A Seminar on CBRN Protection By Cenjows

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CENJOWS , DRDO and IMR jointly organized a seminar on 'CBRN Protection' a subject of immense strategic importance from 03 Mar to 04 Mar 2014 at Dr DS Kothari Auditorium in DRDO Bhawan, Rajaji Marg , New Delhi 11. Apart from participation by eminent academicians, speakers from scientific community of DRDO, NDMA, Services and from the Industry participated in the seminar. The subject had generated a considerable interest and was widely attended by the serving officers of three services, central police organizations, members of the think tanks, and industry. (Copy of the programme is attached) The event was covered in six sessions for two days. The highlights of the deliberation are covered below.

Inaugural Address: As per the programme, Maj Gen (Retd) KB Kapoor, VSM, the Director, CENJOWS gave the Inaugural address. He after covering the aim of the seminar went on to cover the paradigm of CBRN threat. Apart from its possible use of CBRN by the enemy, the terrorists too could employ these weapons may be crudest from to terrorize the public. He referred to a recent sensational disclosure by Yasin Bhatkal, the IM founder who during his interrogation by the police disclosed that his group had sought to acquire nuclear device from Pakistan. Even if this was an exaggeration, acquiring a medical Radiological device is not difficult due to lack of effective monitoring. In comparison, the chemical weapons are relatively easy to manufacture. The cruelty and magnitude of chemical attack is exemplified a case of domestic terrorism in which a sarin attack carried out in a Japanese subway in 1995 killing thirteen people, severely injuring fifty and causing temporary vision problems for nearly a thousand others and also recently in ongoing civil war in Syria where perpetrator could be the government as alleged by the opposition or by the opposing forces as asserted by the government. In either case, the use of chemical weapon is reprehensible. The use of chemical weapons has been banned by the international but, six nations are still to sign and ratify the treaty. The severity of Biological attack is even greater to the human life as it continues to infect and inflict death and miseries to the victim, therefore, it is no wonder that it is banned. He concluded by saying that threat from the CBRN is viable and distinct possibility.

Key Note Address: It was given by the eminent scientist, Dr Manas Mandal, The Director General (Life Sciences), DRDO. He set the tone of the subsequent discussions by setting the aim of the seminar as to generate awareness, review, internalize from the incidents such as from the incident of a Chemical attack in ongoing Syrian civil war and understand our vulnerabilities so that we can strategize and develop tactics to counter such threats. Skeptics may consider CBRN threat a hype but, the Syrian incident proves its possibility. Further, questions which need consideration are, whether such threats are incidents only or these have systemic dimensions? What intensity of the warfare CBRN would be employed? Is it Weapon of mass destruction as commonly understood? Which kind of environment would be susceptible to the CBRN usage? Can the threat be defined as asymmetric or symmetric? We may not face many attacks but, these may create panic in the general public as was witnessed with the Northeast population who moved back to Northeast India fearing attacks after alleged persecution of Rohnigia Muslims in Myanmar. Hence, India is susceptible to the CBRN

threat. We therefore need to make sure DRDO, Services and civil services plans and procedures are matched and fully synchronized to fight CBRN scourge?

Special Address: Lt General Prem Praksh Verma, SM, VSM, Deputy Chief Integrated Deference Staff (Medical), HQ IDS gave the special address in the seminars inaugural address. He opened the address with the statement that medical professionals would be the first responder of the CBRN challenege. Doctors who have may have never seen the CBRN victim earlier and are in all probability not aware of the symptoms before, may have to treat large unprecedented causalities caused by a CBRN attack. We have seen the confusion which prevailed in handling the Mayapuri case of mishandling of the radiological device ,the magnitude of the challenge can be gauged in operation where enemy chooses to use CBRN attack.

NDMA has laid down detailed guidelines to handle such cases and dealt it with four prong approach.

1. Impart Training and Education.
2. Having SoPs and policies in place.
3. Hold Enough equipment/Medicines.
4. Hospitals Preparedness

After the Mayapuri experience, Office of the DGFAMS has equipped hospitals to treat CBRN cases as follows:-

1. Seven hospitals for nuclear and radiological patients,
2. 25 hospitals to tackle biological attack cases.
3. 85 hospitals for chemical attack cases.

These steps are not enough to handle the grave consequences of CBRN dispersal whether of intentional or unintentional type. The intentional CBRN attacks will lead to massive damage. We could estimate the magnitude from the fact that it takes nearly 20 minutes to decontaminate a person who suffers nuclear fallout. We can imagine the effort involved, the size of the of the trained force and the resources required to decontaminate a large population which require treatment after nuclear and radiological attack . Treatment would be totally different for water poisoning case. Do we have enough antidotes to treat them? In the CBRN School in each command area nearly 1400- 1500 personnel are being trained. Is that adequate? Do we have personal equipment such as clothing, ambulances or even capability to handle this challenge? We need to work out strategy to tackle this threat.

Session 1

Vice Admiral P Kaushiva,UYSM,VSM of NMF chaired the first session of the day. He opened the debate by welcoming the speakers of the session and the audiences and stressed that subject of discussion should be CBRNE not CBRN where the E stands for explosives. He emphasized that In the developing world the R&D effort would be handled by the Government the industry comes in for mass production.

First Speaker. Dr. MP Kaushik , the Outstanding Scientists and Programme Director from the of the Defence Research &Development Establishment , Gwalior was the first speaker of the session. In

his talk,he covered the 'DRDO ongoing efforts in CBRN defense R&D' to fight the CBRN . He said that possibility of CBRN attack exists both from the state and non-state sources. He graded the threats and concluded that in peace time the CBRN threat emanates more from the non state actors especially unlike state the non-state actor does not get barred by any treaty or convention. He gave poser that CBRN threat mainly affects South Asia and covered the advances in this field by china who acquired chemical weapons in 1949 and biological weapons in 1958. Despite several international treaties the threat has remained. The DRDE has been working on the chemical and biological weapons. The mortality is very high with the chemical weapons the extent of damage depends on the extent of the exposure. We cannot assume that it cannot happen to us is fallacy. The other fallacy is the victim would die is once again wrong and would depend on the extent of the exposure. In case of enemy attack the troops are the first responder but not in case of the non state actors who could attack the civilian population as well. The terror elements could also be state sponsored. The motives of the terrorism could be political. He however, was vehement in assertion that that CBRN offensive cannot win the war. He said that DRDO has made significant contribution in formulation of Sop's to counter NBC and has developed the state of the art equipment/systems as well the NBC training programme undertaken by DRDE. He also brought out greater trust and reliance on DRDE has been built over the period and their help was even been sought for the CHGAM in 2009, CWG 2010. He discussed several NBC threat Detection and monitoring system and equipment for the collective as well as for protection of an individual . Some of these were also displayed in the exhibition. The NBC systems has also been developed to meet the requirements of the individual service.

Second Speaker. Dr. Rajesh Arora Scientist 'E' of Director General Life Sciences, DRDO HQ spoke on "Protection against the Biological Threats: Issues and Challenges ahead ".He stressed that war using microbes is more damaging. Out of the 57 million deaths that occur every year 25% die due the infectious diseases. He asserted that war of Microbe is more damaging than the conventional war. The impact is so serious that it not only leads to the loss of employment, the economy of the country due the loss of tourism and investment scenario itself becomes gloomy. He quoted from history the figures pertaining to the large number of infections and deaths caused by the diseases. For example the disease killed an estimated 400,000 Europeans annually during the closing years of the 18th century (including five reigning monarchs) Smallpox was responsible for an estimated 300–500 million deaths during the 20th century and , 50 million died of the Spanish Plague. There has been three major pandemic of Plague. These have resulted in death of millions people worldwide besides; there are large number of emerging infectious diseases such as H5Ni Foot and mouth disease etc. The reason for the spread of the diseases is large population, quicker means of communication, poor health and hygiene etc. Viral diseases are more serious as virus can modify their nature. He opined that that First World war was fought with chemical agents; the second world war was nuclear and third world war in all probability will be biological. This shows the seriousness of the situation .The biological weapon could be used by non state as well as the state. The impact can be gauged by the fact 100 kg of Anthrax can cause anywhere 1 million to three million deaths which is equivalent to the effect of one megaton nuclear bomb . Biological weapons can be deployed by various modes these are versatile, cost much less, difficult to detect and treatments are not available for all agents. The question how the responder should be trained can be summed by the acronym, RAIN which is followed by U.S. military where R stands for recognize, A for avoid, I for isolate and N for Notify. They have real time bio surveillance for early warning of biological agents. You require very sophisticated VLS-4 laboratories. Developed country has many but, we have two, One at Bhopal and other has just come up at Pune. Future foretells generation of artificial bacteria's which could self replicating .This gives us food for thought that what could happen when bacteria are developed

in the LAB ? We are developing detection Kits to detect and fight these. He ended the talk by giving several works carried out by DRDO. In Surat plague, DRDO gained expertise which they used in Shimla plague and in a Plague breakout at Housur. DRDO has developed detection Kits for Bio and Chemical attacksas well as Bio protection suits to protect the individual soldier.

Third Speaker. Mr. Devkanta Pahad Singh, Scientist F, Director General Life Sciences, DRDO spoke on the subject of " CBRN Defense R&D in Time to come " He commenced his talk with a quote of Sun Tzu" If you The enemy you do not have worry about the hundred battles." In the recent times, the Syrian attack chemical attack is most serious form of attack. To prepare defence against the chemical attack, we need to know the manner CBRN attack would be carried out. These could be disseminated by Missiles , Aircraft, cruise missiles and unmanned remotely piloted controlled vehicles etc . He opined that that Hypersonic Vehicles such as one tested by china recently are difficult to intercept due to high speed and consequent minimal reaction time it provides. Earlier only U.S. Russia had this type of weapons but, china's test has brought in new dimension to the threat in our neighbourhood. CBRN threat emanates equally from the non State actors as these are relatively easy to build. In favorable weather conditions the causalities can be as much as 60%. If you compare the casualties caused strategic weapons and the CBRN weapons, the damage is comparable if not more with CBRN weapons. With the exception of Submarine, all forces are susceptible to CBRN weapons with limited protection afforded to troops in the tank and combat vehicles. To fight the CBRN the strategy is, first deny enemy the use of the weapon with international treaties and conventions but, even these would not yield results in absence of effective monitoring mechanism next, employ counterforce but this calls for a political will to target the centers of CBRN weapons and finally, intercept CBRN threats before these are deployed .But, one must consider that even though the missile carrying the CBRN war head is intercepted, there is no guarantee that the CBRN would not get dispersed despite interception . The solution like provision of shelters is not adequate; we need to ensure that reliable rescue system is developed. He discussed the need develop passive standoff detectors , mobile detectors , Wide area chemical Reece, modular hardened shelters, biological detection system etc . We continuously need to anticipate the future requirements. He concluded the talk with a poser that in United States the share of cost of defense procurement is far less than the expenditure in R&D. In India, the opposite is true which must change.

Q.A Session 1. During the Q.A.at the end of the session 1, it was observed that poor intelligence capability could seriously impact our ability to fight the CBRN threat. There was also a query regarding Water Poisoning Detection Equipment which has not been found effective in areas with Low temperatures. Similarly, on the question for vaccination for small pox it was told that as small pox has been eradicated from India and post 1970 no small pox vaccination is being carried out, we thus need to synthetically develop the small pox virus for vaccines purposes since natural strain is not available. Further, currently, only two centers, one in United States other at Russia hold the strains. Vaccines would be made if there is outbreak of small pox anywhere in the world but, they would not share the strain with other countries. However, it was assured that if there is attack in India it would not be difficult to develop the vaccination with in the country. Yet to another question which still needed answer is about need to develop the detectors to detect the chemical attack even before these attacks are carried out.

Guest Speaker .Lt General (Retd) J R Bhardwaj, PVSM, AVSM, PHS a former member of the NDMA where he has done pioneering work, spoke on the role played by NDMA in CBRN field. He opened the discussion that threat of bio-terrorism is a reality. Bio terror agents are easy to create and

one does not require any sophisticated technique or equipment to create as the offending product can easily be created even in our common kitchen. Large population centers, water points, religious places, entertainment places, and wherever there is large congregation of people such as railway/ Metro stations etc are targets for such attacks. The methodology for attack is to contaminate sources of air, water, food. The CBRN attack becomes more violent and difficult to detect if combination of agents such as bio and chemical are used together. He opined some symptoms /happenings which normally do not occur are observed, the inference could be that these are caused by CBRN terrorism. The preparedness to fight this menace is first to carry out a risk assessment, setting up bio safe laboratories and stocking laboratories with the essential drugs , antibiotics and vaccines, formation of rapid response teams and finally , developing Sop's, and database, carryout mock drills and train specialized force to manage CBRN cases . As on now not many states with the exception of some Southern states and Gujarat are prepared to some extent to fight CBRN menace. He also apprised that NDMA has created and trained specialized NDRF Bn to handle all types of natural and CBRN induced contingencies. In the aftermath of Fukushima nuclear disaster they went to Japan and were praised by the Japanese government for good performance. At present, National Disaster Response Force consists of ten battalions, two each from the BSF, CRPF, two CISF and ITBP. Each battalion will provide 18 self-contained specialist searches and rescue teams of 45 personnel each including engineers, technicians, electricians, dog squads and medical/paramedics.

Session – II

MITIGATION, DECONTAMINATION AND TREATMENT

The second session was chaired by Vice Adm VS Chaudhari, NM, Addl Director CENJOWS New Delhi. In his opening address the chairman thanked the speakers of Session I for their contribution and introducing the subject well. He acknowledged the fact that the source of threat for India remains with neighbouring countries specially China and Pakistan. Besides Nuclear threat we may face the chemical and biological threat too.

Under the Nuclear gambit, he broad lined three themes to be catered while dealing with the CBRN threat, they being ;The spread of the problem may be well beyond CBRN and may include 'E' making the threat as CBRNE (E being Explosion).

1. Scale or the spread of the area to be covered is going to be large, and
2. Uncertainty of the time and place of threat, which would be known as and when we face the threat.

The chairman further quoted the nuclear incidence of Chernobyl and Fukushima disasters. He pointed that Chernobyl incidence, although measured equivalent to only 1 kt strength, did cause the reactor plates to rise to few thousand feet up in the air passing through the reactor's strong roof.

Speaker. Col (Dr) Sanjay Kaushal, Director (CBRN), HQ IDS was the first and sole speaker of the session. A paper on 'Hospital Disaster Preparedness in Relation to Chemical Disasters' was presented by him.

The speaker highlighted in detail the motives and the type of attacks carried out in a terrorist attack involving use of chemical weapon/ substances. He brought out these aspects as it is essential to know

it in advance in order to keep the respective medical equipments/ medicines ready for use in case of occurrence of such an attack or disaster.

Speaker said that while in case of a chemical accident like 'Bhopal Gas Tragedy' the effecting chemical, its effects, time duration available for treatment and it's antidote is fairly accurately known, in a politically or fanatically motivated attack it would be difficult to predict (time of attack, type of attack, place of attack, number of effected people etc.). Therefore there is a need to know various types of attack which may be used and be prepared to deal with them in case of such occurrence.

The speaker brought out that there are chemical agents affecting a person's ability to sense or to sustain leading to individual's disability or mortality. He said, based on the type of chemicals in use various products and technologies are being used and pursued for protection. He went on to explain various techniques and software in use to detect, treat and prevent the spread of chemical hazards.

The speaker highlighted that almost 1000 chemicals are added every year and almost 1,00,000 chemicals are used globly. There are about 1666 major accident hazard units in India. The commonest causes of chemical accidents in order of increasing severity were leakage or brusting of Pressure Cessels, lack of hydraulic testing, corrosion of vessels/ pipelines, improper mixing of fluids, accident during transportation, improper handling of herbicides, terrorist attack and chemical warfare.

The speaker highlighted various disasters involving chemical agents from olden times to as recent as Aug 2013, where use of Sarin gas was suspect for genocide. Union Carbide's Bhopal gas leak case was highlighted where 500,000 people were exposed to the gas, 20,000 have died till date and 120,000 continue to suffer due to exposure to the gas. More other examples were repeat of session I of the seminar.

Hospital emergency departments generally are not prepared in an organised manner to treat victims of chemical or biologic terrorism. He said that a holistic and co-ordinated approach is needed in this arena. The preparedness required is of is in field of infrastructure and also in the response to the chemical incidence. He elaborated upon both kinds of preparedness required.

The speaker opined that as a country we are not fully prepared to deal with chemical attack or major disaster. The gap in our preparedness were highlighted to be in lack of knowledge and training, inadequate hospital disaster plans for chemical agents, non availability of specialised chemical injury treatment centres, non availability of decontamination facilities at hospitals, inadequate contingency planning, lack of mechanism for long term follow up, non availability of SOPs and absence of regular drills for hospital staff.

While concluding the speaker said that we must plan and co-ordinate preparedness of response organisation, carry out drill and update them, educate masses, co-ordinate medical care, make station based plans with all elements represented and also make area/ zonal plans.

During the question and answer session it emerged that the disaster response framework has been made for certain cities like Visakhapatnam and Mumbai and further refined ratified by carrying out

mock drills. The plans are understood to have been promulgated ever since. What needs to be done id to replicate the same for other cities in the country.

Session – III

Session III was chaired by Maj Gen (Retd) RK Arora. He welcomed the speakers and the guests and reiterated the importance of participation of industry in developing and providing long term support to the Armed forces. He expressed happiness over the enthusiastic response from the industry in participation in the seminar and the excellent displays put up. He invited the first speaker to take up the podium.

First Speaker was Mr Eric Damiens Marketing and Sales Director, Proengin, a graduate from Supmeca School of Engineers. He is a member of the French High Committee for Civil Defence (HCFDC) and of the Defence NBC French Industry Group. In his talk he covered the background of the company and the company profile in developing, manufacturing and marketing Bio and Chemical detectors. Active in 55 countries, he said, their main export customers are USA, UK, Japan, India, Saudi Arabia, Singapore, Germany, Finland and Sweden. He went on to enlist various customer reference list like military, police, border security forces, customs, civil defence forces etc in the countries covered.

The speaker then presented various types of equipments developed and marketed by them based on the QRs provided. He said that there are two main classification of equipments developed. One that detect the presence of bio/ chemical agents, which are broad based and limited to only detecting the presence and do not give specific identification of the type of threat presence. These equipments allow the forces/ workers to take initial preventive measures like wearing of protective suits, masks, gloves etc. The second type of equipments developed are for the analysis of the the threat present in the environment and give the presence of type of agent and its concentration etc. These equipments are used to determine the effect of the bio/ chemical agent and derive the possible extent, its effect on population and to determine the necessary corrective measures to be taken by the authorities and antidote and remedial measurements to be taken by the medical staff.

The speaker re-iterated the fact that the conditions in the laboratory considerably differ from the ground situations and all the equipments developed world over have certain limitation in taking into account all types of situations which may persist in countries based on the environmental conditions like temperature, wind force and direction, presence of dust etc.

The speaker then showed the photographs and technical details of the equipments like AP4C (Flame spectrometer for detection of chemical warfare agents and toxic industrial materials), AP4C-V (same as AP4C, for use by armoured vehicles) (AP4C-F (for use on industrial/ installation on infrastructure and warships) MAB (a biological Alarm monitor, Detector, reconnaissance and critical area surveillance operations).

He brought out that all analysis devices require sampling and use expansive reactive agents, while the detectors are cheaper to use for initial detection. He said that extensive field trials have been carried out of all equipments in 2006 and they are now in use by various forces as said earlier.

Second Speaker was Col (Retd) HR Naidu Gade, Chief Consultant CBRNe Secure India. He spoke on subject 'ÇBRNe IEDs – New Challenges'. He covered his topic in four major headings namely CBR materials & means of delivery, CBR incidences and vulnerable targets, CBR IEDs/ Ids – New challenges and Technological tools to mitigate challenges.

In the first part explaining the types of CBR materials, the speaker said that it was important to know the types of material used category wise so as to know the type of threat and take effective remedial measures. He described the chemical warfare agents as nerve agents, blister agents, choking agents, intoxicating agents and toxins. He also described the effect of various industrial and commercial chemicals which are produced, transported and stored and may lead to a chemical disaster necessitating similar corrective measures as in case of a CBR warfare.

In the second part of the presentation the speaker described the delivery methods of both – the chemical agents as well as the biological agents. He said that during the precautionary stage it is important to know these probable delivery methods in order to safeguard such places of interest. The main methods of delivery of chemical agents described were ventilation system of buildings, passive release of chemicals (container left open), bombs, mines or other explosive devices, IEDs that combine dangerous chemicals, sabotage of plants and vehicles containing chemicals and introduction of toxins in food and water supply. The biological agents described were the pathogens, bacteria, viruses, rickettesia, fungi, toxins and some 'Agri-Bio threat agents'.

In the third part the speaker spoke about Radiological CBR material having 'Alpha Beta or Gamma' emitters. A comprehensive list of radiological agents of each type of emitter including their delivery method was given in the presentation. The speaker said that state sponsored threat from radiological agents is less likely to be used by and against any state because of various international agreements and treaties signed by the countries and strict control over such materials. He however said that possibility is more likely from the nuclear disaster (in various nuclear power plants) or from the possibility of such radiological; agents falling into the hands of large terrorist organisations and radical forces operative in various regions.

Various CBR incidents taken place within India and also worldwide were listed by the speaker with brief description and its catastrophic effect on population.

Coming to main topic of the presentation the speaker brought out the challenges faced in dealing with CBR IEDs. He said that the threat has to be dealt in three phases i.e. survey and identification phase, rendering 'safe' phase and disposal or containment phase. He said that the CBR IEDs cases are rare and most of them go unreported, therefore not much of data on such incidence is available. Moreover most of the chemical or biological agents used in IEDs gets dissipated/ self destruct due to the explosion itself, therefore rendering this method less effective vis-a-vis other cheaper and safer methods by the terrorists. If these were to be used, it has to be a conscious standoff large scale attack by a state or military. Further its threat assessment is based on intelligence and it is highly dependent on weather conditions.

Before ending the presentation the speaker highlighted the need of training of personnel during peace time and availability of trained manpower in times of need. He listed the technological tools like RCVs/ ROVs and UGVs available for dealing with CBR IEDs.

The Third speaker of the session was Col (Retd) TS Sachdeva, Consultant at National Disaster Management Authority. The topic of the speaker was on the regulatory and Governmental efforts in the field of Disaster Management. He covered the topic under the heads of Genesis of Disaster Management Act 2005, Disaster Management Framework in India and Foundation of Disaster Management Framework in dealing with CBRN emergencies.

Starting with pictorial depiction of various major disaster from 1980 to 2013 he presented the Natural Hazard vulnerability profile of India. He first spoke on the origins and causative factors in chemical (Industrial) disasters. He went on to describe the nuclear and Radiological emergency disaster scenario e.g. explosion of N Weapons, accidents in N Power plants and other facilities, accidents during transportation of radioactive materials, disintegration of satellites during re-entry and N/ Radiological terrorism. Natural disasters like earth quakes and Tsunami precipitating into CBRN disasters were also explained. The speaker said that about 12% of Government revenue is spent on relief and rehabilitation and amounts to about 2% of GDP loss.

Speaking on management of disaster, he said that the main responsibility of is the state. Presenting the history he said that, until 2001 the responsibility of Disaster Management was under Agriculture Ministry as most of the disaster considered were natural disaster effecting the cultivation. Various committees were setup following International initiatives on disaster management and the responsibility was transferred to Ministry of Home Affairs in Jun 2002 and DM Act was enacted on 23 Dec 2005. Following this there was a paradigm shift from a 'Reactive' disaster management response to a proactive multi-disciplinary, multi-sectoral, holistic and comprehensive approach. He went on to show the complete National Disaster Management structure of Govt of India, composition and responsibilities of crisis management committees/ groups and task to be dealt with by the mechanism.

A full list of Emergency Response Centers established all over India to deal and manage chemical, biological, radiological emergencies and medical preparedness requirements including responsibilities of crisis management were enlisted in the presentation. The Rapid Response Team composition and their responsibilities both at state level and national level were presented.

The speaker told the audience about the places and the type of training being provided on CBRN. The main centers being CME Pune, CAPF Trg Centre, DRDE Gwalior, BARC Mumbai, OPCW, The Hague, ANMAS Delhi and Singapore Civil Defence Academy.

The speaker also gave out details of various publications given to the public from time to time. He saiod that many mock drills have been carried out in Delhi and Kolkata metros and 'off-site disaster management drills' near various N. Power plants. He further said that there have been various enhanced preparedness actions taken post Fukushima incidence.

Finally before concluding the speaker highlighted the road ahead and gave the visions as 'To build a safe and disaster resilient India by developing a holistic multi-disaster and technology driven strategy through a culture of prevention, mitigation, preparedness and efficient response.

Session IV

Session IV on second day focused on "CBRN Threat Assessment and Countermeasures". It was chaired by Maj Gen. Dhrub C Katoch SM, VSM, Director, Centre for land Warfare Studies who after brief introduction of the speakers of this session, invited the first speakers to examine the subject from individual service perspective.

First Speaker. Col Deepak Sharma, Deepak Sharma ,Director, PP(TAS& O) ,Army HQ spoke on the subject of " Pakistan nuclear strategy :Irrationality , Myth or Reality." He opened the topic with assertion that Pakistan's nuclear strategy is shrouded in the fog of uncertainty .It tries to convince India that it will act in the irrational manner and continues to support the terrorists act from its soil. It has always tried to project that it has low nuclear trigger and have ambitious thresholds. It follows first use policy which is clearly India Centric. How and when it will use nuclear weapon is assessed from the statements of its political and military leaders who has defined redlines for nuclear use. It may also induct tactical nuclear weapons in near future in the tactical battle area to counter the so called India's policy of Cold Start which has not been confirmed by India. In comparison India's nuclear policy hinges on credible minimum deterrence and pursues the policy of "No First use". The speaker analyzed the nuclear doctrine and asserted that irrationality serves Pakistan's aim well hence, it always continue to project irrationality but actually is rational in approach. He theorized threat of a nuclear war on breaching of redlines - probably mere saber-rattling and nuclear signaling and it is likely to follow the graduated response and follow the escalatory ladder gradually. In that the stage one will be Media blitz, followed by threat of use of nuclear weapon in the second stage. In the third stage, he will carry out demonstrated explosion, and then use Pakistan tactical nuclear weapon on Pakistan soil in the fourth stage. Finally, Pakistan may use counter value target against India.

Second speaker GpCapt SH Ramsali Commanding Officer of the NBC Protection, Indian Air force spoke on Dimension of NBC threat to IAF operations. He explained that nuclear threat is a war time threat whereas, all other types i.e. chemical, biological and explosive threats are predominantly peacetime threats . Thereafter, he briefly discussed the peace time and wartime vulnerabilities of air force operation and recommended utilization of existing assets like blast pens and hardened shelters for safe aircraft operations with some modifications .He felt that an airfield offers a viable target for the nuclear weapon where it could cause extensive damage with fireball , thermal and blast effect. The blast pens provide protection from the blast effect of a nuclear explosion could provide adequate thermal and radiation protection as well.

Third Speaker. . Cdr.Mukesh Dhondial, Director, NBC cell Indian Navy spoke on the naval perspective of the Nuclear Threat from Pakistan. In his talk he discussed the naval environment, Nuclear threat to Indian Navy , NBC Counter measures and finally concluded his talk after briefly covering the challenges and way ahead for Indian Navy. He briefly gave dimension of Threat from China and Pakistan .Defining the threat he assessed that Nuclear threat remains probable to the naval vessels both in the sea as well as in the harbour but, the chemical and biological attack are possible only when the vessel is in the harbour. The blast and EMP has adverse effect on operation which varies with the type a of the vessel and size of the vessel. A ship's design plays an important role in protection. He also discussed the type of the fixed detection equipment on board to detect the nuclear and chemical attack .While highlighting challenges, he stressed that apart of nuclear hardening of the ship there is a lack of early warning systems onboard of a ship. The systems also suffer from short shelf life. These need to be rectified with improvements of procurement procedure of new equipment which often takes very longtime.

Fourth Speaker. Dr.Monika Chansoria of the Centre for Land warfare studies discussed the "Chinese CBRN capabilities" in her talk. She apprised the audience that Chinese poses a viable nuclear biological and chemical threats and have variety of delivery systems to disperse this using ballistic and cruise missiles, aircraft and artillery. China is believed to have an advanced chemical warfare programme that includes research and development, production and weaponization capabilities. Its current inventory is believed to include the full range of traditional chemical agents. Chinese forces have conducted defensive CW training and are prepared to operate in a contaminated environment. China states that it is in compliance with the CWC. China declared in 1997 that it had a small offensive CW program that has now been dismantled.

China is also considered to have an active biological warfare programme, which is funded and supported by the Government. There is essentially no open source data on the subject of Chinese BW activities, and many legitimate research programmmes use similar, if not identical equipment and facilities It uses underground shelters to hide these from the world. Little information is known about China's activities, and that recent dual-use activities may have breached the BWC.

VALEDICTROY SESSION

Lt general Ravi Dastane,AVSM,VSM DCIDS (Operations)HQ IDS gave the valedictory address. This was followed by Closing remarks by Maj General KB Kapoor, VSM Director CENJOWS who after briefly speaking on the high points of the seminar, thanked the sponsors of the seminars, speakers and the audience for successful conclusion of the seminar.