

## Annex D Results of Incident Review

### Summary of Incidents related to Hypochlorite

<i>Date</i>	<i>Location</i>	<i>Injuries</i>	<i>Death</i>	<i>Description</i>
1970/03/08	Kaiserlautern, Germany	67	0	Pipe leak allowed mixing of hydrochloric acid and sodium hypochlorite in storage vessel and subsequent chlorine gas cloud.
1979/02/12	Cologne, Germany	4	0	Works evacuated when sodium hypochlorite tank mistakenly filled with sulphuric acid forming chlorine gas cloud.
1984/09/06	Hinckley, UK	43	0	Accidental mixing of sodium hypochlorite and hydrochloric acid in swimming pool.
1984/11/20	Slaithwaite, West Yorkshire, UK	29	0	Ferric Chloride was erroneously loaded into a sodium hypochlorite (bleach) tank resulting in toxic chlorine cloud.
1985/03/01	Westmalle, Belgium	25	0	HCl was accidentally delivered to plant and mixed with residue of sodium hypochlorite in tank producing cloud of chlorine gas.
1987/05/17	Philadelphia, Pennsylvania, USA	42	0	Leakage from separate tanks of hydrochloric acid and sodium hypochlorite formed chlorine fumes, causing 42 people to be hospitalised and 300 to be evacuated.
1989/01/31	Wells, Somerset, UK	8	0	8 pipeworkers treated for the chlorine gas inhalation when tanker driver connected wrong pipe & discharged hydrochloric acid into a sodium hypochlorite tank.
1990/04/02	Norwich, Norfolk, UK	1	0	Wrong chemical accidentally used. Spillage of hydrochloric acid and sodium hypochlorite led to release of chlorine. One worker taken to hospital.
1990/07/27	Manchester, Greater Manchester, UK	7	0	Hydrochloric acid and sodium hypochlorite, used for water treatment at swimming pool, came into contact producing chlorine. Fumes spread via air-conditioning system. Injured treated for effects of fumes. Spillage dealt with by fire brigade.
1990/10/01	Kidlington, Oxfordshire, UK	0	0	Chemical leak from pipe leading from 1000l tank of sodium hypochlorite at sports centre dealt with by firemen in gas tight suits.
1991/05/03	Hoo, Kent, UK	0	0	1000l sodium hypochlorite spilled to car park after tank sprung leak. Filtered into drains, but firemen with breathing apparatus and suits made area safe.
1991/06/02	Exhall, West Midlands, UK	0	0	Tanker carrying sodium hypochlorite sprang leak releasing 2500l. Firemen with breathing apparatus stemmed flow using sealing compound but some overcome by chemical vapours whilst dispensing first aid. Suspected cause willful damage of connecting hose from tank.
1991/07/15	Sunderland, Tyne & Wear, UK	0	0	400l sodium hypochlorite leaked from pipe fractured by workmen at swimming pool.
1992/02/23	Torquay, Devon, UK	0	0	100galls sodium hypochlorite seaped from pinhole leak in storage tank. The bleach is used as a chlorine substitute for a swimming pool. The chemical leaked into a special safety container. 1ton of sand used to absorb chemical.
1992/04/26	Maldon, Essex, UK	0	0	Sodium hypochlorite leaked from 1000l tank at leisure centre. Thought due to leaky or improperly operated valve: specially built wall had contained the chemicals.
1993/01/24	Chippenham, Wiltshire, UK	3	0	450l sodium hypochlorite & 40l hydrochloric acid released at leisure centre. Centre was evacuated &

				3 people taken to hospital for chest x-rays were later released.
1994/01/15	Scunthorpe, Humberside, UK	0	0	Small leak in feed pipe from sodium hypochlorite tank noticed during hourly monitoring. About 500l was spilt & firemen used bricks & wooded wedges to stem the leak. No evacuation. Fire brigade attended scene for 1 hour.
1994/05/28	Torquay, Devon, UK	0	0	1000l sodium hypochlorite leaked from container into ground floor swimming pool plant room. Release entered emergency containment area & firefighters pumped liquid into portable container. Centre not evacuated & no danger to staff or public.
1994/06/02	Scunthorpe, Lincolnshire, UK	4	0	30 evacuated from leisure centre & 3 staff & 1 council employee doing electrical work taken to hospital after sodium hypochlorite & sodium bisulphite became mixed, releasing gas.
1994/08/24	Holborn, Greater London, UK	21	0	21 construction workers needed hospital treatment when 25l sodium hypochlorite & 25l ammonium citrate were mixed to produce chlorine gas due to the incorrect labeling of a container. Workmen alleged insufficient care being taken.
1995/01/23	Grimsby, Humberside, UK	0	0	900l sodium hypochlorite leaked from storage tank at school. Firefighters pumped corrosive chemicals back into tank. Sand bags used to mop-up remainder of chemical & tank, in swimming pool plant, room made safe.
1995/07/25	Consett, County Durham, UK			<40 workers taken to hospital from factory, 2 being detained overnight when 7000 L hypochlorite which had reacted with small amount of hydrochloric acid in tanker gave off chlorine gas when the hypochlorite was being transferred.
1997/06/19	Methwold, Norfolk, UK	0	0	Chlorine gas was released when citric acid and sodium hypochlorite were mixed accidentally when one chemical was spilled. Firefighters wearing protective equipment cut off the supply of one chemical and removed it from the building.
1999/02/24	Stowmarket, Suffolk, UK			A 1000 L hypochlorite tank sprung a leak at a swimming pool. There were fears that fumes could mix with other chemicals in the area but the leak was safely contained and dealt with by the fire brigade. Swimmers were not affected.
1999/10/19	Sleaford, Lincolnshire, UK	0	0	Minor leak of sodium hypochlorite from pipe involved in chlorine delivery at leisure centre. Fire crews and staff cleaned up contaminated area. Centre remained open and unaffected.
1999/11/16	Grimsby, Humberside, UK	0	0	School caretaker noticed that the storage tank was leaking and called fire brigade. Firemen decanted 750 litres from the tank into specialist containers for disposal. There is no information on the size of the leak.
2001/03/14	Barway, Cambridgeshire, UK	4	0	Sodium hypochlorite solution, used for cleaning water, was accidentally mixed with citric acid at a salad-packing firm. The release of chlorine gas affected up to 50 staff. 14 workers were taken to hospital by ambulance, 4 were detained overnight.
2001/08/16	Coatbridge, Lanarkshire, UK	30		Tanker driver, unfamiliar with the delivery, transferred hypochlorite solution and hydrochloric acid into the same tank at a swimming pool. Chlorine gas filled the pool area and eighty people were evacuated. 30 people were treated at 3 local hospitals.
2002/11/05	Broward County,	0	0	A road tanker overturned after taking an off-ramp too

	Florida, USA			quickly. 12m <sup>3</sup> of the 16m <sup>3</sup> cargo of sodium hypochlorite spilt when tanker dome sheared off.
2004/01/06	Thetford, Norfolk, UK	0		Blaze at depot destroyed 8 articulated lorries, 12 trailers and storage tanks. 120,000l sodium hypochlorite lost to drains & river from 200,000l tanks & 600,000l removed from 3 further tanks damaged by fire.
2004/4/30	Putney, Vermont, USA	0		Bulk delivery driver dispensed ~200gal resin into container of sodium hypochlorite - transfer point was clearly marked as for sodium hypochlorite. 2 chemicals reacted to produce chlorine gas to paper mill & surrounding area. Driver charged after incident.
2004/11/05	West Nyack, New York, USA	0	0	A tanker carrying sodium hypochlorite overturned and spilt part of its 3400gal load. The spill was diluted with water and the leak was patched.
2005/04/28	Mount Vernon, Alabama, USA	0	0	Road accident between road tanker and car caused the release of about 2000l of the 13,300l cargo of sodium hypochlorite from the tanker to roadside ditch. Fire department attended the scene.
2005/06/21	Mattawoman, Maryland, USA	0	0	No injuries or evacuations were reported following a leak of 5300litres sodium hypochlorite from a storage tank at a waste water recycling plant. The release occurred around a pipe fitting in tank and was contained in berm within a building.

#### Summary of Incidents related to Bleach

Date	Location	Injuries	Death	Description
1984/11/20	Slaithwaite, West Yorkshire, UK	29		The Britannia works of hays chemicals were expecting a delivery of sodium hypochlorite but received ferric chloride instead. The load was put in a bleach storage tank, a toxic chlorine cloud was formed + residents had to be evacuated.
1986/08/11	Prudhoe, Durham, UK	5		5 workers in hospital, 300 evacuated when chemicals mixed with bleach produced chlorine at Kimberly-clarks Mill. Incident occurred in plants main wadding mill.
1986/08/15	Hunt Valley, Baltimore, USA	32		The gas was formed when sodium nitrate and sodium nitrite were accidentally mixed with chlorine bleach. Operations were halted while the fire dept ventilated the building. The incident disrupted traffic in the area.
1990/11/20	Wednesbury, Midlands, UK			Policemen and works chemist went to hospital when chlorine fumes escaped from waste treatment plant. Hydrochloric acid reacted with bleach and rain water in a storage tank. Release dissolved almost instantly.
1992/02/23	Torquay, Devon, UK			100 galls sodium hypochlorite seaped from pinhole leak in storage tank. The bleach is used as a chlorine substitute for a swimming pool. The chemical leaked into a special safety container. 1 ton of sand used to absorb chemical.
1994/06/??	Scunthorpe, Lincolnshire, UK			Valve on 1000 L bleach tank used to stonewash jeans developed fault. Fumes given off as firefighters pumped bleach to spare tank. Tank in confined space & equipment used not designed to pump out at floor level.
1994/11/15	Kidlington, Oxfordshire, UK			Dozens of people evacuated from sports centre after 1000 L bleach seaped from tank behind building.

2001/12/17	Durham, County Durham, UK			1000 L hypocleanse (type of bleach) released from faulty valve at soft drinks maker. Bleach came into contact with citric acid and reacted to produce chlorine gas.
2003/07/15	Rodeo, California, USA			Clean-up crews had to be called in after road tanker carrying 5.7m <sup>3</sup> bleach hit a passenger train. Cargo was spilt but no injuries were reported.
2003/07/29	Broward County, Florida, USA			HAZMAT teams attended the scene of an incident where a tractor trailer overturned. The vehicle was carrying >5000 galls bleach & no release occurred.

#### **Summary of Incidents related to Bisulphite**

<i>Date</i>	<i>Location</i>	<i>Injuries</i>	<i>Death</i>	<i>Description</i>
1994/06/02	Scunthorpe, Lincolnshire, UK	4	0	30 evacuated from leisure centre & 3 staff & 1 council employee doing electrical work taken to hospital after sodium hypochlorite & sodium bisulphite became mixed, releasing gas.
1999/01/29	Southwick, Sunderland, UK	0	0	Approximately 100l of sodium bisulphite escaped at an engineering works when a feed pipe became blocked. Firefighters wearing protective suits cleaned up the leak.