

Coping in the post-Soviet

John Frame is an independent fire, explosion and emergency response consultant. His long career has involved assignments in every continent, every climate and culture – and for the vast majority of the world’s oil and gas companies. He found that working with the Russian fire authorities was to be one of his most challenging projects. Here he gives a very personal view of the conditions and difficulties faced by Russian responders who operate outside of the main cities. His observations were over a five-year period in the north, centre and south of the country, including two years when he was the de-facto fire protection consultant for an international consortium operating a gas stabilisation facility in eastern Siberia.



John Frame emphasises that the firefighters at Chernobyl demonstrated the highest levels of professionalism, integrity and indeed honour that could be asked of any emergency responder, in any country.

An important reminder

To set the scene, it is necessary to look back. In this instance, to 1986 and the nuclear disaster at Chernobyl, near Pripyat, about 110 kilometres north of Kiev in the Ukraine.

Much has already been written about this disaster, but it is important for readers to appreciate the sacrifice of the initial responders, which in the author’s opinion stand alongside the highest ideals of any other fire response group.

The reactor accident and fire at the Chernobyl nuclear power station was the worst nuclear incident in history, resulting in a severe nuclear meltdown. The incident occurred on 26th April 1986 at around 01:20 hours, when a steam explosion damaged reactor No. 4 and blew off part of the reactor building roof. The resultant fuelling rush of oxygen, combined with extremely high temperatures of the reactor fuel and graphite, created a graphite fire. This fire sent a plume of highly radioactive fallout into the atmosphere, and over an extensive geographical area. The plume drifted over parts of western Russia, Eastern, Western and Northern Europe and as far as some parts of eastern North America. Large areas in the Ukraine, Belarus and Russia were badly contaminated, resulting in the evacuation and resettlement of over 300,000 people.

Shortly after the explosion, on-site Soviet firefighters (Russian and Ukrainian) from the power station arrived to try to extinguish the fires. As was very common in Soviet times, information was not forthcoming and the emergency responders were not, initially, told of the radioactivity in the air, smoke and debris.

The fires on the roof of the building and the area around the building containing Reactor No. 4 were extinguished by 05:00 hours, but by then many firefighters had received high doses of radiation.

In one particular case – as the incident severity was becoming obvious to the fire response team – a responder realised that cooling water flow which also served the nearby town would be contaminated. Although he knew that accessing and closing the valve to stop this flow would result in lethal radiation doses, he did not hesitate.

The fire inside Reactor No. 4 continued to burn until final extinguishment by helicopters dropping materials including sand, lead, clay and boron onto the burning reactor.

It is recorded that the fire team leader arriving first at the scene, Lieutenant Vladimir Pravik, died from radiation poisoning on May 9th 1986, only two weeks after the incident, and another five died during 1986 alone. The Soviet-era secrecy made it very difficult to track down victims. It is reported that casualty lists were incomplete and Soviet authorities apparently prevented doctors from stating “radiation” on death certificates.

Although around 23 years ago, many readers will have heard of Chernobyl and many will recall the apprehension felt in Europe at the migrating radioactive particles. What was – and is still – less appreciated was the great effort made by the fire response personnel throughout the incident and the human sacrifice this entailed. Through their efforts, the fire did not spread to or involve the remaining three reactors. Although contamination spread over a massive geographic

era



Emergency Situations. The State Fire Service is divided into the Federal Fire Service and the Fire Service of the Federal Subjects of Russia, some 85 regions across Russia.

The Institute for Fire Defense and Scientific Research is the Moscow-centred body which uses more than 50 special laboratories for RSFS scientific support, new technologies and methods of work.

The Ministry of Emergency Situations is also known as EMERCOM. The official title is Ministry of the Russian Federation for Affairs of Civil Defense, Emergencies and Disaster Relief.

From the RSFS viewpoint, EMERCOM is a rival that enjoys funding, equipment and political power which in a great many cases would be better deployed with the RSFS. All the more so when it is realised that EMERCOM personnel were sent to assist India in the 2001 Gujarat earthquake, when many regional fire brigades were desperately short of good equipment and apparatus. The political kudos and the recognition for international assistance in India far outweighed the deficiencies back home. If this reminds the more mature readers of the Soviet-era dogma with its smoke and mirrors publicity, it will also be obvious that the similarities extend to many other aspects of Russian public service organisations.

Standards and site fire teams

The industrial fire and emergency response teams across Russia have to satisfy the GOST requirements (Gosudarstvenii Standart – Russian Equivalent of ANSI or BSI) of such a fire brigade and these requirements are prescriptive and very rigid. The GOST standards are different from most countries’ fire and safety standards in that they dictate fire apparatus and manpower requirements according to industrial facility size.

Apart from the GOST, there is also SniP (Stroitelnye Normy i Pravila – Construction Codes and Regulations) and NPB fire safety regulations. These standards sometimes overlap with GOST and also state equipment and apparatus requirements for responders.

Industrial fire brigades in Russia are simply an extension of the RSFS and in many refineries, terminals and oil and gas stabilisation installations, the “site fire brigade” is a directly connected part of the regional fire service. This is a legacy of the Soviet-era when the claim of 100% employment for the Soviet Bloc was being made. A case in point for the author was in one facility in Russia he visited, where there were three fire stations and 150 firefighters for a single 100,000 bbl/day refinery. The claim that they were all employed could certainly be justified. This desire to see high employment levels prevails today, despite the collapse of the Soviet Union, and was one of the major obstacles to overcome in an onshore gas stabilisation site in eastern Siberia.

The RSFS prescriptive requirements at the base project level meetings, were for four foam/water fire trucks, two foam pumper trailers, one water pumper, and a total fire brigade manpower in the order of 85. The total operations, maintenance and admin personnel for the facility was planned at some 52 people.

It should be noted that these resources were to be provided

Centre pictures clockwise; Siberian firefighters; the determination to get an aerial ladder into position for a tank full surface fire is always evident (the wisdom and stability of such a deployment is in the author’s opinion, very clearly in doubt in this photograph); Novorossysk firefighter; despite relatively strong winter driving capability, the trucks are only as good as their drivers. Despite the lack of seat belts, no one was injured in this skidding accident.

area, nonetheless, a far greater and possible global disaster was prevented.

The responders had no really effective PPE, no respiratory protection and had little knowledge initially of the radiation presence. Yet despite these deficiencies, the firefighters at Chernobyl performed to the highest levels of professionalism, integrity and indeed honour that could be asked of any emergency responder, in any country.

There is a monument to the responders, located only a few kilometres from the power station. It is a fitting memorial to those who gave their all, literally, in the emergency response to this catastrophe.

With the above in mind, the author provides snapshots of the realities of fire and emergency response in a country still slowly emerging from its Soviet past.

In brief – the Russian Fire Service

The RSFS – Russian State Fire Service – Gosudarstvennaya Protivopozharnaya Sluzhba) is a part of the Ministry of

Left to right; Ural trucks’ basic chassis and compartment designs are 50 years old; Kamaz aerial ladder – it has no fixed water piping or pump; converted tanks offer the best solution for snow clearance; Kamaz has been attempting new technology and design, but this is a slow process due to red tape.



for what was a gas stabilisation plant where condensate and gas are the principal hazards and crude oil flowed to on site storage only in the event of a process upset.

The international consortium operating company desired an operator-member fire response unit, made up of only the site operations and operational support employees, with one full time fire chief.

In the end, after much discussion, presentations, meetings, arguments and visits by increasingly higher ranking officers (until the General of the RSFS appeared himself), it was finally agreed and documented that this particular production facility would have a site fire team of operators only, with two fire trucks.

The author had spent over two years in developing the scenario and QRA-based assessment of emergency response actual needs versus the GOST requirements, and in persuading the RSFS Moscow authorities that the assessment was not only credible but viable in operation.

Fire apparatus

By and large, Russian fire trucks and equipment are unattractive, seemingly poorly built and on first impression, liable to fall apart. However, this is very deceptive. These hulks can keep moving in the worst winter conditions. They are ugly, yet robust, slow yet

capable of maintaining movement in snow and pumping for hours on end. Always provided, of course, that they are well maintained! There is almost no difference in the fire truck and equipment models of the Soviet era and the present day Russian fire trucks and equipment. The two principal truck manufacturers are Ural and Kamaz, but both produce the GOST standard type trucks, the specifications of which have not changed greatly since the end of WWII.

The reason for this is the great bureaucratic barrier that is the Fire Science Institutes of Moscow, which forever wait on the Federal Russian Fire Service's (FRFS) approval before attempting any changes to standards. The FRFS have shown very little signs of moving with the times as yet.

The Russian winter defeated Napoleon Bonaparte (1812) and Adolf Hitler (1942). Russian fire officers point to the lack of Western understanding of their country's climatic extremes and to their lack of understanding of how modern technology can fail in extreme winter conditions. There is therefore great pride in the Ural and Kamaz vehicles and you criticise them at your peril.

Strategies and tactics

Russian strategies and tactics, for industrial incidents, are somewhat different and more hazardous than current Western practices.

The full surface fire is one example. Western oil companies have until fairly recently (c. 1995) considered a tank full surface fire as an incredible event. However, Russian fire protection standards not only consider it a credible event, but also require fixed foam systems for their atmospheric storage tanks, as well as the mobile and portable capability to extinguish such fires in event the fixed system fails, regardless of tank size.

Thus for some facilities, the main reason for large, though often outdated mobile fire apparatus, and for large numbers of full time professional responders, is in case of a storage tank fire.

This situation is extremely difficult, if not impossible, to justify to Western oil and gas company management (unless it is a key strategic tank farm) where the tendency is to reduce responder numbers and rely on external local or government fire brigades.

Blowouts are not uncommon in Russia. This one occurred during workover and was eventually fully capped after two weeks. The Russians take great pride in not calling for external specialists for such incidents.



New technology in oil industry firefighting is only gradually being introduced. This Kamaz mobile water spray/mist vehicle is being tested for well blowouts. An interesting aspect of this exercise is the semaphore used by the officer in the left foreground. The other interesting point is the use of hand-held nozzles for cooling.



Responders and their equipment

Russian firefighters, like most of the country's population, are melancholic, have a tendency to be pessimistic and in not a few instances, fatalistic. Rampant alcoholism is but one example of lost hope.

Alcohol consumption in Russian fire stations is officially prohibited, but like a large percentage of the population, many responders do drink on duty. (The author worked closely with a reformed alcoholic who stated that he used to consume a bottle of vodka daily. At 35 years old, his view was that since the average lifespan of a Russian is about 40 (his estimate), his time was short, so perhaps he should think about enjoying a drink again.)

While optimists may say that this has changed with the introduction of democracy, for the author, this certainly does not appear to be the case. The firefighters that were there then and are there now, see very little improvements. Fire hose manufacturing still uses natural fibres for the external jacket, and hose has to be dried – never a simple task during winter use – and fire stations by and large do not consider hose towers for this purpose. Bunker gear quality varies and there is still widespread use of what passes for 1970s style close proximity suits. Water nozzles are generally barrel-type with open nozzles. Foam nozzles are for medium expansion only and this is still the type of produced foam favoured across Russia, although there are at last signs that low expansion foam concentrates are finally being accepted by the FRFS in Moscow.

SCBA equipment is probably the worst of the current equipment shortfalls in regions outside of the main cities. Where there are breathing sets, and not all stations have them, these are re-breathers of WWII type. The use of SCBA in some areas is very poorly understood. An example is that after one SCBA training course for the personnel of the gas stabilisation facility, the author was approached by the local fire chief requesting if he could attend any future courses with his crews.

100mm, 70mm and 35mm are typical diameters of fire hose used. There are various reducers and control fittings/breechings for maximising water flow and hydraulics. An interesting feature is that in many cases, due to severe winter climates, the water pump is within the cabin so the operator is protected. Although, obviously, North American counterparts also have heated pump operator shelters, the Russian version has the pump taking up space in the crew cabin itself – and is also used as the heating.

Fire trains and tanks

Although limited in capacities of water and foam, fire trains are to be found in every major city railway station. They are a legacy from the Second World War but are still seen as a strategic emergency response in the event of another invasion of Russia. They form part of the current fire service response to rail incidents and to remote town and village incidents. These trains have two water tanks of around 80m³ each, a foam concentrate tank in the order of 9 m³, a separate wagon with diesel fire pump on board and a command carriage.

Interestingly, there are still steam trains held at strategic locations in Russia that can be used if oil and gas supplies are disrupted during any aggression. These would be fuelled by wood from the Siberian forests, which are still dense in the eastern part of Russia. This is a national response strategy. The Russian psyche still considers invasion a threat.

In many areas, extremely heavy snowfall and deep drifts



A Russian Fire Train at a rail incident. It is very much a one-shot response in terms of water and foam, similar to an airport crash rescue tender. Once the agents are expelled, refilling is back at the station.



The build quality, equipment and equipment storage designs are not best-in-class.

mean a route has to be created for the fire trucks. Converted tanks are stationed in some major city stations that operate ahead of the trucks responding. The tanks are not slow (around 50-60 kph) but cannot obviously gain top speed when ploughing in really deep snow.

Hope for the future

Change is inevitable, for everyone. There are already changes underway but as stated previously, the pace of change is frustratingly slow. 100% synthetic hose is, very slowly, being tested. Low expansion foams and film forming foams also are slowly being tested for approval. Bunker gear in the likes of Moscow, St Petersburg, and Murmansk is of better quality.

For industrial response a more recent (2007) development is the trialling of watermist for well blow-out control. Kamaz have developed this and for once it was passed for testing.

Like all bureaucracies, but particularly the Russian one, the restructuring and reorganisation of the various sparring entities which control the overall fire and emergency response services will take a long time. It is to be hoped, for the everyday Russian fire responder, that the necessary changes come sooner rather than later. The legacy of the Chernobyl responders deserves better.

This aerial ladder lost its hydraulic power during an exercise requested by the author. Note the "engineers" working on the hydraulics. The "engineer" used a broom handle in an attempt to correct the defect, but the ladder was still in the same elevated position 24 hours later.

