in the direction of interest than observed in the footage.

Taking into account uncertainty inherent in dispersion modelling, which may give a discrepancies of up to 50% in predicted ranges (HID, 2005e), the results suggest the wind speed at the time of the release was of the order of $1.5ms^{-1}$. Examination of the footage shows that following the initial dense gas dispersion the cloud clearly undergoes a more passive type of dispersion, consistent with a northerly wind, which is reproduced by the modelling. This observation was confirmed by a witness (Coleman, 2005). It may be that there was a lull in the wind during the dispersion event, or at least during the dense gas (i.e. upwind) dispersion phase. A further explanation could be that the quantity released was underestimated and was in fact greater than 600kg.

At present it is not possible to be certain why the discrepancies between the predicted modelling and observations are as large as noted. It is likely to be a combination of limitations in the modelling combined with wind speed lower than $5ms^{-1}$, but it is also possible that the quantity of vinyl chloride monomer released was somewhat above 600kg. A further source of difficulty is uncertainty in correlating the visible extent of the plume with the concentration of vinyl chloride (the quantity calculated by PHAST).

The modelling is consistent in suggesting that the maximum range to half the lower flammable limit is of the order of 35-40m and 50-55m for releases of 600kg and 1200kg of vinyl chloride monomer, respectively. That is, varying the wind speed gives similar maximum ranges to half the lower flammable limit. These ranges ought be a cautious prediction because the release has been modelled as nearly instantaneous. However, since observation suggests that the modelling is, if anything, under predicting the dispersion ranges 50m will be adopted as the range to the flammable hazard. That is, this range is proposed to take into account effects of time-averaging the release and uncertainty in the modelling results. This distance refers to the hazard on land and the ship only as a somewhat shorter range would be appropriate directly upwind, which is over the Manchester Ship Canal.

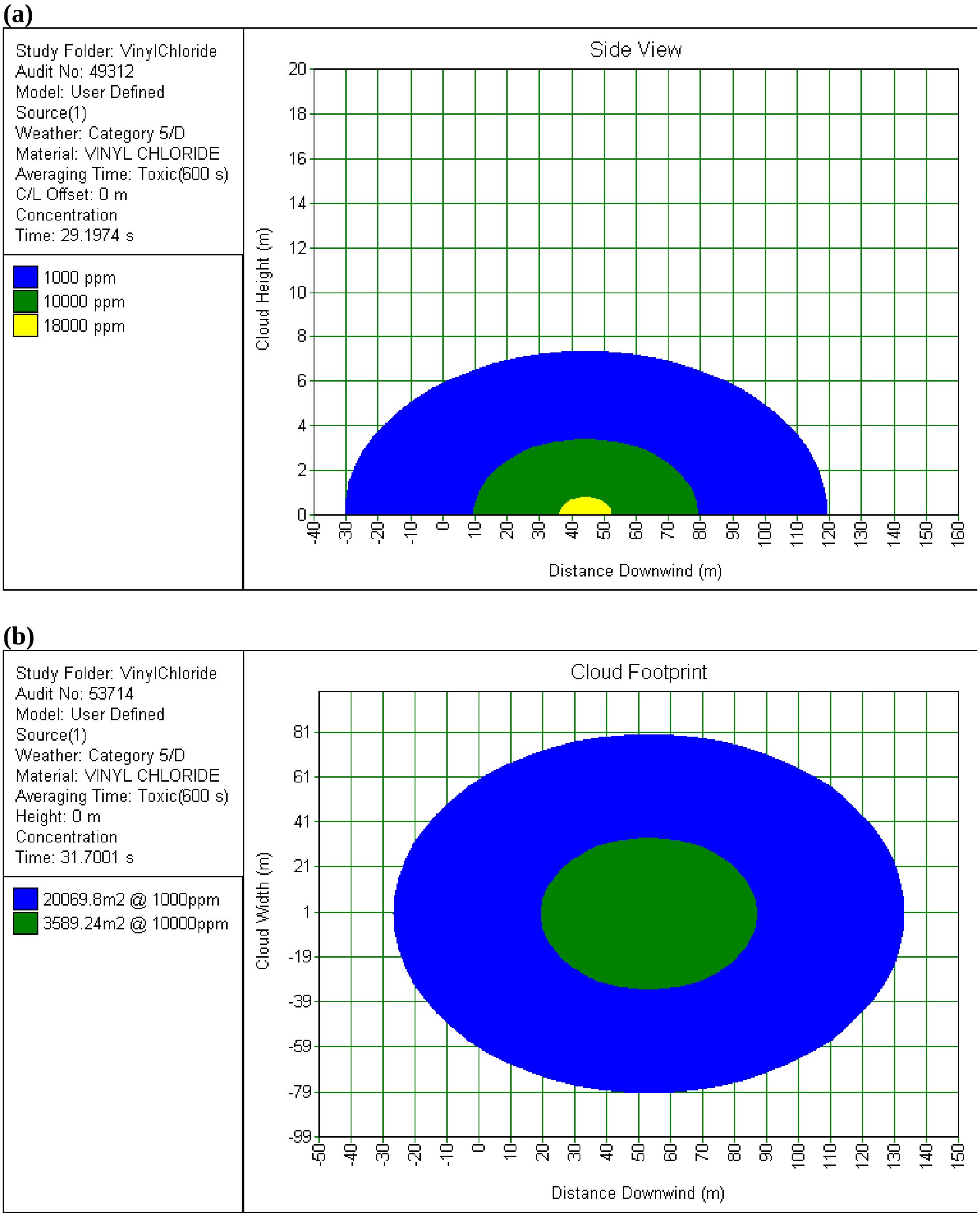
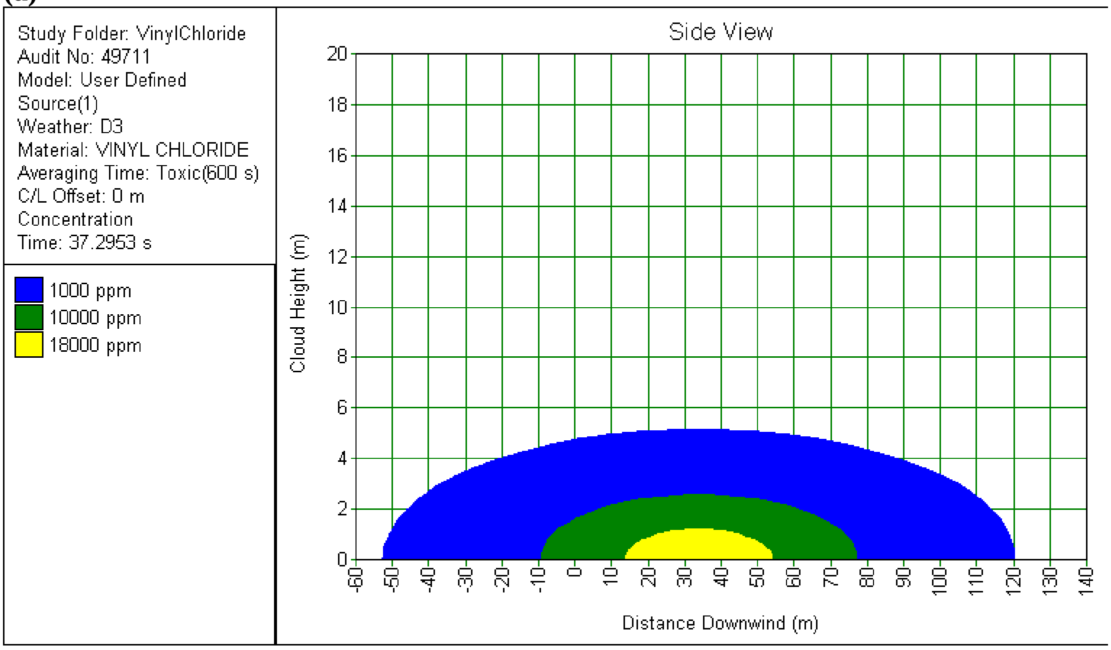



**Figure 3.4** Release of 1200kg vinyl chloride monomer $5ms^{-1}$ wind speed (a) sideview up/down wind (b) plume footprint (furthest extent in direction of interest; north is on the left). Note: 18000ppm corresponds to half the lower flammable limit of vinyl chloride monomer

**(a)**

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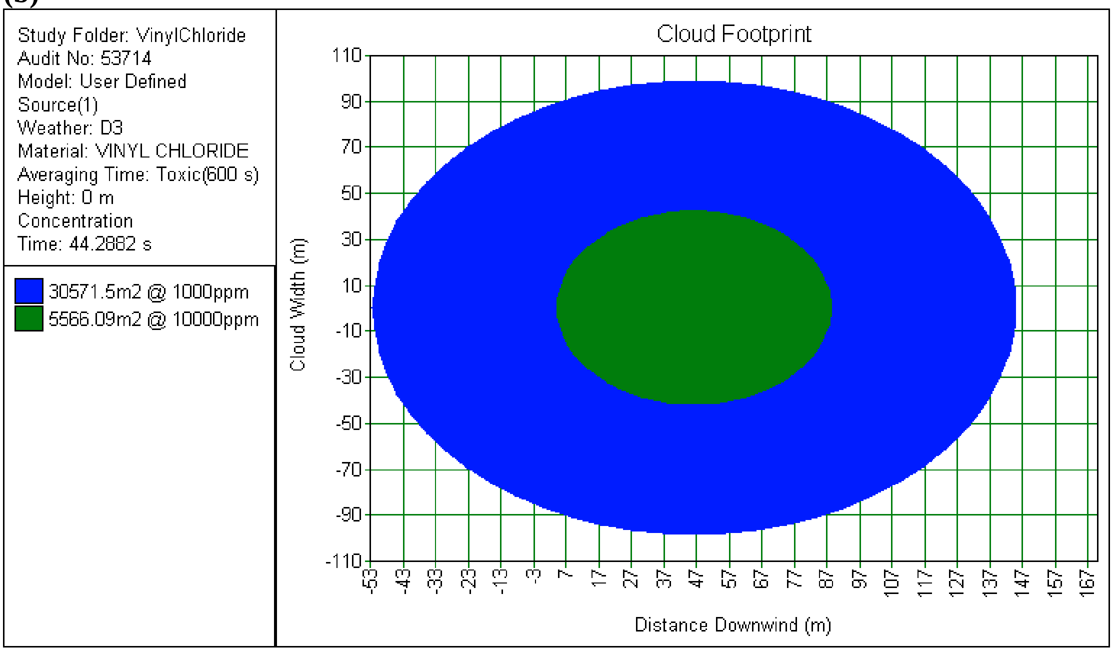


**Figure 3.5** Release of 1200kg vinyl chloride monomer 3ms$^{-1}$ wind speed (a) sideview up/down wind (b) plume footprint (furthest extent in direction of interest; north is on the left). Note: 18000ppm corresponds to half the lower flammable limit of vinyl chloride monomer

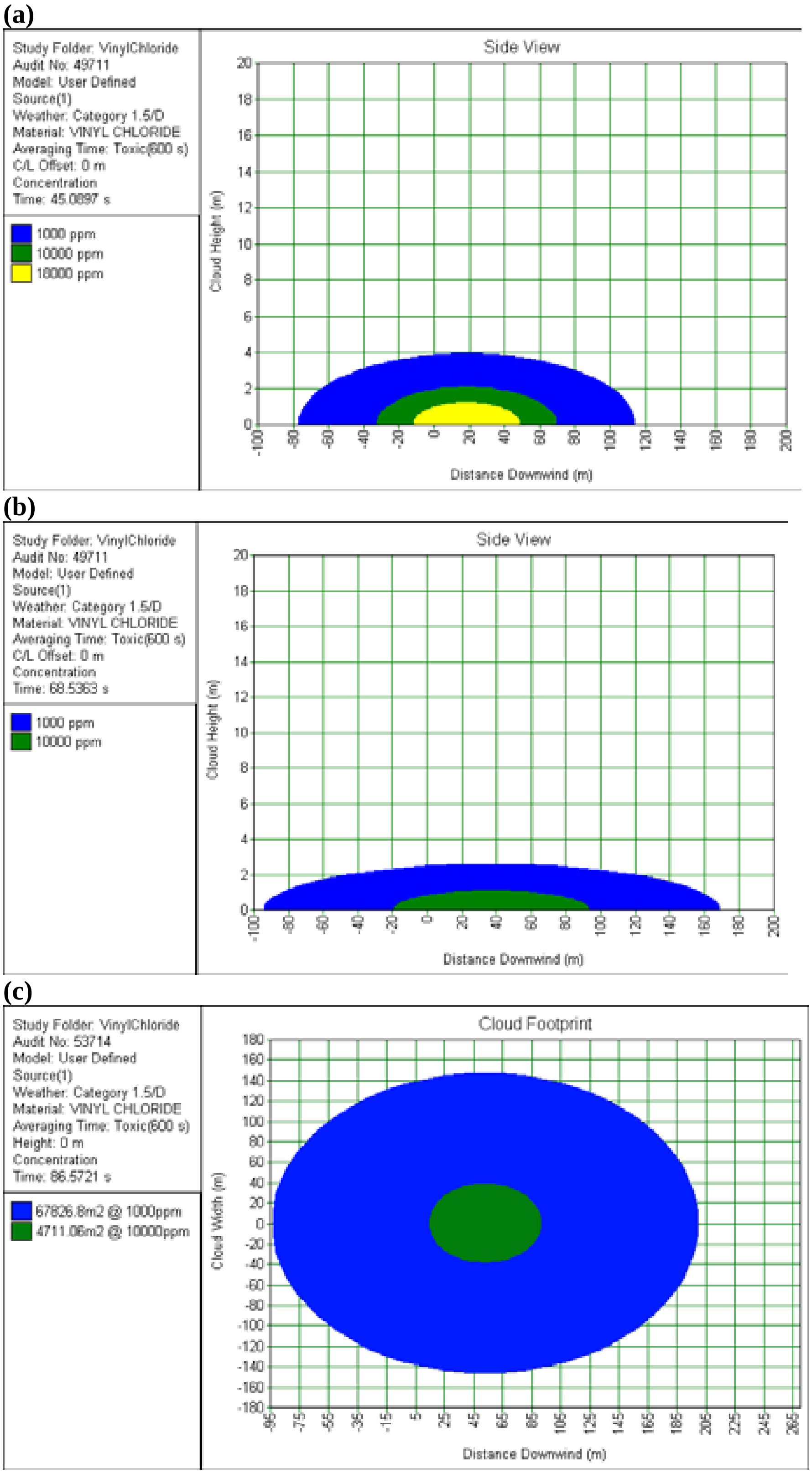


**Figure 3.6** Release of 1200kg vinyl chloride monomer 1.5ms$^{-1}$ wind speed (a), (b) sideview up/down wind (c) plume footprint (furthest extent in direction of interest; north is on the left). Note: 18000ppm corresponds to half the lower flammable limit of vinyl chloride monomer

# 4 CONSEQUENCE MODELLING

## 4.1 TOXIC RELEASES

The results show that HSE's Dangerous Toxic Load (HID, 2004) was not reached anywhere within the plume. The Dangerous Toxic Load is the combination of concentration of substance and length of exposure (the dose) likely to be fatal to the most sensitive members of an average population (1-3%) and cause discomfort to most others. On the basis of the Dangerous Toxic Load not being reached, no toxic effect from the release is predicted.

## 4.2 FLAMMABLE AND EXPLOSIVE HAZARDS

Several types of flammable event could potentially occur from a release of liquefied flammable gas from a pipe, namely a fireball, a flash fire or a jet fire. The vertical plume on the footage appears too diffuse for a jet fire. Therefore it is proposed that only a fireball or flash fire are relevant as flammable events. Flammable mixtures of gases may undergo a vapour cloud explosion (VCE). VCEs are very damaging but require ignition of a flammable gas mixture in a congested area (e.g. around plant pipework). This congested area needs to be large enough for a vapour cloud explosion to develop. It is proposed that a VCE would not occur for the best estimate scenarios because the congested area of pipework near the mast riser is probably to small for a VCE to have developed.

***Flash fire***

As discussed in Section 3.4, the flammable hazard limit for a flash fire or 'envelope' is taken to extend 50m from the mast riser. The proposed flash fire envelope is shown in Figure 4.1.

Flash fires are relatively low energy events of short duration and are presumed to give a high probability of death for those inside the flash fire and very low probability of death for those outside it (HID, 2005b). They consist of relatively slow combustion of a cloud of flammable gas mixture (HID, 2005b). Even for the rapid releases modelled here, the flash fire envelopes only extend to their maximum range after 30-60s. Escape from such a flash fire envelope would usually not be taken into account but it is worth noting that there would be an opportunity for escape.

The situation for those inside a building is less clear but for the relatively short duration of the plume is likely to depend on whether the flash fire ignited the building (HID, 2005c).

Based on the length of discharge observed from the footage and the dispersion speed observed from the modelling, there was only a small 'window of opportunity' for a flash fire, probably only 30-120 seconds, before the plume was too dilute to support combustion. Therefore, consideration of the modelling results suggests that for around a minute or two, following the start of the release, anyone outside a building inside the plume and within 50m of the mast riser would probably have been killed if there had been a suitable ignition source and they had not managed to escape the flash fire 'envelope'. This distance refers to people on land and the ship only as a somewhat shorter range would be appropriate directly upwind, which is over the Manchester Ship Canal.

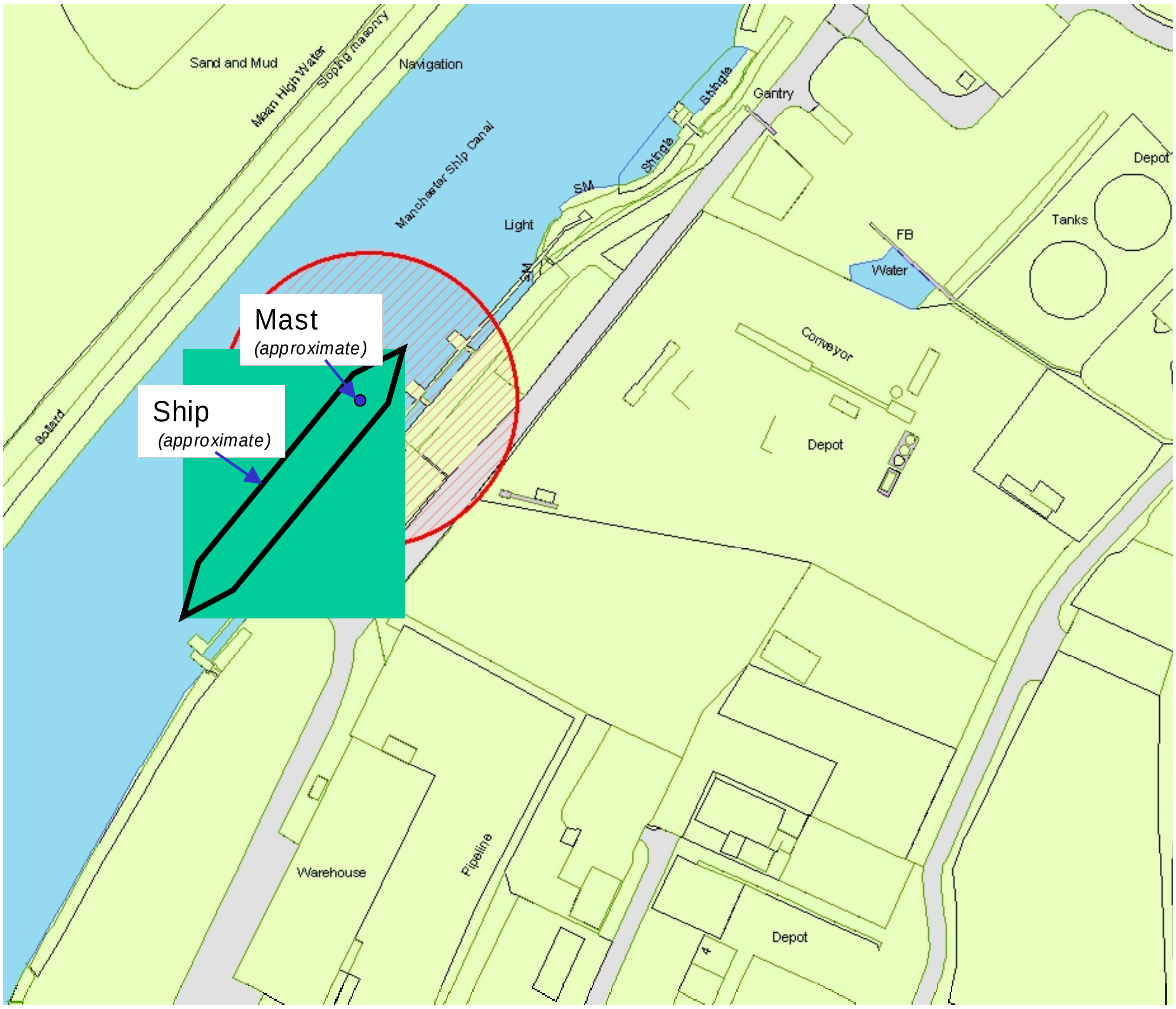


**Figure 4.1** Extent of flash fire envelope, valid for on land and on the ship (see text for details).

***Fireball***

Fireballs are associated with fuel rich mixtures and thus with large, rapid releases ignited close to the place (and time) of discharge (HID, 2005a). Thus a fireball would only have taken place in the proximity of the mast riser.

Figure 4.2 shows the plume with lower flammable limit and half lower flammable limit close to the start of the release, before transition to instantaneous release modelling, for the base case. Figure 4.3 shows a similar plume for a release of 1200kg of vinyl chloride monomer.

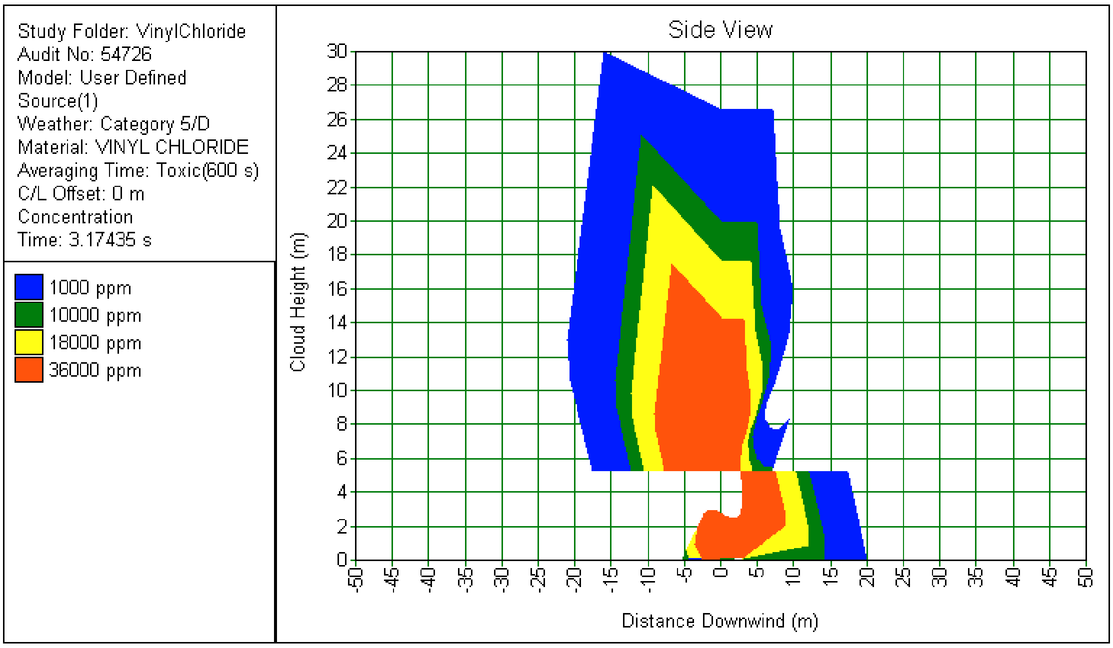


**Figure 4.2** Vertical plume from mast riser, base case (600kg). The top of the mast riser is 0m downwind and 5m height. North is at the left of the figure. The lower flammable limit of vinyl chloride monomer is 36000ppm.

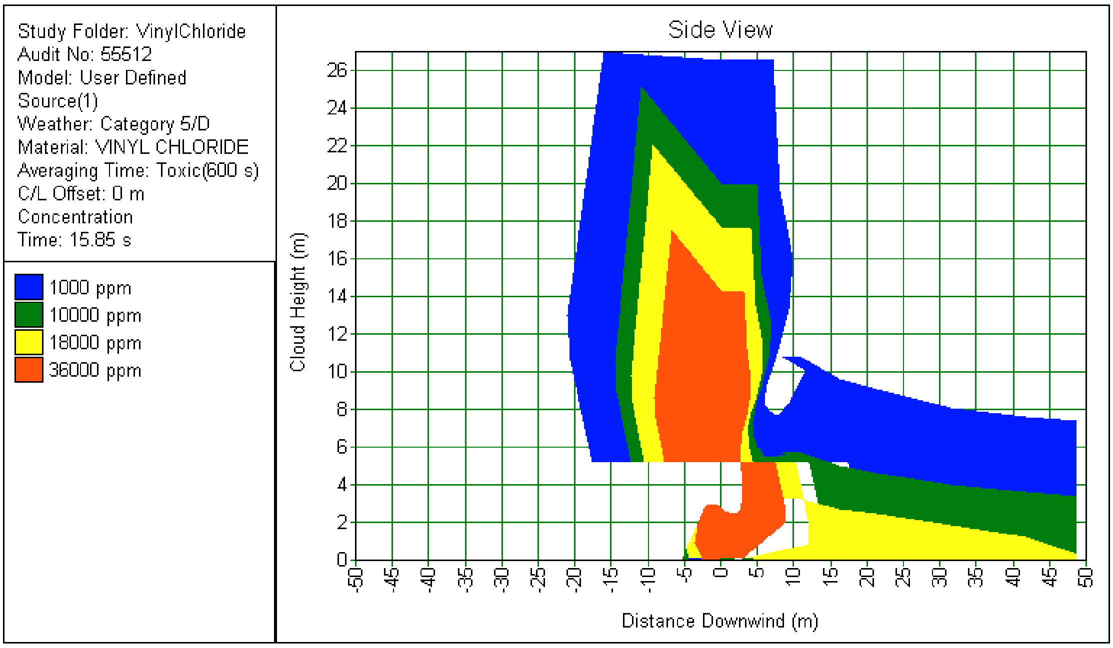


**Figure 4.3** Vertical plume from mast riser, 1200kg. The top of the mast riser is 0m downwind and 5m height. North is at the left of the figure. The lower flammable limit of vinyl chloride monomer is 36000ppm.

The concentration of flammable substance in air indicates whether it would support combustion. However, the level of harm received will depend on the intensity of the fireball and the length of time that an individual is exposed to it. The combination of intensity and time of exposure is measured by the thermal dose. HSE has proposed the following thermal doses and associated levels of harm in relation to exposure to radiation from a fire (HID, 2005c):

- 1800tdu – likely to produce 50% or more fatalities in an exposed population
- 1000tdu – around 1% fatalities in a normal population

- 500tdu – around 1% fatalities in a vulnerable population (e.g. young children and the elderly)

The modelling results suggest that the first two levels are not reached whilst exposure to the third level would not be experienced beyond about 10m (600kg release) or 15m (1200kg release) from the mast riser. Since the operatives are presumed not to be typical members of a vulnerable population, the modelling suggests that no fatalities would have resulted from a fireball.

As discussed, the release duration in the base case scenario was shorter than the actual release. Therefore, a scoping calculation of 600kg of vinyl chloride monomer over 60 seconds, of approximately the same duration as the actual release, was carried out. This calculation predicted that there would be no fireball hazard from this particular release.

In addition, it may be presumed that the operators exercised control over ignition sources in the region of the mast riser. The modelling results suggest that if there was a fireball hazard it would have largely been restricted to the area under direct control of the operators. Taking account of these two points, it is unlikely that a fireball would have taken place.

# 5 CONCLUSIONS

The modelling carried out is believed to reflect the key features of the incident that took place on the Coral Acropora. Nevertheless, it has not been possible to closely replicate the observed release range. Four potential reasons are proposed for this:

1) The design of the model is limited in modelling a 'time-varying' release of dense gas. It is believed that this has largely been overcome in this case by treating the release as near-instantaneous.
2) Poor correlation between the presumed edge of the visible plume in the modelling work (1000ppm vinyl chloride monomer) and that observed. However, it is thought unlikely that a part of the plume with lower concentration (e.g. 100ppm) would produce the thick mist observed.
3) Wind strength for the 60-120 seconds immediately following the release was lower than $5ms^{-1}$. This seems plausible given that a witness described the wind as being 'light' (Coleman, 2005).
4) Release inventory larger than 600kg. It is understood that there is likely to be some uncertainty surrounding this figure. Running the model with 1200kg suggests that this is an unlikely explanation on its own, unless the quantity has been greatly underestimated, but it could have been a contributory factor.

Taking into account the discrepancies observed, a flash fire envelope of 50m radius from the mast riser is proposed. If there had been a flash fire, and people had been both outside and within this envelope it is likely that they would have been killed. Nevertheless, the relatively slow movement of the flash fire envelope (30-60s to reach its maximum range) means that anyone within the cloud would have had some opportunity to escape the hazardous part of the plume.

The modelling suggested that a fireball was not likely to present a credible, life threatening scenario in this case. A jet fire was not considered because the vertical release appeared too diffuse. Moreover, a jet fire would have been largely in an upward direction. A vapour cloud explosion has not been considered because the apparent level of congested pipework in the vicinity of the release was not judged sufficient for escalation into a vapour cloud explosion to be considered a credible scenario.

Based on HSE's Dangerous Toxic Load not being reached, no toxic effect from the release is predicted.

*Recommendations*

1) HSE and MAIB should consider the release as having the potential to kill anyone outside within 50m of the mast riser in the event of a flash fire (requiring a suitable ignition source). This distance refers to people on land and the ship only as a somewhat shorter range would be appropriate directly upwind, which is over the Manchester Ship Canal. The potential for fatality will be mitigated by the 30-60s opportunity for such people to escape the hazardous zone.
2) Recommendation (1) is based on the best available knowledge at this time. Nevertheless, there remains some uncertainty regarding the dispersion, and thus the hazard posed by this release. Research should be commissioned to improve understanding of events of this type.

# 6 APPENDICES

## APPENDIX A: REQUEST FOR MODELLING SUPPORT

REQUEST FOR SPECIALIST ASSISTANCE

# (HID CI3E)

| To: John Brazendale, PI CI3E | | | |
|---|---|---|---|
| From (inspector): | David Hair | Request Date: | 01/11/2004 |
| Office: | Bootle | Band 2: | Trevor Britton CI2B |
| 3E Discipline needed | Predictive | Activity Type: | Inspection |
| Priority: | Immediate | Type of Visit: | None |

| | | | |
|---|---|---|---|
| Site MH Status: | Not Major Hazard Site | Job Chargeable? | No |
| MH Plan Made? | No | Job in MH plan? | No |

| | | | |
|---|---|---|---|
| Client Name; | EVC Ltd | CIS Client #: | 4685 |
| Site Address; | Runcorn Layby Runcorn Docks Runcorn | CIS Location # | 13990 |
| Contact Name: | N/A | Phone #: | |

| | | | |
|---|---|---|---|
| Others involved? | Yes | How: | Ship based incident. |
| CIS Client #: | N/A | CIS Location # | N/A |

| | | | |
|---|---|---|---|
| Help Needed: | In support of joint investigation being led by Marine Accident Investigation Branch (MAIB), who will produce a public report, information is required on:<br>1) Extent and severity of major accident scenarios - flammable / toxic - involving ship transporting Vinyl Chloride Monomer (VCM);<br>2) Modelling of effects of an actual release which occurred. | | |
| Background: | Incident occurred at Runcorn Docks on 10/08/04 when approx 600 kg of VCM was released from a cargo ship.<br>Information about ship and release:-<br>1) Two cargo tanks within hull of ship. Tanks are cylindrical, and their maximum capacities are:<br>Aft tank: Approx 2160 cu.m.<br>Forward tank: Approx 980 cu.m.<br>Tanks are interconnected.<br><br>2) Actual release of approximately 600kg of VCM from forward tank via pressure release valve (situated on mast at bow of ship).<br>The wind was 10.5 knots from the north.<br>Weather was overcast with light rain. | | |
| Action Proposed: | Information possibly included in public report produced by MAIB. | | |
| Notification # (if any): | | Incident # (if any): | |
| Request Discussed? | Yes | | |
| Any special h&s Info: | N/A | | |

| | |
|---|---|
| Any comments by PI: | Support the request because of<br>• The need to confirm the extent of the potential hazard<br>• The value of cross agency cooperation |

*The* ***inspector initiating*** *the* ***request*** *should* ***complete*** *all the* ***fields*** *highlighted* ***in green*** *(free text)* ***and blue*** *(drop-down list) and then* ***send*** *the form (****via group PI****) to John Brazendale, PI HID LD3E, preferably by e-mail.*

# 7 REFERENCES

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