INSPECTION VISIT REPORT – PIR/RSR

ENVIRONMENT AGENCY

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FILE NOS: CoMAH
DATE OF REPORT: 18 Feb 2005
REPORT NO:
INSPECTOR'S SIGNATURE: [redacted]

OPERATOR: (Name, address)	**W H Keys Ltd**, Hall End Works, West Bromwich.

PROCESS/PREMISES TYPE:	Organics blending		
IPC Process Sch Ref	None	*PPC Primary Activity Sch Ref*	None
PROCESS NAME:	Cresols		

TYPE OF VISIT: (enter no of visits in each category – if other describe under PURPOSE OF VISIT)	PPC	IPC	COMAH		RSR		
			TT	LT	B3	B4 C/E	B4 Other
Enforcement *- investigation & enforcement*							
Incident response *- complaints & incidents*				*1*			
Permitting *- permits; variations; reviews; transfers; surrenders; COMAH SR assessments; etc*							
Compliance *- programmed inspection; compliance; monitoring*							

PURPOSE OF VISIT:	Investigate reported tank failure		
INSPECTION VISIT BY:	[redacted] with [redacted] (all HSE)	DATE OF VISIT:	17 Feb 05
PERSON(S) SEEN: (Name, Position)	[redacted] *(MD)* [redacted] *(Chemist)* [redacted] *(Eng Contractor)*		

Reviewed by *(TL complete as applicable)*

	RTL (PIR/RSR)			Final Inspector check	QC
Date	28.3.05				
Initial	[redacted]				

HEALTH & SAFETY:

	Issue	*Comment*
1.	*Special risks*	Flams, corrosives, toxics
2.	*Relevant PIR Risk Assessments*	QRA 1,2
3.	*Lone worker?*	No
4.	*Time of day*	office hours
5.	*Site familiarity*	some
6.	*Unusual conditions / weather leading to increased risks?*	soft ground
7.	*Environmental or Occupational Health, COSHH*	Cresolic vapours
8.	*Highest risk event?*	Falling 28' tank
9.	*Learning points*	No equipment has ever been inspected. Approach with caution. Also HSE have non- electrical cameras for use in flam atmospheres.
RSR	*Recorded dose received. µSv*	n/a

ITEMS CARRIED OVER FROM LAST VISIT:
None

REPORT:
On 15th February the company reported an incident via the fire brigade to HSE. One of two tanks used to blend and store cresols had suffered some form of mechanical failure and begun to lean dangerously, snapping 2 of its 5 supporting legs. The tank is 28' tall and contained 34 m^3 of mixed cresols and phenols. The mixture is toxic, corrosive and dangerous to the environment. The tank stands in a low (2') bund and had it fallen would be likely to have released all or most of its contents to ground, possibly collapsing a second similar tank in the process. Depending upon the geology/ hydrogeology, this release could have been sufficient to cause a MATTE to groundwater and/ or any controlled waters in continuity. Due to the weight of the tank and the toxic and corrosive properties of the materials inside, such an event would have also been likely to result in fatalities amongst the three people working nearby. Following the incident the company managed to temporarily jack the tank back nearer vertical and pump out its contents to the neighbouring vessel, with fire brigade assistance.

On 17th Feb I attended with [redacted] (HSE, HID), [redacted] (HSE, Mechanical Specialist) and [redacted] (HSE, Process Specialist). The incident had occurred at around noon on the 15th, just as the transfer of cresol/phenol mixture from a road tanker onto a heel of mixed cresols had finished. A loud crack was heard and the vessel was noted to be leaning over. The crack was the welds on the front legs giving way. This was only the second time that WH Keys had performed the blend within the storage tank, rather than in other vessels. Under this duty the tank contained several tonnes more than usual. It should be noted that [redacted] did not phone the fire brigade, he drove round to ask their advice. They responded with several tenders and two ambulances

[redacted] and I asked about the process. Keys blend OP1 (ortho cresol/phenol blend from Degussa Knottingly) with Lights (mixed low boiling chlorocresols from AH Marks Ltd) to form a Jayes fluid type product for sale primarily in Latin America. OP1 is brought in at around 40 °C to prevent crystallisation (at around 17°C), although once blended the mixture remains liquid at all foreseeable temperatures. Lights are added to the tank

first, followed by OP1, before pumped circulation is used to blend the two in the tank. The tank (T1) is 9' diameter by 28' straight side and of mild steel construction. It stands in a low bund with a second tank of different design but similar dimensions (T2). As well as a recirculation line T1 has a 'scrubber'. This is a plastic drum of caustic on the ground with a short dip leg, and vents through a small number of perforations in the lid. There is no other pressure relief.

WH Keys toll the product for PMC marketing Ltd and claim that PMC own the tanks.

[redacted] stated that no reaction took place between OP1 and Lights, and having studied the MSDSs this seems plausible, assuming that the correct materials were delivered.

We then went out to see the cresols plant. T1 and T2 were roped off and T1 had been emptied into both T2 and a road tanker. T2 had not been emptied. [redacted] implied that this was because he was not sure that access was permitted, but it later became apparent that- due to incomplete mixing- the blend in T2 was not saleable and the operator wished to make further additions.

[redacted] made a full external inspection of the tank. My dynamic risk assessment suggested that climbing scaffolding to reach the top of an unstable tank would not be necessary and I declined. [redacted] found that:-

- The left hand tank of the pair (T1) was leaning noticeably toward the neighbouring building.
- T1 had major bulges in the side toward which it was leaning.
- The bottom was now concave, and had reportedly been convex following the incident. It had originally been flat.
- The lean had snapped 2 of the five welds attaching it to its legs.
- Total collapse had been prevented only by pipework, now severely distorted, and possibly the building.
- The tank was designed to stand on a sand base and the legs were a later addition. Its base was wholly unsuited to such a modification.
- The temporary repairs were sufficient to support it in the short term whilst empty.

[redacted] opinion was that a catastrophic release had been avoided by a very small margin and that even had the tank remained upright there was still a very real possibility of a failure around the bottom weld. This would have sprayed cresols horizontally over the bund wall with almost a full atmosphere of head. It should be noted that the blend is corrosive, harmful to aquatic life (R52/3) and toxic (R23/4/5 Severe perhaps fatal poisoning by contact with skin, ingestion or inhalation if special medical treatment not immediately applied.)

[redacted] also noted that T2 had been designed as a horizontal tank.

We concluded that the incident had been caused by the bulge in the side of the tank making it unstable. Possible causes for the bulge were:-
Thinning due to corrosion
Inappropriate initial design
Inappropriate modification
Back pressure from inadequate venting arrangements
Transport damage.
Unexpected reaction

We now returned to the offices to discuss the provenance of the tanks T1 and T2. These vessels were moved to Keys site about 2 years ago from a company called Con-Ren in Derbyshire, where they had performed the same duty, again for PMC. PMC have confirmed verbally to [redacted] that these tanks are at least 18 years old. No drawings of the tanks exist and the last- somewhat basic- thickness test was performed at Con-Ren in 2002. T1 was stated as uniformly 10mm thick whilst T2 was around 7.5mm thick. No thickness measurements on the bases had been taken. No measurements have been taken since and no inspection for transport damage was made.

[redacted] was asked who's responsibility it was to maintain the tanks. He said this was down to PMC, but they had never come on site to do so. We spoke to [redacted] who is WH Keys maintenance contractor. He states that only breakdown work is ever undertaken. He installed the tanks originally and says that he noted no defects. His logo describes him as a boiler maintenance expert.

We now became concerned that the remaining material had been transferred to T2 which was actually a thinner tank (possibly due to it's intended horizontal use). [redacted] was asked how he ensured that vessels were fit for purpose. He did not know. He was asked if any vessel had ever been inspected. They had not. He was asked if mild steel was suitable for the cresol blend. He said he thought it was. AH Marks and a cresols industry consultant (a [redacted]) were then contacted by phone. AH Marks stated that Lights were stored only in stainless or glassed tanks. [redacted] stated that until recently the Lights had been contaminated with HCl and that this had caused a failure at AH Marks. T1 and T2 have been used in this duty for years. [redacted] contacted HSL and was given a figure 0.5mm pa corrosion for a similar material on mild steel.

[redacted] was by now asking to be allowed to transfer the remaining material to his mixing tank for blending. This is mild steel.

CONCLUSIONS / RECOMMENDATIONS:

It was felt that only by using a certified stainless isotanker could we ensure that the material was contained safely. It was clear that T1 could not be used again and that T2 should be emptied as soon as possible. No other tank on site has ever been properly assessed for purpose or inspected. Although there are some stainless vessels it became clear that these were designed for brewery duty only. We therefore drafted and served the four following CoMAH Prohibition Notices:-

1) No further additions to T1 or T2 (immediate effect)
2) No further manufacture of cresol blends on site (immediate effect)
3) No further storage in T1 or T2 (from Midnight 18th)
4) No storage of cresols in any other vessel (from Midnight 18th)

This will force the operator to transfer to tanker and remove the material from site. Production will only restart when it can be shown that the plant is fit for purpose.

HSE also served an Improvement Notice under Provision and Use of Work Equipment Regulations 1998, setting out the required programme of plant survey and inspection.

HSE also require WH Keys to conduct a full external survey of T1 and T2 as part of the investigation. If this shows signs of corrosion damage HSL will probably have the tanks carved up for internal investigation before their removal from site.

I have agreed with [redacted] that HSE will take the lead in the ongoing investigation, given their expertise in the mechanical design area.

Since coming under regulation by PIR and HID in 2004 this operator has received 8 notices.

Chargeable time 5.5 hours on site, 1.5 hours report.

NON-COMPLIANCES:		
1.	MAH- no CCS	Category
2.		
3.		
	Entered on CCS *(tick box)*	

CORRECTIVE / PROTECTIVE ACTIONS:
(Inspector to sign off when complete)

	ACTION:	Complete	
		Date	Initial
1	To be coordinated by HSE		
2			
3			
4			
5			

REVIEWERS COMMENTS: