THREATS TO PAKISTAN’S NUCLEAR WEAPONS: MYTH OR REALITY

Ph.D THESIS

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REGISTRATION NO. NDU-SNS/PhD/F-11/005

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NATIONAL DEFENCE UNIVERSITY, ISLAMABAD
PAKISTAN
2018
Declaration

I, Tahir Mahmood Azad, hereby declare that the thesis titled “Threats to Pakistan's Nuclear Weapons: Myth or Reality” submitted for examination is my own original work except where acknowledged in the references.

Student Signature:  --------------------------------------------

Date: July, 24, 2018
SUPERVISOR’S DECLARATION

I hereby declare that the PhD scholar Mr. Tahir Mehmood Azad has completed his dissertation on the topic “Threats to Pakistan’s Nuclear Weapons: Myth or Reality” under my supervision. I recommend it for submission in candidacy for the degree of Doctor of Philosophy in Strategic Studies.

Dr. Syed Shahid Hussain Bukhari
(Supervisor)
ABSTRACT

Ever since Pakistan carried out its nuclear tests in 1998, the international community has voiced grave concerns over the prospects of Pakistan’s nuclear weapons or fissile material falling into the hands of non-state actors or terrorists. The threat of nuclear terrorism has gained exclusive attention after the events of September 11, 2001, with concerns that terrorists could create even greater destruction if they had gained possession and know-how of nuclear materials and technology. Today nuclear security has become a leading issue of concern in contemporary international politics. Various academics as well as policy analysts have expressed their apprehensions regarding the security of Pakistan’s nuclear programme. So many hypothetical scenarios are being projected in the Western media, portraying a dramatically chaotic situation about Pakistan’s nuclear assets. Since the international community is facing serious challenges regarding nuclear insecurity, any single nuclear incident by a non-state actor may disturb global peace. Elaborating on the serious security threats to Pakistan’s nuclear weapons, Western security analysts and policy makers have pointed out a potential threat from radical militants and their sympathizers in the civil and military organizations. Additionally, it is a fact that terrorist attacks on military installations, including suicide bombings, have been observed in the last few years, all heightening the perception that Pakistan’s nuclear weapons are not secure. Several suppositional situations have been developed by Western analysts in this context; such as, terrorists attacking Pakistan’s nuclear facilities, controlling its nuclear weapons, accidental or unauthorized use of nuclear weapons and questions on nuclear weapons’ security when military installations are under attack. The other side of picture presents a highly professional and confident Pakistan with state of the art safeguards and highly evolved personnel check mechanism involved in its nuclear security protocol. Pakistan’s nuclear establishment has always strongly rejected such claims by media and policy institutes. Pakistan’s nuclear weapons’ safety and security system is as much advanced and robust as the infrastructure of any other nuclear weapon state. International concerns regarding Pakistan’s nuclear weapon programme are based on hypothetical scenarios that have little chance of materialization. This study is an attempt to conduct an in-depth evaluation of the international concerns cultivated through media, Pakistan’s response and the safety measures taken by Pakistan. It is an overall assessment of the issues related to nuclear safety and security of Pakistan’s nuclear weapons programme. The study suggests that Pakistan needs to improve and strengthen its nuclear diplomacy through effective global representation with special focus on countering negative propaganda, which would be the best way to mitigate international concerns about the safety and security of Pakistan’s nuclear assets.
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DEDICATION

Dedicated to the innocent martyrs of Army Public School (APS) Peshawar and Pakistan Armed Forces.
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<td>Airborne Laser</td>
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<td>ABM</td>
<td>Anti-ballistic missile</td>
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<td>AEC</td>
<td>Atomic Energy Commission</td>
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<td>ANRE</td>
<td>Agency of Natural Resources and Energy</td>
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<td>APS</td>
<td>Active Protection System</td>
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<td>ASP</td>
<td>Advanced Spectroscopic Portal Monitor</td>
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<td>ATBM</td>
<td>Anti-Tactical Ballistic Missile</td>
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<td>BAMBI</td>
<td>Ballistic Missile Boost Intercept - program ended in 1968</td>
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<tr>
<td>BMC3</td>
<td>Battle Management, Command, Control, and Communications</td>
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<td>BMD</td>
<td>Ballistic missile defense</td>
</tr>
<tr>
<td>BMDO</td>
<td>Ballistic Missile Defense Organization (succeeded SDIO)</td>
</tr>
<tr>
<td>BPI</td>
<td>Boost-Phase Intercept</td>
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<tr>
<td>BW</td>
<td>Biological Weapon</td>
</tr>
<tr>
<td>BWR</td>
<td>Boiling Water Reactor</td>
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<tr>
<td>COAS</td>
<td>Chief of Army Staff</td>
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<tr>
<td>CBRN</td>
<td>Chemical, Biological, Radiological and Nuclear</td>
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<td>CCD</td>
<td>Coded Control Device</td>
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<tr>
<td>CDS</td>
<td>Command Disablement System</td>
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<td>CHASNUPP</td>
<td>Chashma Nuclear Power Plant</td>
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<tr>
<td>CIA</td>
<td>Central Intelligence Agency</td>
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<tr>
<td>CPB</td>
<td>Charged Particle Beam</td>
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<td>CPPNM</td>
<td>Convention on the Physical Protection of Nuclear Material</td>
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<td>Acronym</td>
<td>Description</td>
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<tr>
<td>CRIEPI</td>
<td>Central Research Institute of the Electric Power Industry</td>
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<tr>
<td>CTR</td>
<td>Cooperative Threat Reduction</td>
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<td>CTBT</td>
<td>Comprehensive Nuclear Test Ban Treaty</td>
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<td>DBT</td>
<td>Design Basis Threat</td>
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<td>DCC</td>
<td>Development Control Committee</td>
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<tr>
<td>DEW</td>
<td>(Distant Early Warning) Line</td>
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<td>DEW</td>
<td>Directed Energy Weapon</td>
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<td>CW</td>
<td>Chemical Weapon</td>
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<td>DSP</td>
<td>Defense Support Program (satellites)</td>
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<td>DHS</td>
<td>Department of Homeland Security</td>
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<td>DIQ</td>
<td>Design Information Questionnaire</td>
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<td>DNDO</td>
<td>Domestic Nuclear Detection Office</td>
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<tr>
<td>DoD</td>
<td>Department of Defense</td>
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<td>DoE</td>
<td>Department of Energy</td>
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<tr>
<td>ECC</td>
<td>Employment Control Committee</td>
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<td>EDS</td>
<td>Environmental Detection Sensors also known as Environmental Sensing Device (ESD)</td>
</tr>
<tr>
<td>EEI</td>
<td>Enhanced Electrical Isolation</td>
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<tr>
<td>EML</td>
<td>Electromagnetic Launcher (rail gun)</td>
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<td>EMP</td>
<td>Electromagnetic Pulse</td>
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<td>ENDS</td>
<td>The Enhanced Nuclear Detonation Safety</td>
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<td>ESD</td>
<td>Environmental Sensing Device</td>
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<td>FATA</td>
<td>Federally Administered Tribal Areas</td>
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<td>FBI</td>
<td>Federal Bureau of Investigation</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<td>FIA</td>
<td>Federal Investigation Agency</td>
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<td>FRP</td>
<td>Fire-Resistant Pit</td>
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<td>GBI</td>
<td>Ground Based Interceptor</td>
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<tr>
<td>GHQ</td>
<td>Generals Headquarter</td>
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<tr>
<td>GLCM</td>
<td>Ground-Launched Cruise Missile</td>
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<td>GNEP</td>
<td>Global Nuclear Energy Partnership</td>
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<td>GPALS</td>
<td>Global Protection against Limited Strikes</td>
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<tr>
<td>GSTS</td>
<td>Ground-Based Surveillance and Tracking System</td>
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<tr>
<td>GTRI</td>
<td>Global Threat Reduction Initiative</td>
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<tr>
<td>HEL</td>
<td>High-energy laser</td>
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<td>HEU</td>
<td>High Enriched Uranium</td>
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<td>HUMINT</td>
<td>Human Intelligence</td>
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<td>IAEA</td>
<td>International Atomic Energy Agency</td>
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<td>IB</td>
<td>Intelligence Bureau</td>
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<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<td>ICBM</td>
<td>Intercontinental Ballistic Missile</td>
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<td>ICR</td>
<td>Inventory Change Report</td>
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<td>IFICS</td>
<td>In-Flight Interceptor Communications System</td>
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<td>IFT</td>
<td>Integrated Flight Test</td>
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<tr>
<td>IHE</td>
<td>Insensitive High Explosive</td>
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<tr>
<td>IMO</td>
<td>International Maritime Organization</td>
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<td>INF</td>
<td>Intermediate Range Nuclear Forces Treaty</td>
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<td>IND</td>
<td>Improvised Nuclear Device</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>INPO</td>
<td>Institute of Nuclear Power Operations</td>
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<tr>
<td>IOC</td>
<td>Initial Operational Capability</td>
</tr>
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<td>IRA</td>
<td>Irish Republican Army</td>
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<td>IRBM</td>
<td>Intermediate-Range Ballistic Missile - any ballistic missile with a range between 2400 and 5500 km (1500 to 3300 mi)</td>
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<tr>
<td>ISI</td>
<td>Inter-Services Intelligence</td>
</tr>
<tr>
<td>ITDB</td>
<td>Illicit Trafficking Data Base</td>
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<tr>
<td>JAERI</td>
<td>Japan Atomic Energy Research Institute</td>
</tr>
<tr>
<td>JAPEIC</td>
<td>Japan Power Engineering and Inspection Corporation</td>
</tr>
<tr>
<td>JCSC</td>
<td>Joint Chiefs of Staff Committee</td>
</tr>
<tr>
<td>JSOC</td>
<td>Joint Special Operations Command</td>
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<tr>
<td>JTOT</td>
<td>Joint Technical Operations Team</td>
</tr>
<tr>
<td>KANUPP</td>
<td>Karachi Nuclear Power Plant</td>
</tr>
<tr>
<td>KEW</td>
<td>Kinetic Energy Weapon</td>
</tr>
<tr>
<td>KT</td>
<td>blast equivalent of One thousand tons of TNT</td>
</tr>
<tr>
<td>LEU</td>
<td>Low Enriched Uranium</td>
</tr>
<tr>
<td>LLCs</td>
<td>Limited Life Components</td>
</tr>
<tr>
<td>LOF</td>
<td>Location outside Facility</td>
</tr>
<tr>
<td>MAD</td>
<td>Mutual Assured Destruction</td>
</tr>
<tr>
<td>MBR</td>
<td>Material Balance Report</td>
</tr>
<tr>
<td>MEST</td>
<td>Mobile Expert Support Team</td>
</tr>
<tr>
<td>MIRV</td>
<td>Multiple Independently Reentry Vehicle</td>
</tr>
<tr>
<td>MOFA</td>
<td>Ministry of Foreign Affairs</td>
</tr>
<tr>
<td>MOX</td>
<td>Mixed Oxide Fuel</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>MPC&amp;A</td>
<td>Material Protection, Control, and Accounting</td>
</tr>
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<td>MRBM</td>
<td>Medium-Range Ballistic Missile - any ballistic missile with a range between 1000 and 3000 km (600 to 1800 mi)</td>
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<td>MRV</td>
<td>Multiple Reentry Vehicle</td>
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<td>MS</td>
<td>Mechanical Safing</td>
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<tr>
<td>MT</td>
<td>blast equivalent of One million tons of TNT</td>
</tr>
<tr>
<td>MUF</td>
<td>Material Unaccounted For</td>
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<tr>
<td>NACCJSG</td>
<td>National Advisory Committee on Criminal Justice Standards and Goals</td>
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<td>National Counterterrorism Authority</td>
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<td>NCA</td>
<td>National Command Authorities</td>
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<td>NEST</td>
<td>Nuclear Emergency Support Team</td>
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<td>NNSA</td>
<td>National Nuclear Security Administration</td>
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<tr>
<td>NIE</td>
<td>National Intelligence Estimate</td>
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<td>NM</td>
<td>Nuclear Material</td>
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<tr>
<td>NMD</td>
<td>National missile defense</td>
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<td>NORAD</td>
<td>North American Air Defense Command</td>
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<tr>
<td>NPB</td>
<td>Neutral Particle Beam</td>
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<td>NPT</td>
<td>Nuclear Non-Proliferation Treaty</td>
</tr>
<tr>
<td>NSAP</td>
<td>Nuclear Security Action Plan</td>
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<td>Nuclear Safety Commission</td>
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<tr>
<td>NSD</td>
<td>Neutron Search Device</td>
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<td>NSECC</td>
<td>Nuclear Security Emergency Coordination Centre</td>
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<td>NSSS</td>
<td>Nuclear Steam Supply System</td>
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<td>Acronym</td>
<td>Expansion</td>
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<tr>
<td>NSTC</td>
<td>Nuclear Security Training Centre</td>
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<td>NTC</td>
<td>Nuclear Power Training Center</td>
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<td>NUPEC</td>
<td>Nuclear Power Engineering Corporation</td>
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<td>NW</td>
<td>Nuclear Weapon</td>
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<td>NWS</td>
<td>Nuclear Weapon State</td>
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<tr>
<td>OPSD</td>
<td>One-Point Safe Design</td>
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<tr>
<td>OTA</td>
<td>Office of Technology Assessment</td>
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<tr>
<td>PAC</td>
<td>Patriot Advanced Capability (theater missile defense system)</td>
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<td>PAEC</td>
<td>Pakistan Atomic Energy Commission</td>
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<td>PAL</td>
<td>Permissive Action Link</td>
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<td>PIL</td>
<td>Physical Inventory Listing</td>
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<td>PIT</td>
<td>Physical Inventory Taking</td>
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<td>PNC</td>
<td>Power Reactor and Nuclear Fuel Development Corporation</td>
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<td>Pakistan Nuclear Regulatory Authority</td>
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<td>PPS</td>
<td>Physical Protection System</td>
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<td>PRD</td>
<td>Personal Radiation Detectors</td>
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<td>PRP</td>
<td>Personnel Reliability Programme</td>
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<tr>
<td>Pu</td>
<td>Plutonium</td>
</tr>
<tr>
<td>QDR</td>
<td>Quadrennial Defense Review</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RDD</td>
<td>Radiological Dispersal Device</td>
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<td>RED</td>
<td>Radiation Exposure Device</td>
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<tr>
<td>RID</td>
<td>Radionuclide Identification Device</td>
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<tr>
<td>Acronym</td>
<td>Definition</td>
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<tr>
<td>RPM</td>
<td>Radiation Portal Monitor</td>
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<td>PWR</td>
<td>Pressurized Water Reactor</td>
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<td>SAC</td>
<td>Strategic Air Command</td>
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<td>SALT</td>
<td>Strategic Arms Limitation Talks</td>
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<td>SBI</td>
<td>Space-Based Interceptor</td>
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<td>SBL</td>
<td>Space-Based Laser</td>
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<tr>
<td>SC</td>
<td>Separable Components</td>
</tr>
<tr>
<td>SDI</td>
<td>Strategic defense initiative</td>
</tr>
<tr>
<td>SDIO</td>
<td>Strategic Defense Initiative/Organization</td>
</tr>
<tr>
<td>SD</td>
<td>Security Division,</td>
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<tr>
<td>SFC</td>
<td>Strategic Force Command,</td>
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<td>SLBM</td>
<td>Submarine Launched Ballistic Missile</td>
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<td>SMTS</td>
<td>Space and Missile Tracking System</td>
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<td>SMU</td>
<td>Special Military Unit</td>
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<td>SOCOM</td>
<td>Special Operations Command</td>
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<td>Special Operations Forces</td>
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<td>Short-Range Attack Missile</td>
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<td>STA</td>
<td>Science and Technology Agency</td>
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<tr>
<td>START</td>
<td>Strategic Arms Reduction Treaty</td>
</tr>
<tr>
<td>TMD</td>
<td>Theater Missile Defense</td>
</tr>
<tr>
<td>TA</td>
<td>Threat Assessment</td>
</tr>
<tr>
<td>TTP</td>
<td>Tactics, Techniques, and Procedures / Tehreek-e-Taliban Pakistan</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>UAV</td>
<td>Unmanned Aerial Vehicle</td>
</tr>
<tr>
<td>UEWR</td>
<td>Upgraded Early Warning Radar</td>
</tr>
<tr>
<td>UNECE</td>
<td>United Nations Economic Commission for Europe</td>
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<tr>
<td>UNGA</td>
<td>United Nations General Assembly</td>
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<tr>
<td>UNRISD</td>
<td>UN Research Institute for Social Development</td>
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<tr>
<td>USDEA</td>
<td>United States the Drug Enforcement Agency (DEA)</td>
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<tr>
<td>WANO</td>
<td>World Association of Nuclear Operators</td>
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<tr>
<td>WMD</td>
<td>Weapon of Mass Destruction</td>
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<td>WNTI</td>
<td>World Nuclear Transport Institute</td>
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<td>WoT</td>
<td>War on Terror</td>
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CHAPTER ONE
INTRODUCTION

1.1. Background

The world today is in a state of highly volatile political situation with ever changing dynamics of international strategic environment depending upon multiple factors. These factors include but are not limited to politico-economic and strategic dimensions pertaining to inter-state and intra-state situations where the issues related to international security have gained great importance. The old alliances have given way to new ones ushering the world political situation onto the highest levels of uncertainty and chaos. In such an ambiguous environment the security, internal as well as external, has become the most important issue for any state. Amongst the issues related to international security, nuclear weapons have undoubtedly become the focal point of international concerns. The politics of nuclear weapons in international relations is based on the adherence and non-adherence of international community to the Nuclear Non-Proliferation Treaty (NPT), which categorizes the world into two groups; i.e., the nuclear ‘haves’ and ‘have-nots’. The NPT has divided the world into groups with reference to the possession of nuclear technology; i.e., Nuclear Weapon States (NWS) and Non-Nuclear Weapon States (NNWS). Nuclear weapon states (NWS) consider their nuclear weapons as a guarantor of their security and survival. The possession of nuclear weapons for some states is not only a symbol of prestige and honour, but it also provides them a sense of “absolute security”.

Soon after the nuclear attack by USA against Japan in 1945\(^1\), many raised the fear that dozens of states would ultimately acquire “the bomb.”\(^2\) However, in reality, it was not an easy


task for the states to acquire this technology. According to David Albright, “proliferation fears reached their height in the early 1960s when President John F. Kennedy said that more than 20 nations might have the bomb by the 1970s.” Since 1945, there were assumptions that many states would eventually struggle to build their own nuclear devices for defence purposes, but only a few states have been successful in developing their nuclear weapons. Despite this, the International Atomic Energy Agency (IAEA) has tried to prevent states from building nuclear weapons and, for that reason, the IAEA has established very strong legal instruments and nonproliferation regimes to counter nuclear proliferation, but still there is a need to strengthen these efforts. There are eight declared nuclear weapon states: China, United States, UK, Russia, India, France, Pakistan and North Korea. The North Korean nuclear test in 2006 was the biggest surprise to the nuclear non-proliferation regime. Israel is the only state that has not declared itself as a nuclear weapon state, but it is largely accepted that it has nuclear weapon capability. The ultimate objective of these states is to ensure their national security, and their nuclear weapons capabilities are enough to deter any aggressive state from waging war. So theoretically, the ultimate aim of nuclear weapons is to prevent war.

Since the beginning of the nuclear age in 1945, war fighting strategies have also greatly changed. It has become unimaginable that a nuclear war would actually occur. It was the threat of nuclear war that deterred the United States of America (USA) and the former Union of Soviet Socialist Republics (USSR) from engaging in any direct military confrontation during the Cold War. Both sides were completely aware of the consequences of a nuclear war.

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3 Ibid.
Regarding the role of nuclear weapons in strategic stability, the world has been divided into two groups that are known as ‘nuclear optimists’ and ‘nuclear pessimists’. Both these groups have different perspectives on the issue of nuclear weapons. Some scholars, academics and policy-makers believe that nuclear weapons have increased “the chance of preventive wars, crisis instability, and accidental nuclear detonation.” On the other hand, some experts contend that nuclear weapons are a reason of stability and they have prevented war between the USA and the former Soviet Union and it was only due to the presence of these weapons that Cold War era remained largely war free in conventional terms. Nuclear optimists believe that nuclear weapons have become the cause of international stability and “more may be better.” Nuclear pessimists raise the alarm that nuclear weapons are dangerous and that “more may be worse”. They think that the risk of nuclear war, either intentionally or by accident, is too great and that there is also the possibility of nuclear proliferation. Both nuclear optimists and pessimists have logical grounds to defend their respective perspectives. In spite of this, it could be argued that nuclear weapons have saved the world from a third world war. Kenneth Waltz has stated that “world has enjoyed more years of peace since 1945”.

The post 9/11 world scenario has also raised apprehensions about the dangers of nuclear weapons as suggested by deterrence pessimists. Therefore, the issue of nuclear security
has emerged as one of the most frightful threats to the world. There are concerns that terrorists may try to acquire nuclear devices or fissile materials to accomplish their political objectives. Apprehensions about terrorists’ utilising weapons of mass destruction (WMD), are not new. The same concerns have been voiced since the end of 1970s\(^{14}\) when these apprehensions compelled the U.S. Department of Energy to articulate nuclear response capabilities.\(^{15}\)

In addition to nuclear security challenges, nuclear weapon states are facing various domestic challenges as well, such as growing insurgencies, terrorism, ethnic conflicts, clash of interests and rights which can create differences between the state and its people. Every nuclear weapon state has numerous issues and challenges in its territories. Social vulnerabilities, confusions and conflicts are common challenges for states. Amongst these challenges, terrorism has emerged as a major challenge for the national security of any state.\(^{16}\) Pakistan is located in one of the most volatile regions of the world as it is surrounded by two most densely populated and economically booming nuclear powers, namely India and China. The situation in Afghanistan and the interplay of multiple world powers in Afghan arena brings the world strategic focus on Pakistan. The Iranian nuclear and ideological conflicts with the world at large also brings Pakistan in the limelight. All these factors have made this region a hotbed of strategic manoeuvres and conspiracies from many actors in the world politics. Nonetheless, in the back drop of these fears, Pakistan’s nuclear weapon programme has been under great scrutiny by the international community. Many concerns have been raised about the safety and security of its nuclear weapons.


1.2. Statement of the Problem

Ever since Pakistan carried out its nuclear tests in 1998, there have always been serious concerns raised by international community about the safety and security of its nuclear installations, nuclear materials, equipment involved in the process (i.e., centrifuges, enriched material etc) and even the ready-to-use nukes. Various hypothetical scenarios have been projected about Pakistan’s nuclear weapons’ security resulting in a strong perception that Pakistan’s nuclear weapons are under serious threat of theft, mishandling and even unauthorized use. There has been a constant buzz that Pakistan’s nuclear weapons can fall into the hands of terrorists or non-state actors, or there can be an accidental or unauthorized use of nuclear weapons or there can be an attack on nuclear facilities of Pakistan, etc. Such opinions are usually expressed by the Western experts in the nuclear intelligencia.¹⁷ On the basis of social vulnerabilities, terrorism and socio-political issues, Pakistan’s nuclear weapons’ security is being highlighted as a threat to the world peace. While, Pakistan’s perspective is opposite to the Western arguments and Pakistan claims to have complete confidence in its nuclear security arrangements. Despite assurances given by Pakistan, the international community is skeptical about Pakistan’s preparedness to secure its nuclear assets in case of any serious nuclear catastrophe.

In order to objectively evaluate the situation, this study intends to undertake a scholarly assessment of both the perspectives and draw the most logical inferences. According to official narrative of Pakistan, the nuclear safety and security arrangements of its nuclear weapons are as much advanced and fool proof as those of any other nuclear weapons state.¹⁸ In spite of such

¹⁷Various research articles/ books/ reports have been written by western authors claiming that Pakistan’s nuclear weapons are not secured. A detailed analysis has been done in Chapter Four.

assurances, the international community has been suspicious of Pakistan's willingness and capabilities to secure its nuclear assets in case of any serious eventuality.

The dread of nuclear terrorism continues to be one of the gravest (potential) threats to the international peace and security. Every nuclear weapon state (NWS) is equally responsible to shield its nuclear assets from terrorist attacks, and should be prepared to meet such challenges effectively. Similarly Pakistan too is obliged to put all safeguards required to protect its nuclear related materials, technology and installations whether military or civil. Since Pakistan has a flourishing civil-use nuclear programme, so most of its civil nuclear facilities are under IAEA safeguards. This provides Pakistan with all the required know-how and technology to ensure the safety and security of its nuclear related activities including weapon-grade technology, installations and materials. Keeping these facts in view, it would be safer to say that Western concerns about Pakistan’s nuclear weapons’ safety and security are largely ill-founded and based on a general lack of trust in Pakistan’s commitment in this regard.

It is a fact that the subject of Pakistan's nuclear safety and security has not been undertaken by Pakistani strategic and nuclear experts resulting in the absence of Pakistan’s narrative in this regard and letting scholars mainly depend on one-sided standpoint on this subject. Not a single major research study has been conducted on nuclear security in Pakistan. However, a few research articles, books and newspaper articles on the technical aspects of nuclear security have been written during the last few years by Pakistani experts. However, the current study intends to approach the techno-political aspects of this subject from the point of view of a student of strategic studies. This study tries to fill this gap and initiate an academic debate for further contribution.

1.3. Significance of the Study

Pakistan’s nuclear research programme was started in March 1956 with the creation of Pakistan Atomic Energy Commission (PAEC) under the chairmanship of Dr. Nazir Ahmad.20 Pakistan was one of the states that got the know how and technology for its nuclear programme under ‘atom for peace’ campaign by Eisenhower. Initially, the state of Pakistan had no intention to develop nuclear weapons.21 It was only after the 1971 war that culminated in the form of the dismemberment of East Pakistan that it decided to build its own nuclear weapon.22 India’s calendestine involvement in Bangladesh before the conflict reached its full swing and its open involvement in the event of full fledge conventional war led Pakistani leadership realize the imbalance of power present in both the adversaries. The Indian supremacy in the conventional warfare had totally shaken the strategic equillibrium in the South Asia. Now there was only one option left to create this balance and that was the attainment of weapon-grade capability of nuclear technology in order to create a deterrence that could ensure the safety and security of Pakistan as a nation state. This ushered a new era of nuclear politics in the region. “Since 1980, Pakistan has pursued a doctrine of minimum credible deterrence and conventional defence to balance India’s nuclear and conventional forces.”23

India, having the upper hand in the region, dictated the politics and even geography of the region in its own interest. She played a major role in Bangladesh saga and the confessions are made even by the Narendra Modi during his visit to Bangladesh in early 2015.24 According to Zafar Iqbal Cheema, “Pakistan’s leaders kept their nuclear intentions and efforts undisclosed

22Chakma, Pakistan’s Nuclear Weapons, p.38.
23Cheema, “Pakistan’s Use Nuclear Doctrine and Command and Control,” p.158.
until the May 1998 nuclear tests.” However, Pakistan was left with no other option but to declare its attainment of nuclear weapon power after Indian nuclear tests on May 11, 1998. According to Matthew Bunn, Pakistan’s nuclear stockpile is modest, located at various unidentified number of places. Pakistan believes that its nuclear weapons are a vital component of its national security policy, and credible nuclear weapon systems maintain the strategic stability in the region. To ensure the safety and security of its nuclear weapons, Pakistan is continuously improving its nuclear safety and security mechanisms.

The present research provides a comprehensive and up-to-date analysis of the issues and challenges to nuclear safety and security in general. It also sheds light on the measures taken by Pakistan to guard its nuclear weapons. Pakistan is being unjustifiably criticised by the world community for its lack of preparedness to meet any such challenge. Its nuclear security system suggests that the multilayer safety and security system adopted by Pakistan is in no way less effective than other nuclear weapon states.

Pakistan is faced by several challenges. Its security-intensive environment, with domestic, regional and external threats, makes an efficient and secure nuclear weapons structure a vital component of its survival and national security planning. Pakistan is going through a fragile period of its national history. It is actively engaged in the War on Terrorism to counter Tehreek-e-Taliban in different rural and urban areas of Pakistan. A massive military

28 Ibid.
operation “Zarb-e-Azb” against TTP militants was started on June 15, 2014\textsuperscript{29} in North Waziristan and it has successfully achieved its targets.\textsuperscript{30} Prior to that, Pakistan army has had successfully completed its operation against militant group [of Maulana Fazlullah] in the Swat Valley in 2009. As Pakistan’s military started operation against TTP forces in the rugged terrain of the North West of Pakistan, various Western security analysts got alarmed and feared that Pakistan’s nuclear weapons can fall into the hands of these terrorists thus raising serious questions on the security of the nuclear weapons of Pakistan.\textsuperscript{31}

Pakistan is composed of diverse social, religious and ethnic groups. The country has strongly responded against the Taliban with general population revolting against the idea of an orthodox and unprogressive version of Islam. Its dominantly Muslim population has a history of repeatedly rejecting religious political parties in the general elections.\textsuperscript{32} Due to the unacceptance of general public and strong actions of civil and military leaderships to curtail this evil, terrorism has been greatly weakened in Pakistan. The surge of armed militant groups after 9/11 has been checked to a large extent. They are no more strong enough to pose serious threat to Pakistan, though the random groups and individuals are still working. This situation makes the assumption that Pakistan’s nuclear weapons could fall into hands of Taliban, misleading.\textsuperscript{33} Pakistan has adopted a multilayered security system to protect its nuclear assets which would prove a hard nut to crack for not only the local terrorists but also the international agencies or any other outfit of the sort.

\textsuperscript{31}These concerns have been discussed in following chapters.
\textsuperscript{32}General Elections of 2008 and 2013 results are clear evidence in this regard.
\textsuperscript{33}Successful Pakistan military campaign “Zarb-e-Azb” against Tehreek-e-Taliban Pakistan (TTP) proves that Pakistan has sufficient capabilities to counter any kind of internal threat, and Pakistan’s nuclear weapons and facilities are safe and secure from terrorists and Taliban.
There is a dire need to highlight the ground realities of Pakistan's strategic make up so that world can understand and acknowledge that it is a responsible state with serious commitment to the world peace. The present study suggests that if Pakistan wants to make the world understand it standpoint clearly, it must concentrate on the development of a pool of intellectuals, social activists and academics for the proper communication of its narrative and to identify research potential in issues of national security. In the contemporary global politics, the role of social scientists has become very significant. All these elements would help build a positive perception about Pakistan’s security arrangements and efforts.

1.4. Objectives of the Study

The study aims to juxtapose the stances of Pakistan and the rest of the world about how Pakistan is managing its nuclear assets. It mainly focuses on evaluating the Western concerns about security issues of Pakistan’s nuclear weapons and whether western concerns about the security of Pakistan’s nuclear weapons are real or solely being used as a way to keep Pakistan constantly under pressure. This research study aims at finding the answers to these concerns with logic. The analysis of Pakistan's and Western perspectives would further generate opportunities for testing the quantum of actual threats to nuclear security. It also aims to provide the critical analysis of Pakistan’s nuclear weapons safety and security architecture. It also provides a comprehensive understanding of Pakistan’s efforts to secure its nuclear weapons.

Since, Pakistan is currently facing various kinds of domestic and regional challenges, an attempt is also made to analyse the real implications of these challenges. The validity of the stance of Western intellectuals will be analysed objectively to move forward and reach a better ground. The study concludes with some policy options and recommendations for Pakistan to enhance its nuclear image at international level and address the key elements to strengthen its nuclear security culture.
1.5. Literature Review

Most of the literature available on this subject is produced by Western authors and analysts. Indian analysts and researchers have also contributed to the predominant bias on Pakistan's nuclear weapons programme. Western literature is myopic. It is deficient in primary resources. Perceptions on the basis of theoretical assumptions are presumably politically motivated. Unfortunately, Pakistan's narrative has been insufficiently shared with the world. Though, sacrosanct the paucity of literature and research work has hugely damaged the international perception on Pakistan’s nuclear weapon programme. Pakistan remained preoccupied with politically restless in its larger portion of life. The unreliability on Pakistan’s political sources is one of the reasons of lack of confidence in their security-specific programme. Pakistan failed to convince the world.

Some security analysts assume that it could have very serious consequences if any radical religious or political group takes over the government that owns nuclear weapons. In other case, proliferation by insider or sympathisers within nuclear complex in case of a breakdown of the control systems. However, both the U.S. and Pakistani government officials continue to show their confidences over the safety and security of Pakistan’s nuclear weapons,\textsuperscript{34} some analysts have created different hypotheses that continued instability in the country could impact these nuclear safeguards.

In the opinion of neo-realists, nuclear weapons are the ultimate tools of offense and defence and should be a prized part of national security.\textsuperscript{35} According to the realist point of view, in the contemporary world political system, every state is responsible for its own security

\textsuperscript{34} During interviews of USA’\textquotesingle s officials and experts, it was reported that USA is satisfied with current Pakistan’s nuclear safety and security arrangements. Details are available in the next chapters.

and survival. Kenneth Waltz in his book the *Theory of International Politics*, has highlighted that self-help is necessarily the principle of action in an anarchic order.\(^{36}\) Similarly, security and survival is the responsibility of every state in the contemporary world political system, according to the realists view. “Global politics is driven by competitive self-interest”\(^{37}\) opines John T. Rourke in his book *International Politics on the World Stage*. The realist further argues that struggle for power is the driving force among all countries which is usually associated with improving military muscle and economy.

*Normal Accidents: Living with High Risk Technologies*,\(^{38}\) by Charles Perrow provides profound analysis of high-risk technology through social aspects. Perrow initially formulated normal accident theory (NAT) after the incident of the Three Miles Island nuclear power plant in 1979. In this book, he explained that in some organizations, where technology is complex with high-risk systems, accidents or errors are inevitable. In this context, it would be an interesting work to evaluate Pakistan’s nuclear safety parameters with the help of normal accident theory. Scott D. Sagan’s book *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons*, has explained safety of issues of nuclear weapons by utilizing two apparently opposing theories: the Normal Accidents theory (NAT) and the High Reliability theory (HRT).

NAT stresses that accidents are inevitable in any organization, while HRT explains that a good organization can perform in any situation. The researcher has added that accidents and errors can be prevented through good work of organization. The researcher has applied these theories to various nuclear weapons’ accidents, incidents and near misses. The researcher has further explored the warning systems during crisis time. He has also explained the significant

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features of these theories. He has concluded his work with some findings on handling of nuclear weapons’ safety. HRT and NAT theories can better explain Pakistan’s position on its nuclear weapons’ safety and security.

Scott D. Sagan, in his article, “Why do States Build Nuclear Weapons? Three Models in Search of a Bomb” has explained that due to massive destructive capability of nuclear weapons, any state that seeks to maintain its national security must balance against any rival state that develops nuclear weapons by gaining access to a nuclear deterrent itself.\textsuperscript{39} In this article, Sagan has built an argument regarding why states build nuclear weapons. In support of his argument, he has discussed three theoretical models:\textsuperscript{40}


ii. The Domestic Politics Model: Nuclear Pork and Parochial Interests.

iii. The Norm Model: Nuclear Symbols and State Identity.

With the help of these three models Sagan has comprehensively discussed that there are various motives which lead states to build nuclear weapons. Pakistan’s case can be highlighted in the prism of these models.

\textit{Organizational Cultures and the Management of Nuclear Technology: Political and Military Sociology},\textsuperscript{41} the book edited by Karthika Sasikumar, provides interesting topics on the management of civil and military nuclear facilities. It further discusses the civil-military relations in nuclear weapon states and non-nuclear weapon states. In nuclear weapon states, both civil and military authorities have been given certain powers to deal with nuclear weapons in peace and crisis times. This book provides a good analysis on the civil-military relations and


\textsuperscript{40}\textit{Ibid.}

how organizational culture evolves in nuclear weapon states. Also, this book provides a good analysis of issues such as how social factors and media shape the states’ nuclear policies. Military plays significant role in nuclear weapons’ management system in Pakistan. In such scenario, it would be interesting to analyse Pakistan’s case where civil-military relations have a history of troubled connexion.

Feroz Hassan Khan’s book, *Eating Grass: the Making of the Pakistani Bomb*, provides an up-to-date analysis of Pakistan’s nuclear weapons programme. This book comprehensively discusses Pakistan’s struggle to acquire its own nuclear weapons. The author has taken advantage of his previous work experience as a director of Arms Control and Disarmament Affairs (ACDA) in the Strategic Plans Division (SPD) of the Joint Services Headquarters of Pakistan. From nuclear development to nuclear operational deterrent, Khan has explained every aspect of Pakistan’s nuclear programme. He has used primary, secondary sources, interviews and, most importantly, his personal experience to support his study. This book provides detailed information about Pakistan’s nuclear command and control system. How National Command Authority (NCA) and its secretariat, the Strategic Plans Division came into existence.

Mark Fitzpatrick’s Adelphi book, *Overcoming Pakistan’s Nuclear Dangers*, provides the latest debate on Pakistan’s nuclear weapons and Western misperceptions about its nuclear management. The author has suggested that Pakistan should be treated as a “nuclear normal state”. After evaluating Pakistan’s nuclear commitment in the wake of A.Q. Khan’s case, the author suggests that Pakistan should be considered for “a nuclear cooperation deal akin to India.” The author has fairly elaborated that media has been unjust with Pakistan’s efforts for

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44Ibid., p.162.
nuclear safety and security. This book, although written by a Western author, acknowledges Pakistan’s commitment in dealing with nuclear weapons’ security.


The book contains three sections, and each section has been contributed by nuclear policy experts from various institutions and laboratories such as Sandia National Labs, Pacific Northwest Nuclear Labs, Texas A&M University, Los Alamos National Labs, and the Monterey Institute of International Studies. Doyle has elaborated that it is very difficult for any state to establish perfect security for nuclear weapons and fissile material. The book focuses primarily on the security of nuclear installations and fissile material, illicit trafficking of fissile material, improvised nuclear devices (IND) or radioactive dispersal devices (RDD) and prevention from nuclear terrorism. Various examples and incidents of nuclear history have also been discussed.

In his book, *Pakistan’s Nuclear Future: Reining in the Risk,* Henry Sokolski has highlighted worst threat scenarios to Pakistan’s nuclear weapons. According to the author, the

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risk of war between Pakistan and India and possible nuclear escalation would be terrible. He assumes that a nuclear terrorist act is one of the most serious frightening security threats Pakistan now faces. Naeem Salik and Kenneth N. Luongo, in their article *Building Confidence in Pakistan’s Nuclear Security*, have pointed out that Pakistani officials are aware that they have not completely alleviated international worries regarding the security of the country’s nuclear arsenal.\(^{48}\) Terrorist incidents, weak economy, socio-political issues, ethnic issues and religious intolerance are serious challenges for Pakistan’s security which have directly and indirectly weakened Pakistan’s stance over the safety and security of its nukes.

In his article, “Nuclear Security in Pakistan: Separating Myth from Reality,” Feroz Hassan Khan has written that since 2002, Pakistan has carried out sufficient measurements to enhance security and command and control of its nuclear weapons and facilities.\(^{49}\) Unfortunately, due to domestic violence, terrorist insurgencies and the war in Afghanistan, Pakistan is confronting Western criticism and pressure. Luongo and Salik in their article, “Building Confidence in Pakistan’s Nuclear Security,” have highlighted four main concerns/scenarios which remain to exist pertaining Pakistan’s nuclear programme, some more sensitive than the others:

1. Nuclear assets or technology falling into the wrong hands.
2. Islamist takeover as a result of elections or collapse of government.
3. Assassination attempt or elimination of key leaders leading to a loss of control of the nuclear programme.
4. Secondary proliferation.\(^{50}\)

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\(^{50}\)Salik and Luongo, “Building Confidence in Pakistan’s Nuclear Security,” pp.11-12.
All these scenarios are equally applicable to all nuclear weapons states. Pakistan has maintained sufficient measures to keep these weapons safe and secure. However, the international media campaign and propaganda have tarnished Pakistan’s image regarding its nuclear weapons’ security. Journalistic stories, news, reports, articles and books have been written by many Western and Indian authors and security analysts. Garima Singh’s, *Pakistan Nuclear Disorder: Weapons, Proliferation and Safety*, a series of articles and books written by Shaun Gregory about the safety and security of Pakistan’s nuclear weapons, Christopher Clary’s paper “Thinking about Pakistan’s Nuclear Security in Peacetime, Crisis and War,” and there are many Indian and Western reports which are repeating the same statements. They are not just misleading the global community, but are also exaggerating the situation. Conspiracy theories are at full swing against Pakistan.

Michael A. Levi in his book, *On Nuclear Terrorism*, has stated that Pakistan “the most obvious nuclear armed candidate for collapse”. In addition, he mentioned that “Pakistan’s case present into how technically unsophisticated physical security systems might operate”.

Bhumitra Chakma in his book, *Pakistan’s Nuclear Weapons*, has tried to elaborate the similar concerns by referencing the “same sources”. Linda Diaz in her paper “Pakistan’s Nuclear Arsenals: A Threat to U.S. Security,” has tried to explain that Taliban or Al-Qaeda can get nuclear material or technology from Pakistan. Furthermore, in table 2.1., “western analysts’ extraction about Pakistan’s nuclear’s image” provides some details of western authors’ writings about Pakistan’s nuclear weapons. On the other hand, Pakistan’s policy and decision making elites believe that the threat of falling of its nuclear weapons into the wrong hands or

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54 Ibid. p.103.
Unauthorized use of nuclear weapons is not possible. Terrorists’ intentions to steal the nuclear weapons from Pakistan has also been overstated as a threat. Pakistan is an advanced and responsible nuclear weapon state and it has placed extraordinary security parameters, multi-layered protocols and processes for the security of its nuclear programme.\textsuperscript{55} However, due to inefficient civil leadership and fragile political system, Pakistan could not project its perspective very efficiently at international forums. In response to this, Pakistan is confronting serious global pressure over its nuclear weapon programme from time to time. A disturbing question in the contemporary state of affairs is that would Pakistan be able to maintain its nuclear weapons or fissile material safe and secure? Pakistan has to keep its needed nuclear weapons safe and secure to maintain deterrence strategy in the region.

Other nuclear weapon states such as India, Russia and Israel are also confronting severe security challenges. Although all nuclear weapon states are equally responsible for the safety and security of their nuclear weapons, and they do not disclose every theft or mishap in the media. It is a fact that there have been some known incidents in warhead security, even in the United States.\textsuperscript{56} According to Scott Jones, no nuclear weapon state has perfect safety and security system.\textsuperscript{57} No nuclear weapon state can claim to have 100% secure system. Not surprisingly, the most advanced nuclear weapon states like the United States cannot report for all its nuclear weapons or fissile material, nor stop someone from flying a nuclear-armed bomber across the country.

Pakistan's nuclear weapons are fundamental components of its national security policy and source of strategic stability in the region. Pakistan is facing an existential threat which has


\textsuperscript{57} In an Interview with Dr. Scott Jones, Executive Director, Center for International Trade and Security (CITS), University of Georgia, USA on April 17, 2014.
been increased by ever-growing activities of non-state actors. These non-state actors are not only indigenous but come through the machination of intelligence agencies of neighbouring countries. To sustain its credible minimum deterrence, Pakistan has to maintain safe and secure nuclear weapons under highly reliable command and control system. For this purpose, Pakistan has enhanced its nuclear safety and security system by keeping it multi-layered and according to international standards. Pakistan understands the western concerns about nuclear security issues and acknowledges and supports the global agenda for nuclear security. This research study is an attempt to understand Pakistan’s perspective regarding the security of its nuclear weapons. This study further discusses as to how global perceptions can be changed about Pakistan's nuclear weapons' safety and security. What are the key factors which have worsened Pakistan's image in the nuclear field? This study comprehensively explains the real challenges for Pakistan’s security as well.

However, there are some optimistic views about Pakistan's nuclear security arrangements as well. According to the International Institute for Strategic Studies (IISS), London, Pakistan’s nuclear safeguards are “robust” and Pakistan happens to be very serious about keeping its nuclear weapons safe and secure.58 Pakistan believes that the international media is projecting a negative image of its nuclear programme. Through various media campaigns, it has been projected that Pakistan’s nuclear weapons are under serious threat and they could fall into the hands of non-state actors or terrorists. These negative media campaigns have deep consequences for Pakistan. According to Khalid Ahmed Kidwai, foreign press is negative about Pakistan.59 The Western, and Indian electronic and print media in particular has

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never left a single chance to malign Pakistan’s position over its nuclear weapon programme. Some Western analysts’ fictional stories about Pakistan’s nuclear weapons have been projected during the last few years. Some analysts have tried to convince through their hypothetical statements that non-state actors can control Pakistan’s nuclear weapons at any given time and there is a possibility of unauthorised use of nuclear weapons. According to Bruce Riedel, “Pakistan is the most dangerous country today, where every nightmare of the twenty-first century—terrorism, nuclear proliferation, the danger of nuclear, dictatorship, poverty, and drugs—come together at one place.” Same assumptions have been addressed by various other analysts.

After analyzing the Western literature, interviews, and media sources, it can be concluded that there is a significant gap between the reality of Pakistan’s nuclear security and western perspectives. By analyzing both perspectives, this study also provides few recommendations for Pakistan to improve and show case its global image in a positive light.

1.6. Hypothesis

“Projected threats to Pakistan’s nuclear weapons security are based on misperceptions created through propaganda.”

1.7. Research Questions

The study revolves around a single major question:

“Are the projected threats to Pakistan’s nuclear weapon security real or merely based on assumptions?”

In order to address this major question, the study also strives to find the answers to some supplementary questions such as:

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60 Various media reports based on fictions have been generated by the Western and India media.
(a) What is the perception about Pakistan’s nuclear weapons’ safety and security in global intellectual and strategic community?

(b) What has Pakistan done so far to secure its nuclear weapons?

(c) What can Pakistan do to present its case on the world fora?

Through analysing these questions with the help of scholarly work of various schools of thought, academic literatures and different perspectives, it would be very helpful to understand Pakistan’s angle, its responses and its efforts to secure its nuclear weapons.62

1.8. Research Methodology

Research methodology is the technique to scientifically explore the research problems and propose appropriate solutions.63 According the nature of this subject, this study uses the qualitative research paradigm with historical, descriptive and analytical research approaches. The norms of high reliability theory (HRT), normal accident theory (NAT), organizational theory, and Noam Chomsky and Herman S. Edward’s propaganda models provide the primary framework for analysis. This research study has also tried to examine the subject under investigation through a set of sub-theories such as realism, neo-realism, deterrence theory and constructivism that are relevant in accordance with the available information. Moreover, in context of specific research questions, a key emphasis is given to explore the unclassified information and hence focus of attention was to find the Pakistan’s arrangements to secure its nuclear weapons. Being a researcher of nuclear studies, the scholar was critically observing the western concerns regarding Pakistan’s nuclear weapons. These observations have developed

62 Although, due to security reasons, it is difficult to get access to the sensitive data.
the scholar’s curiosity to further investigate the western misperceptions through effective critical analysis.

Initially, the information was collected through content analysis. Moreover, this research has also covered accessible official data, books, declassified documents, newspapers, journals and relevant websites, etc. In order to fulfil the demands of the study, both primary and secondary source material has been consulted. The scholar has visited various European and U.S. think tanks and academic institutions for research and interview purpose. During the fellowships, the scholar had the opportunity to evaluate the Western perspective and general assumptions about Pakistan’s nuclear weapon programme. In exploring the contributors’ knowledge, perception, opinion and information, the qualitative data collection strategy best facilitates the conversation and in-depth discussions. This type of interview comprises a series of semi-structured, predetermined open-ended questions developed to explore the phenomenon under study while the scholar had a flexibility to inquire new questions that arise during the interviews. The scholar has conducted interviews of international and national analysts, nuclear security experts, security and strategic experts, academicians, journalists and the government officials including those in the armed forces and foreign office. The scholar has adopted non-random, snow ball sampling technique to identify the limited population of experts. At some occasions, few experts on non-proliferation issues have avoided to respond the questions of nuclear security stating that this is not an area of their academic expertise. Therefore, scholar’s limited access to identify the experts on the subject matter, the snow ball sampling technique was adopted.

64 Complete list of interviewees is available in bibliography section.
It is a fact that nuclear studies has become an important part of international affairs. There are different specializations in this single discipline. A different set of questions on nuclear safety, security and proliferation were prepared to investigate the issue. See annex I. Interviews were transcribed and consents were taken from the interviewees. Each interview lasted between 60 to 180 minutes, prior written permission to take each interview was obtained and they were conducted in the English language. Additionally, as described by Irit Mero-Jaffe, during the course of each interview, notes were taken for the purpose of record. This procedure was projected to enhance the quality of the transcript as well. The scholar has kept all these interview notes in a file for any reference in future.

Since nuclear weapon technology is very complex, its safety and security guiding principles are very difficult to understand. In previous research studies, very less efforts have been made to address techno-political aspects of nuclear weapons. This author has tried to address nuclear weapon safety and security with the help of its safety and security guiding principles. Due to security and secrecy reasons, very less unclassified data is available to study. Even some nuclear security experts and analysts avoided to share their views. However, with the help of available sources and information, author has tried to address such problems which are directly relevant to nuclear weapons safety and security.

1.9. Employed Theories

Hypothesis has been tested by two leading theories; High reliability theory (HRT), Normal Accident Theory (NAT) and Organizational Theory. There is a misperception that Pakistan’s nuclear weapons are not secure and its safety and security mechanisms are not

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65 Experts on nuclear proliferation issue, experts on nuclear security, experts on nuclear safety (usually referred to civil nuclear programme).
66 However, some interviewees did not sign the consent form due to some personal reasons.
adequate. HRT elaborates the organizational effectiveness and its role in maintaining a robust system. So according to this theory, no organization can work effectively without a logical set of rules and protocols making it too naive to think that Pakistan owns a highly developed nuclear programme without ensuring its smooth working and security. Whereas NAT is concerned, it anchors on the unavoidability of accidents on account of multiple reasons. The researcher finds this theory relevant as the fear of accidents helps any organization to get well equipped and address all potentials threats involved in the process. In Pakistan’s subjective situation, this theory makes Pakistan even better prepared than rest of the nuclear world.

The propaganda model has been employed to study, explore and analyse the vastly found perceptions about the safety and security of Pakistan's nuclear weapons. These perceptions are featured in the academic and journalistic works done by Western scholars and researchers. The Propaganda model presented by Edward. S. Herman and Noam Chomsky has been used to understand that how mainstream media is manipulated to project vested interests of influential actors. There are expert spin doctors to trim the news according to their needs. The motives to malign Pakistan can be many; mainly the Afghan situation has put Pakistan into a constant pressure zone. The Indian lobbyist are also instrumental in making this perception widely spread and accepted. Moreover, as nuclear technology is considered to be a complex and sensitive subject so the world community is doing everything to stop its proliferation to NNWS and its further development in NWS. The concerns raised about Pakistan in particular and other NWS in general are a way to curtail the further proliferation of this technology. Then there is another issue, the spread of nuclear technology has been largely in a secret environment, no state or international organization knows about the exact situation of other states nuclear programme. So there is a general lack of trust in this regard.

In their book, Herman and Chomsky say, “A propaganda model emphasis on this inequality of wealth and power and its multilevel effects on mass-media interests and choices.
It traces the routes by which money and power are able to filter out the news fit to print, marginalize dissent, and allow the government and dominant private interests to get their messages across to the public”. Herman and Chomsky call the factors which misshape news as filters. The news is being filtered by each of these factors before they reach its audience or general public. These five filters are: Size, Ownership and Profit orientation of mass media, Funding, Source, Flaks and Anti-communism. Based on interviews with Pakistani experts and nuclear scientists, the scholar has tried to build the argument that the same exercises have been carried out against Pakistan. Currently, there are many books, articles, reports and newspaper articles written to malign Pakistan. A table of such writings has been added in the thesis.

A cursory analysis through the lenses of Realist Perspective, Concept of Deterrence, and Constructivism, provides the logic that Pakistan’s nuclear weapons’ security is an essential part of Pakistan’s national security; it is, therefore, imperative to ensure the security of nuclear weapons. Any security lapse would lead to challenge the credibility of nuclear deterrence, which is the corner stone of Pakistan’s national security.

1.10. Limitation

The study is limited to the evaluation of international concerns about Pakistan’s nuclear weapons’ safety and security and its nuclear security mechanism to meet international requirements as well as domestic security threats to its nuclear weapons. It also analyzes Pakistan's nuclear weapons security in particular in accordance with the international standards for nuclear weapons’ safety and security around the world in general.

1.11. De-limitation

The study does not address the global civil nuclear industry and its related issues. Civil nuclear industry has universally defined parameters and regulations under the International Atomic Energy Agency (IAEA). Moreover, this study does not address the global fissile
materials safety and security issues. Safety and security parameters/ arrangements for civil nuclear facilities and weapons’ facilities are somehow different. The researcher has deliberately omitted discussion on civil nuclear issues in order to preserve the scope of detailed research in this area.

1.12. Organization of the Chapters

The study consists of seven chapters. Chapter One provides the introduction to the thesis that includes the statement of problem, significance of the study, objectives, research questions and hypothesis, literature review, and employed research methodology. Chapter Two discusses the theoretical framework. Different theories have been conjugated in this study to comprehend the analysis. Normal Accidents Theory (NAT), High Reliability Theory (HRT), Organizational Theory, Propaganda Model of Noam Chomsky and Herman S. Edward provide the main framework of the analysis while a cursory analysis through Realist and Constructivist have also been provided.

Chapter Three discusses the basic concepts of nuclear weapons’ safety and security system and related issues of nuclear technology. It also discusses the global legal instruments to protect, secure and control nuclear weapons, material and technology. Furthermore, it also illustrates the basic challenges to all nuclear weapon states in general. All nuclear weapon states are confronting various socio-political challenges. The level and degree of challenges may vary from state to state.

Chapter Four discusses the evolution of Pakistan’s nuclear programme. This section generally discusses why, how and when Pakistan developed its nuclear weapons. The development of Pakistan’s nuclear programme has been divided into two phases:

- Phase One: Pre-1998 developments
- Phase Two: Post-1998 developments
Phase one discusses Pakistan’s nuclear programme before its nuclear tests in 1998. It basically discusses the manufacturing period of Pakistan’s nuclear programme. Phase two basically elaborates Pakistan’s nuclear developments after its nuclear tests in 1998. Post-1998 phase is the era of development of nuclear planning and strategy, command and control system and enhancing nuclear safety and security mechanisms.

Chapter Five elaborates international perceptions about Pakistan’s nuclear weapons’ programme. The world community is continuously criticizing Pakistan’s nuclear assets and safety and security issues related to them. Global apprehensions about the safety and security issues of Pakistan’s nuclear weapons are based on their own perceptions. This chapter explains that, on the basis of domestic challenges and social vulnerabilities, the global community has targeted the security arrangements of Pakistan’s nuclear assets.

In chapter Six, Pakistan’s arrangements to secure its nuclear weapons and installations have been discussed. This chapter, too, has two parts; the first part discusses the nuclear safety and security system. This part is further divided into three components, i.e. Institutional Developments, Safety and Security Protocols, and International Cooperation. The second part discusses the nuclear command and control system in Pakistan. Pakistan set up the National Command Authority (NCA) in February 2000, whose responsibilities include the employment and deployment aspects of the Pakistani nuclear force and the Strategic Plans Division (SPD) that is responsible for the daily management of the Pakistani nuclear weapons complex.68 This part further elaborates how the nuclear command and control system works in Pakistan. However, this chapter also highlights the challenges to Pakistan. All these challenges and social vulnerabilities have weakened Pakistan’s stance over its capability to secure its nuclear assets.

Every state has numerous challenges and threats within its territory. Pakistan is also dealing with all these challenges.

Chapter Seven discusses the findings of this research. It also provides the best policy options for Pakistan on how to improve its global image and to enhance its nuclear diplomacy. After critically analyzing the Western perspective, Pakistan has to adopt best policy options to enhance its international standing.

This research study concludes by addressing all the stated research questions and offers recommendations. It would elaborate as to why the Western perspective is so different from the Pakistan’s perspective. Western analysts have repeatedly shown their concern, while ignoring Pakistan’s standpoint. Pakistan has shown full confidence over its nuclear weapons’ safety and security system.
CHAPTER TWO

CONCEPTUAL FRAMEWORK

This chapter presents various theoretical perspectives to provide a framework for the analysis of the ground realities and international perception about nuclear weapons security arrangements and structure implemented by Pakistan. Since nuclear weapon security is a highly complex issue, there is no specific theory that can exclusively explain the entire mechanism. During the Cold War era, “nuclear security” had not emerged as a threatening concern by the security experts though “nuclear safety” was taken as a serious challenge for nuclear weapon states in those days. The concept of nuclear security has loomed large after the disintegration of the former Soviet Union causing a state of alarm in the world community because of the division of its nuclear assets and installations. In recent years, almost all international forums have been used to stress and highlight the issue of nuclear security as a serious threat to the world peace.

Nuclear weapons technology is very complex, and is composed of a high-risk system; therefore, social science theories are unable to explain the complexity of nuclear weapons’ technology. However, the policy arrangements and political aspect of this capability can be put to scrutiny by a social scientist. The current study has tried to examine the subject under investigation through a set of theories that are relevant in accordance with the available information. Social scientists have tried to address the political and strategic aspects of this intricate technology through the postulates formulated by various schools of thought. This chapter strives to establish a relevance and undertake a thorough analysis of these theories in order to explain the subject at hand.
2.1. Normal Accidents Theory (NAT)

*Normal Accidents: Living with High Risk Technologies*, by Charles Perrow and *The Limits of Safety: Organizations, Accidents and Nuclear Weapons* by Scott D. Sagan,1 explain comprehensively the non-technical aspects of nuclear technology. Sagan has explored various safety features of nuclear weapons with the help of organizational structures of safety and presented Normal Accidents Theory (NAT) and High Reliability Theory (HRT).

NAT suggests that accidents are inevitable in any organization, but the high reliability theory holds that accidents or errors can be controlled or prevented with good organizational skills. Sagan, with the help of these schools of thought, has tried to explain the nuclear weapons’ safety issues. There is also a need to understand that nuclear weapons’ safety and security are two different concepts.2 Normal accident theory pessimists’ approach is completely opposite to the high reliability theory. They believe that accidents and errors are part of any organization, they maintain. Nuclear technology is very complex and it requires an effective management to control it. According to Reiman and Oedewald, “nuclear power plants are safety-critical organizations”.3 There are various types of of internal and external developments which lead to new challenges for safety management.”4 Normal accident theory was initially formulated by Charles Perrow5 in the wake of the accident at the Three Mile Island nuclear power plant in 1979.6 This incident raised several questions over organizational capabilities. They claim that accident or error is inevitable in any system. According to Perrow,

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2 In chapter three, basic concepts of nuclear weapons’ safety and security would be elaborated in detail.

3 Ibid. p.2.

4 Ibid.


“systems with interactive complexity and tight coupling will confront accidents that cannot be foreseen or prevented, and he named them system accidents.” In explaining normal accident theorists, Sagan has elaborated the following features:

i. Accidents are predictable in complex and tightly coupled systems.
ii. Safety is one of a number of competing values.
iii. Redundancy often causes accidents: it increases interactive complexity and opaqueness and encourages risk-taking.
iv. Organizational contradiction: decentralization is needed for complexity, but centralization is needed for tightly coupled systems.
v. A military model of intense discipline, socialization, and isolation is incompatible with democratic values.
vi. Organizations cannot train for unimagined, highly dangerous, or politically unpalatable operations.
vii. Denial of responsibility, faulty reporting, and reconstruction of history cripples learning efforts.

Sagan has stated that accidents or errors are predictable in any system, and it cannot be ruled out. Safety issue can arise due to various reasons. With the help of these perspectives, Sagan has tried to highlight nuclear weapons’ safety issues. Normal accident theory suggests that accidents or errors are part of our technology and they are inevitable in any system. Challenges in an organization can create further complexities. NAT theorists suggest that it would be difficult to expect hundred percent efficiency from any organization or its associates. At times, organizations face unexpected operations due to technical or even political reasons. Personal behaviour of individuals or self-interests can also create unexpected situations.

Pakistan's case can also be tested in the light of normal accident theory. Pakistan has solid track record of maintaining a reliable, safe and secure nuclear weapon programme. Its nuclear weapon programme has not faced any major or minor incident. Normal accident theory usually deals with technical as well as administrative staff. In order to sustain an

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7 Ibid., p.2.
9 In an interview with Dr. Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
effective and reliable command and control system, as discussed earlier, Pakistan has established a robust system under highly trained staff. A strong nuclear safety culture exists in its nuclear complex. Pakistan has established Nuclear Regulatory Authority (PNRA), an autonomous institute to ensure safe operation of nuclear facilities and to protect radiation workers and implementing effective regulations.\(^\text{10}\) Furthermore, within the PNRA, the School for Nuclear and Radiation Safety (SNRS), the National Institute of Safety and Security (NISAS) and the Nuclear Security Training Centre (NSTC) has been established.\(^\text{11}\) All these arrangements play significant role in maintaining a credible, safe and secure system.

Pakistan has kept its nuclear weapons in de-mated form with warhead and fissile cores placed separately and apart from other physical security arrangements, the technical design features provide safety against accidental or unauthorized launch.\(^\text{12}\) There are various other classified measures which further provide a secure mechanism. Additionally, people working in nuclear facilities have to clear various security steps such as Personnel reliability programmes (PRPs) and human reliability program (HRP) also known as personnel security programme (PSP). These measures reduce the chances of human error in the nuclear facility.

## 2.2. High Reliability Theory (HRT)

Effectiveness of the working mechanism of any organization can prevent or control accidents happening in its domain. According to Teemu Reiman and Pia Oedewald, the normal accident theory pessimists maintain that “the complexity of modern organizations, combined


\(^{11}\)Pakistan’s National Statement in Nuclear Security Summit 2014 at Hague, Netherlands, p.02. See also, Pakistan Nuclear Regulatory Authority (PNRA) Report 2014, p.02.

with typical human characteristics, makes them inherently unreliable.”¹³ The human factor can create a challenging situation in any organization. On the other hand, high reliability theory suggests that “organizational management and leadership is able to overcome both human and organizational tendencies.”¹⁴ Scholars who have mostly referred to the high reliability theory or organizations (HROs) are Todd La Porte, Gene Rochlin, Karlene Roberts, Karl Weick, and Paula Consolini.¹⁵ These scholars have identified and explained the role of high reliability organization. How can an organization prevent or control mishaps, accidents or unauthorized work in its boundaries? These scholars have tried to explore every aspect in “studying such organizations managing and operating complex and intrinsically hazardous technical systems.”¹⁶ Todd La Porte has identified various features of high reliability organization.¹⁷ He has defined the internal and external characteristics of high reliability organization. Existing organizational theoretical literature about nuclear security management is inadequate to address complex issues of nuclear weapons’ security. LaPorte and Consolini have outlined the conceptual challenges of HROs involved in at least three areas:¹⁸

i. Decision-making in the face of catastrophic error.
ii. Structural responses to hazards and peak-loads.
iii. Challenges of modelling tightly coupled interdependence.

¹⁴Ibid.
Furthermore, LaPorte and Consolini have argued that without enhancing theoretical understanding in an organization, “there are likely to be unpredictable consequences, subtle and unpredictable from the introduction of powerful and demanding new technical systems into complex HROs of scale.”\(^{19}\) Although, advanced technologies have significantly helped organizational capabilities, they have also introduced new challenges. While discussing the culture of reliability in organization, Karl E. Weick has highlighted the necessity for centralization.\(^{20}\) The culture of reliability provides a productive environment for organizational growth. An effective chain of command makes any organization more reliable and productive. According to Weick, et al “organizational reliability is thought to be achieved through the development of highly standardized routines.”\(^{21}\) Appropriate attitude and behaviour are also important for highly reliable organization. Proper knowledge of all the technical aspects of any system is the most vital factor in an organization.

The role of an organization in nuclear weapon complex is very important. Nuclear safety and security management is a highly sensitive subject. Sagan has comprehensively explained the nuclear safety features, while highlighting some examples from the Cold War period. On the basis of empirical material, he has made his theoretical framework valuable. According to proponent of high reliability theory, with the help of good organizational structure and trained management, mishaps can be controlled. There are various salient features of high reliability theory (HRT):

1. Accidents can be prevented through good organizational design and management.
2. Safety is the prime organizational objective.
3. Redundancy enhances safety: duplication and overlap can make “a reliable system out of unreliable parts.”

\(^{19}\) Ibid., p.43.
\(^{21}\)Weick, et al., "Organizing for High Reliability." p.35.
iv. Decentralized decision-making is needed to permit prompt and flexible field-level responses to surprises.

v. A “culture of reliability” will enhance safety by boosting uniform and proper responses by field-level operators.

vi. Continuous operations, training, and simulations can create and sustain high reliability operations.

vii. Trial and error learning from accidents can be effective, and can be augmented by anticipation and simulations.²²

It is in the best interest of an organization to maintain safety in the system. Through various safety exercises and reliability culture, safety could be increased in the system. Every organization learns from its mistakes and errors and a good organization learns from these experiences. Sagan has further stated that “organization theory has been highly suitable in a number of fundamental areas of international relations, illuminating crisis behaviour, alliance politics, weapons procurement, military doctrine, and nuclear weapons safety.”²³ High reliability organization (HRO) theorists have further explained that good organizational characteristics can provide extraordinary results. A good organization always maintains its efficacy in all situations. Teemu Reiman and Pia Oedewald have further mentioned five salient features of high reliability organization to encourage meaningful results:

i. Sensitivity to operations,

ii. Preoccupation with failure,

iii. Reluctance to simplify,

iv. Deference to expertise and

v. Resilience.²⁴

From these features, it becomes understandable that HRO presents an effective combination of multidimensional factors of management. These features provide all the necessary conditions to operate a system in a safe and secure way. From detection to response, an organization should have comprehensive management skills to mitigate all challenges. High

reliability theory suggests that in the presence of effective management, errors and mishaps can be controlled.

Keeping in view, the HRT completely explains Pakistan’s position in this regard. The organizational structure, whether military or civil, is entirely in its place and working flawlessly. All the postulates of this theory are effectively promulgated by Pakistani organization responsible for the smooth working of nuclear set up.

With respect to Pakistan's nuclear weapons' security, military as an organization has performed sufficient role and, according to Sagan, “it has complete control over nuclear arsenals.” Nuclear scientists and engineers’ roles are related to the nuclear weapon development and safety management. According to Khalid Ahmed Kidwai, credit goes to all those engineers and scientists and strategic organisations which helped Pakistan develop its own infrastructure and deterrence capability. Pakistan's nuclear history reveals that it has maintained its nuclear weapons programme safe and secure under military organization. The National Command Authority (NCA) of Pakistan is the supreme body that controls the country's nuclear programme, either for civilian or military purpose. According to Mr. Sartaj Aziz, Advisor to the Prime Minister on Foreign Affairs Pakistan's nuclear security regime is based on national legislative, regulatory and administrative framework. He further stated that the elements of nuclear security in Pakistan include robust command and control system led by the National Command Authority (NCA), rigorous regulatory regime, comprehensive export controls and international cooperation.

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25 In an interview with Dr. Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
28 Sartaj Aziz, Advisor to the Prime Minister on Foreign Affairs, “Pakistan’s Non-Proliferation Efforts & Strategic Export Controls,” Inaugural address in a Seminar at ISSI, May 03, 2016.
2.3. Organizational Theory

Organizational effectiveness always plays a very significant role in maintaining and operating a system in good condition. Best organizations always keep improving their performance and keep learning with the passage of time. It was Adam Smith who is thought to be the creator and proponent of the theory of organization. Organizational theory optimists, Michael D. Cohen, James G. March, Johan P. Olsen, have stated that “an organization is a set of procedures for argumentation and interpretations as well as for resolving complications and making conclusions.” According to Karl E. Weick et al., “the methods found in the best high reliability organizations (HROs) provide the cognitive infrastructure that enables simultaneous adaptive learning and reliable performance.” The introduction of advanced technology into various systems has enhanced the capacity and capability of organizations. Evolution in technology has also changed thinking patterns and practical skills of organizations. According to Weick, “effective HROs represent complex adaptive systems that combine orderly processes of cognition with variations in routine activities in order to sense and manage complex ill-structured contingencies.”

The role of any military organization has always been vital in national security matters. In nuclear-weapon states, the military’s role is even more important. Nuclear pessimists’ assessment about the role of military organization presents various aspects. This perspective raises the alarm that an organization faces several issues and problems every day. In case of Pakistan, its nuclear weapon programme has been established under highly advanced safety

32 Ibid. p.61.
and security mechanisms. Pakistan’s nuclear safety and security mechanisms are based on the best international practices available globally. In addition, training and skills of the personnel, professionalism and work ethics of the people involved in nuclear management in Pakistan are credible and trustworthy. Personal interests and organizational conflicts may lead to disobedience and violence. Organizational vulnerabilities can create serious problems.

Sagan has discussed two important arguments while discussing the role of military organization. According to him, “military organizations, because of common biases, inflexible routines, and parochial interests, display strong proclivities toward organizational behaviours that lead to deterrence failures.” Nuclear weapons states cannot afford such organizational conflicts. In addition, Sagan has stated that in the absence of strong civilian control, military interests will dominate. So, organizational conflicts may lead to destabilization of the system which can create a fairly dangerous situation.

On the basis of historical experience, it is clear that Pakistan’s military has not confronted any such organizational conflicts. Providentially, there is no single incident of organizational conflict or accident in nuclear security management in Pakistan. All military cores, divisions and units have always displayed high professionalism. Nuclear command and control system is very strong and consists of highly professional persons. “The National Command Authority (NCA), the top tier of the command and control structure, aims to ensure that the decision to deploy and release nuclear weapons rests in the hands of civilian and military leaders designated by the National Security Council (NSC) and the Constitution of Pakistan.”

34 Ibid
The first tier of NCA is composed of an Employment Control Committee (ECC) and a Development Control Committee (DCC). “The primary responsibility of these commands is to exercise technical, training and administrative control over the strategic delivery systems. The operational control, however, rests with the NCA.”\textsuperscript{36} The second tier is the Strategic Plans Division (SPD) which is “responsible for protecting Pakistan’s strategic programmes from insider and outsider threats, most importantly from theft or loss of nuclear material and against infiltration of the strategic organizations by ill-intentioned actors.”\textsuperscript{37} Overall, nuclear command and control system is safe and secure under military authority. Many Western nuclear security experts and analysts have a firm belief that Pakistan’s armed forces are highly professional and maintain a good chain of command.\textsuperscript{38}

\textsuperscript{36} Salik and Luongo, “Building Confidence in Pakistan’s Nuclear Security,” p.46.
\textsuperscript{38} In interviews with many western nuclear security experts and analysts from January 2013 to May 2014.
Figure 2.1 depicts the hierarchical structure of National Command Authority and it further provides the functions of various departments at different level.

**Pakistan’s Nuclear Weapon Security:**

The military organization has proved its credibility and maintained an error-free command and control system in Pakistan. The role of military in nuclear safety and security management has always been satisfactory. According to Khalid Ahmed Kidwai nuclear security is not just about protecting nuclear assets and forces, it is a complete cycle of threat assessments, vigilance and response mechanisms. According to Dr. Samar Mubarakmand, a

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39 This structure has been discussed in details in chapter seven.

leading Pakistani nuclear scientist, the track record of military in nuclear security management is highly appreciable in Pakistan.\textsuperscript{41} Pakistan has maintained a safe and secure nuclear programme, and there is not even a single incident of unauthorised or accidental use of nuclear weapon or material in Pakistan’s nuclear weapon industry. Furthermore, Dr. Samar has stated that Pakistan has adopted robust safety mechanisms to avoid any mishap. While conducting successful cold test, safety parameters in nuclear weapons, missile accuracy, delivery system, command and communication have been observed on best standards.\textsuperscript{42} Furthermore, the armed forces keep these nuclear assets under highly trained and reliable command and control all the time. While talking about the role of Pakistan’s military in nuclear management, Daniel S. Markey has given credit to this organization:

Pakistan’s military remains disciplined, unthreatening, and in firm command of the nuclear arsenal. America will have reasons for confidence, even if nuclear weapons are by their nature risky and dangerous things.\textsuperscript{43}

Pakistan has established a credible Personnel Reliability Programme and Human Reliability Programme to screen military and civilian personnel involved in strategic programmes.\textsuperscript{44} Personal and human reliability programmes have been universally accepted as credible programmes in dealing with nuclear security matters. These programmes are also

\textsuperscript{41} In an interview with Dr, Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan. Dr. Samar Mubarakmand is a leading former scientist of Pakistan Atomic Energy Commission (PAEC) Pakistan. Samar Mubarakmand is highly acknowledged in introducing modernization in the technical design and development of many components and instruments that are the keystone of Pakistan’s nuclear and missile technology. Samar Mubarakmand’s contribution in Pakistan’s nuclear and missile development programmes has been of critical importance. He is one of the leading experts in nuclear physics as well as missile systems and has worked both on Pakistan’s nuclear weapon and missile systems. Samar Mubarakmand also a head of the team of Pakistani scientists which successfully carried out country’s first nuclear detonation in 1998. Pakistan became the World's seventh nuclear power. Samar Mubarakmand also established NESCOM (National Engineering and Scientific Commission (NESCOM), a leading research organization which has contributed significantly to Pakistan's defence systems including missile system.

\textsuperscript{42} Ibid.

\textsuperscript{43} Daniel S. Markey, No Exit from Pakistan: America’s Tortured Relationship with Islamabad, New York: Cambridge University Press, 2013, p.18.

\textsuperscript{44} Christopher Clary, "Thinking about Pakistan’s Nuclear Security in Peacetime, Crisis and War," Institute for Defence Studies and Analyses (ISDA) Occasional paper, No.12, September 2010, p.14.
under practice in Pakistan’s nuclear establishment. Sensitivity of the nuclear technology, nuclear weapons and fissile material effectiveness, and demand of national security have made the military establishment in Pakistan highly responsible. The weapons are viewed as a guarantee of Pakistan’s survival as a state, and as instruments to advance Pakistan’s standing internationally as a nuclear-weapons state. Capability and credibility of military as an organization has always been high and dependable. Historical experience and evolving security culture has made military as the most reliable institution. It has adopted new technologies, skills, advanced screening and training systems.

Reliable command and control and safety arrangements are key components of Pakistan’s nuclear deterrent. The control and organization of Pakistan’s nuclear infrastructure falls under the Strategic Plans Division (SPD), a joint-staff organization dominated by the army. Pakistan has implemented a series of measures to ensure the safety of its nuclear arsenal. These measures are designed both to reassure external audiences and to ensure that the army retains control over the arsenal.

Pakistan’s military understands the sensitivity and requirement of nuclear weapons programme. It has prepared itself to mitigate all serious challenges and threats. Having a good command and control system is the guarantee of credible nuclear deterrence. Hence proved that the organizational theory can help to curtail the apprehensions of the international strategists and Western think tanks, political pressure groups and specially the journalists.

2.4. Propaganda Model

The mass media has established itself as a vital organ in the making and breaking of public perceptions. The role of the media has become very crucial in global politics. In 1988, Herman Edward and Noam Chomsky, in their book, *Manufacturing Consent: the Political...*

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46 Ibid.
Economy of the Mass Media, introduced five propaganda models. A five-filter propaganda model to explain this phenomenon, a model that fits well with the sociology of mediated communication:

i. The size, concentrated ownership, owner wealth, and profit orientation.

ii. Advertising as the primary income source.

iii. Reliance upon information provided by government, business, and “experts” by primary sources and agents of power.

iv. “Flak” as a means of disciplining the media.

v. Anticommunism as a national religion and control mechanism.

These five propaganda models demonstrate understanding of the most imperative structural constraints that affect the practices of media operations. Herman and Chomsky referred to this “ideological agreement principally in the context of anti-communism.” The global powers’ interests and competitors have not changed. Media houses are operating under the organised agenda and economic interests. Powerful agents project only those information which are in their personal intertests. State-sponsored media houses have also become a tool of political and propaganda campaigns. In Oliver Boyd-Barrett’s point of view, “today, that might be expressed as ideological convergence between the establishment and the media with respect to the supposed benefits of neo-liberal global capitalism.”


48 “Flak” refers to negative responses to a media statement or programme. It may take the form of letters, telegrams, phone calls, petitions, lawsuits, speeches and bills before Congress, and other modes of complaint, threat, and punitive action. It may be organized centrally or locally, or it may consist of the entirely independent actions of individuals. (Edward Herman and Noam Chomsky, Manufacturing Consent: the Political Economy of the Mass Media, New York: Pantheon Books, 1988, p.26.

49 Ibid. The CIA had published hundreds of books whose purpose was to undermine the Soviet Union and communism. Some were based on manufactured evidence. The agency owned dozens of newspapers and magazines worldwide.


52 Ibid.
“sixth filter”, the direct purchase of media influence by powerful sources, or the “buying out” of individual journalists or their media by government agencies and authorities.\(^{53}\) By introducing the sixth filter, Oliver Boyd-Barrett has tried to highlight a new way of war against a state in modern times. In the name of the threat from Iraq’s supposed weapons of mass destruction, USA invaded the country. By late June 2003, it had become increasingly clear to most commentators that the Bush administration had lied about weapons of mass destruction in Iraq in order to justify the March invasion.\(^{54}\)

Since Pakistan has conducted its nuclear tests in 1998, the same media exercise has been operationalized against the country’s nuclear weapons programme. The media has been successful in creating such misperceptions about Pakistan’s nuclear weapons’ safety and security. Journalistic stories, a series of propaganda, one-sided approach and biased research studies have been done to malign Pakistan’s nuclear image. There are various books, articles and newspaper stories have been written during the last few years to malign Pakistan’s nuclear weapon programme. In the following table, some books and articles have been highlighted which provide hypothetical assumptions about Pakistan’s nuclear weapons and linking them with nuclear terrorism:

\(^{53}\) Ibid.
\(^{54}\) Ibid., p.438.
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Analyst</th>
<th>Book/Article</th>
<th>Year of Publication</th>
<th>Main Theme</th>
<th>Primary Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Michael A Levi</td>
<td>On Nuclear Terrorism</td>
<td>2007</td>
<td>Nuclear Terrorism</td>
<td>Not available</td>
</tr>
<tr>
<td>2</td>
<td>Michael A Levi</td>
<td>Deterring State Sponsorship of Nuclear Terrorism</td>
<td>2008</td>
<td>Nuclear Terrorism</td>
<td>Not available</td>
</tr>
<tr>
<td>3</td>
<td>Bhumitra Chakma</td>
<td>Pakistan’s Nuclear Weapons</td>
<td>2008</td>
<td>Nuclear insecurity</td>
<td>Not available</td>
</tr>
<tr>
<td>4</td>
<td>Jack Caravelli</td>
<td>Nuclear Insecurity: Understanding the Threat from Rogue Nations and Terrorists</td>
<td>2008</td>
<td>Nuclear Insecurity</td>
<td>Not available</td>
</tr>
<tr>
<td>5</td>
<td>Bruce Riedel</td>
<td><em>The Search for Al Qaeda</em></td>
<td>2009</td>
<td>Nuclear Terrorism</td>
<td>Not available</td>
</tr>
<tr>
<td>6</td>
<td>Christine Fair</td>
<td>Pakistan: Can the United States Secure an Insecure State?</td>
<td>2010</td>
<td>Nuclear Weapons insecure</td>
<td>Not available</td>
</tr>
<tr>
<td>7</td>
<td>Graham Allison</td>
<td>A Response to Nuclear Terrorism Skeptics</td>
<td>2009</td>
<td>Nuclear terrorism and security</td>
<td>Not available</td>
</tr>
<tr>
<td>8</td>
<td>Christopher Clary</td>
<td>Thinking about Pakistan’s Nuclear Security in Peacetime, Crisis and War</td>
<td>2010</td>
<td>Nuclear security</td>
<td>Not available</td>
</tr>
<tr>
<td>9</td>
<td>Linda Diaz</td>
<td>Pakistan’s Nuclear Arsenals: A Threat to U.S. Security</td>
<td>2012</td>
<td>Nuclear security and terrorism</td>
<td>Not available</td>
</tr>
<tr>
<td>10</td>
<td>Benjamin Schwartz</td>
<td>Right of Boom: The Aftermath of Nuclear Terrorism</td>
<td>2015</td>
<td>Nuclear Danger</td>
<td>Not available</td>
</tr>
<tr>
<td>11</td>
<td>Robert S. Litwak</td>
<td>Deterring Nuclear Terrorism</td>
<td>2016</td>
<td>Nuclear Terrorism</td>
<td>Not available</td>
</tr>
</tbody>
</table>
These books and articles lack the primary source of information and usually are written on the basis of newspapers stories and western assumptions. These books and articles are based on narrative rather than reality. Most of the stuff is journalistic and none of the source is in public domain. It is not collected through proper procedure required for data collection in social sciences. The propaganda model fits in explaining this situation. The international media has been successful in creating a perception that Pakistan’s nuclear weapons are insecure.

According to Tom Bryder:

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55 The scholar has reviewed these books and most of them have been mentioned in this thesis.
Persuasion is built on the ability to organize the perception of reality and experience for those who are about to be persuaded, so that these views and actions that the propagandist has established in a pre-persuasion (priming) appear natural and self-evident when a direct propaganda-message is framed.56

A state’s image at the global level is very important. That helps a state to formulate its policies and strategies to engage itself with the international community. In the following figure, effort has been made to highlight how media makes and breaks the perception of a nuclear weapon state:

**Figure: 2.2. Media in Making and Breaking Global Perceptions**57

In the figure 2.2, Media in Making and Breaking Global Perceptions, deterrence strategy is the center of gravity for any nuclear weapon state. There are many components which help to establish an effective deterrence. In the age of influential media, which may make or break the state’s image, global perception plays a vital role in determining the state image in the global arena. To project its soft image, states utilize media power. States also use

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57 This figure is Scholar’s own extraction.
media against their adversaries to create negative images about them. If we take the example of Israel and North Korea, it would be understandable how the media campaign changes the global perception and how various perceptions shape any state’s image. “North Korea defends its pursuit of nuclear deterrent to counter what Pyongyang deems existential threats posed by the United States.” The next step for North Korea is to keep its nuclear weapons safe and secure to ensure effective deterrence. The international perception about North Korean nuclear weapons is not positive and the country is thus facing global sanctions at various levels. North Korea has the capability of nuclear deterrence, but it fails to maintain its image in a “positive” way in the global community. On the other hand, Israel has non-declared nuclear weapons capability. But, it has been successful in maintaining its positive nuclear image in the West in particular.

2.5. Realism

2.5.1. Realist School of Thought

A state, particularly its decision-making elites and institutions, observes challenges and opportunities to its national interests. George Kennan, Hans Morgenthau, Reinhold Niebuhr and Kenneth Waltz and E. H. Carr are usually known as realists. Realist explanations of nuclear proliferation have mastered the doctrine about nuclear weapons since 1950s, because realist theory offers a convincing consideration for the attainment of weapons of mass destruction. The destructive nature of nuclear weapons provides them with the vital position in the national

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59 In an Interview with Igor Khripunov, Distinguished Fellow, Centre for International Trade and Security (CITS), University of Georgia, USA on April 17, 2014. He further stated that Israel has successfully established a good network which includes intellectuals, academicians and most importantly media. Although, Israel has regional disputes and terrorism issues, but global community has no concern with its nuclear weapons.
60 Tanya Ogilvie-White, "Is There a Theory of Nuclear Proliferation? An Analysis of the Contemporary Debate," The Nonproliferation Review, Fall 1996, p.44.
security policy. The structural, deterrent, and compelling power attributes of nuclear weapons are based on the assumptions that nuclear weapons are the ultimate source of coercion in the international system.\textsuperscript{61}

Most of the realists argue that the acquisition of nuclear weapons should be seen as a rational reaction of states seeking to defend their interests, since security constitutes the ultimate challenge to a state’s survival.\textsuperscript{62} In contemporary world politics, every state has its own defined goals and objectives. State strategies are understood to have been decided rationally, after taking costs and benefits of different possible courses of action into account.\textsuperscript{63} There is a need to understand why a state may want to acquire nuclear weapons? According to Feroz Hassan, “the passion and fervour with which Pakistan acquired nuclear weapons are only partially explained by realism.”\textsuperscript{64} Sagan has intensely articulated the motives behind developing nuclear weapons. In his article, “Why Do States Build Nuclear Weapons? Three Models in Search of a Bomb,” Sagan has developed three theoretical frameworks and has named them as:

i. The security model: According to this model states build nuclear weapons to increase national security against foreign threats, especially nuclear threats.

ii. The domestic politics model: these envisions nuclear weapons as political tools used to advance parochial domestic and bureaucratic interests.

iii. The norms model: Under which nuclear weapons’ decisions are made because weapons acquisition, or restraint in weapons development, provides an important normative symbol of a state’s modernity and identity.\textsuperscript{65}


\textsuperscript{62} Ibid., pp.44-45.


In this context, there is a need to understand why Pakistan would keep its nuclear weapons safe and secure. If we analyze these three models in Pakistan’s current situation, they seem applicable. In an anarchic global atmosphere, states are primarily concerned with survival and take whatever measures they deem obligatory to secure their existence. Pakistan strongly believes in its self-help and self-defence and self-reliant policy. Pakistan did not get any support in times of crises except from China and the Muslim world. After the 1971 war, Pakistan’s political and military elites decided to acquire nuclear weapons to deter its traditional rival, India, from any aggression. The role of nuclear weapons has become very prominent in Pakistan’s defence policy. Nuclear weapons are so crucial to the country’s national security policy that they should be retained at any cost. They have served in Pakistan’s security interests, and the safety and security of its nuclear installations, weapons, fissile and radioactive material, and equipment is fully assured. In the realist paradigm, Pakistan’s case can be described as follows:

Table: 2.2. Pakistan’s Case with the Realist Paradigm

<table>
<thead>
<tr>
<th>Need of a State</th>
<th>Realist School of Thought</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>Anarchic World, Self-help</td>
<td>India</td>
</tr>
<tr>
<td>Survival</td>
<td>Struggle for Balance of Power</td>
<td>India</td>
</tr>
<tr>
<td>Strong force</td>
<td>Maximizing Security and Power</td>
<td>Stronger Enemy (conventionally superior), Fear of defeat</td>
</tr>
<tr>
<td>Nuclear Weapons</td>
<td>Absolute/ Strategic Power, National Interests,</td>
<td>Stronger Enemy (conventionally superior), Fear of defeat, Past Experience</td>
</tr>
</tbody>
</table>

68 Singh, Pakistan Nuclear Disorder: Weapons, Proliferation and Safety, pp.50-51.
The figure above illustrates that in this anarchic world system, national security is a prime concern for Pakistan and the country believes in a self-help and self-defence policy against its traditional rival, India. India, conventionally stronger than Pakistan’s military in conventional warfare, is a serious threat to Pakistan’s national security and survival. To deter Indian aggression, Pakistan has maximized its security and defence system. The absolute power quotient of nuclear weapons provides deterrence against any Indian aggression. For this reason, nuclear weapons have served best in Pakistan’s national security interests.

Consequences of war in Afghanistan have had direct implications on Pakistan's security. After 9/11, a strong presence of India in Afghanistan has created more security challenges for Pakistan. A safe, secure and reliable nuclear weapon system is a great need for Pakistan to sustain nuclear deterrence in the South Asian region.

2.5.2. Neo-realism

There are logical reasons given by Kenneth Waltz on the need of acquiring nuclear weapons by a state. He is a nuclear optimist. Similarly, according to neo-realist school of thought, “states remain the primary actors, acting according to the principle of self-help and seeking to ensure their own survival.” To ensure security, states always try to maximize their military capabilities and modernize their defence technologies. “Capabilities define the position of states in the system, and the distribution of capabilities define the composition of international system and shapes the ways the units in that system interact with one another.” States retain power or struggle for power for their best national security interests. Waltz believes that states seek only enough power to ensure their security. Domestic and regional

70 Ibid.
security dynamics play very significant roles in the development of national security policy. Every state behaves and projects its security policies according to its security needs. According to Waltz, “state behaviour can be a product of the competition among states, either because they calculate how to act to the best of their advantage or because those that do not exhibit such behaviour are selected out of the system.”

In contemporary global politics, states generally follow the realist paradigm while making their national policies. In the absence of a central authority or agency that can provide and guarantee their security and welfare, states are forced to rely on their own self-help efforts. States also try to acquire a strong position in global politics. According to Waltz, “states are always striving to maintain their position within the international system which implies that security is on the first place on their scale of preferences.” States struggle for power according to their security requirements. Neo-realists argue that “in crucial situations, the ultimate concern of states is not for power but for security.”

Nuclear weapons provide an absolute defence system. Bernard Brodie has used the term “absolute weapons” which means that nuclear weapons are enormously powerful. For a state to acquire nuclear weapons to secure itself in the “anarchic” system seems logical. Nuclear weapons are known as very powerful weapons, and any state that wants to maintain its national security pursues nuclear weapons. This is the reason why for some states, nuclear weapons

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have a crucial part in their national defence. According to Etel Solingen, “since nuclear weapons are presumably the heart, or the inner sanctum, of states’ security dilemma, the study of why states acquire or renounce them loads the dice in favour of neorealism, constituting the most auspicious domain for corroborating its tenets.”  

Nuclear weapons not only prevent a situation of war, but also compel the states to go for peace. The fear of nuclear escalation has played a major role in preventing conventional wars at all levels. Waltz has argued that “proliferation of nuclear weapons will likely make the world more safe, not less.”

States always struggle for power to secure their territorial and national interests. Some states seek nuclear weapons as a guarantor to their national security. “A state’s decision to obtain nuclear weapons is a vibrant function of its search for security in an ambiguous international environment.” Regional dynamics and domestic politics also play a significant role while defining national interests. “Neorealist assumptions about state power and its ceaseless pursuit for security led them to anticipate and predict that states would go nuclear.”

Furthermore, global politics provokes states to acquire nuclear weapons. However, due to non-proliferation regimes, only a few states have been able to get nuclear weapons, took very hard steps for their national security and made difficult choices. Acquisition of nuclear weapons for security purposes seems logical for a few states because they fulfil their security needs or at least complete the security gap. According to Etel Solingen, “nuclear weapons are considered to be well suited to secure survival by generating caution, rough equality and quality of relative

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81Chakma, Pakistan’s Nuclear Weapons, p.6.
power.”

Although, the process involved in acquiring nuclear weapons is very difficult and challenging, some states believe that their survival is linked with these weapons. “The realist (neo-realists) would suggest that states are concerned primarily with maximizing security.”

Nuclear weapons provide all those security assurances which a state requires to deter a strong adversary. All nuclear weapons development programmes constitute a response to insecurity and a form of balancing act against foreign political or military threats. Nuclear weapons have become a strong deterrent objective of nuclear weapon state against any adversary. Hence, nuclear weapons capability is an essentiality for an effective and viable deterrence.

How can a state compromise on its security, sovereignty and survival? How can a state behave irresponsibly after acquiring these multimillion-dollar (nuclear) assets? Safety and security of nuclear weapons has become a fundamental part of deterrence policy. When a nuclear-weapon state understands that without having nuclear weapons its survival is at stake, it will not compromise on the safety and security of its nuclear weapons. All these aspects are not very difficult to understand. The theoretical paradigms of realism and neorealism provide logical measures in addressing all these questions.

What was Pakistan’s main objective in acquiring nuclear weapons? Why did Pakistan pursue its nuclear weapons (deterrence) strategy? It was all about security and survival of the state. Pakistan is on the track of self-defence, self-reliance, self-help and self-determination policy. After the 1971 war, Indian nuclear ambitions became a source of concern for Pakistan. According to Bhumitra Chakma, “Pakistani political elites, particularly Bhutto, believed that only nuclear weapons could guarantee the national survival of Pakistan against India’s

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83 Solingen, Nuclear Logics: Contrasting Paths in East Asia and the Middle East, p.24.
84 Khan, Eating Grass: The Making of the Pakistani Bomb, p.3.
85 Ibid., P.4.
conventional and nuclear threats.”86 Pakistan will maintain a safe and secure nuclear weapons system for its absolute defence. To ensure credible nuclear strategy, Pakistan is continuously updating and modernizing its nuclear weapons which include safety measures, delivery system and command and control structure.

2.5.3. Theory of Deterrence

Thomas Hobbes (1588–1678), Cesare Beccaria (1738–1794), and Jeremy Bentham (1748–1832) are the early classical philosophers of deterrence theory. Scholars like Glenn Snyder, Oskar Morgenstern, Albert Wholstetter, Thomas Schelling and Herman Kahn have contributed to its development and refinement.87 Nuclear weapons are considered as political instruments rather than military weapons. Theory of mutual deterrence works through balance of terror. The ability of each side to wipe out other’s cities remains the central and essential ingredient in the balance of terror.88 This balance of terror has prevented the two major powers US-USSR from going to war during the Cold War period. The Cold War is generally portrayed as a bipolar balance of power based on nuclear weapons and often referred as a balance of terror between US and USSR.89 That’s where the concept of MAD – Mutually Assured Destruction – gained currency. Nuclear weapons have become a political weapon, and nuclear weapon state materialized this asset as a deterrence objective. In the presence of nuclear weapons, nuclear-weapon states avoid going for the option of war. “In a system where every

state must provide for its own security, most realists hold that a balance of power is the most efficient mechanism for maintaining order.ºº

Nuclear weapons are designed and deployed specifically to deter an adversary. For an effective nuclear deterrence, a safe and secure nuclear weapon system is very important. Figure below clearly illustrates that nuclear deterrence, safe and secure system and human factors are interlinked. Furthermore, effective nuclear deterrence, organization and safety and security are also interlinked.

**Figure: 2.3. Correlation among Nuclear Deterrence, Security & Organization**

Strong association of all these factors makes a system reliable and credible. Nuclear organization maintains the nuclear weapons in a safe and secure manner. A credible and reliable nuclear weapon system can ensure effective nuclear deterrence.

Pakistan’s policy and decision making elites strongly believe that the country’s nuclear weapons provide minimum credible deterrence in the region. According to Rajesh M. Basrur,

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“in order to ensure the survivability and credibility of the deterrent, Pakistan will have to maintain, preserve and upgrade its capability.”

Safety and security of nuclear weapons has become a vital issue in global politics and has been converted into a part of deterrence diplomacy. Only a secure nuclear weapons system can provide credible nuclear deterrent strategy. Pakistan believes in self-help, self-reliance and self-protection strategic policy. Nuclear deterrence is impossible without having a safe and secure nuclear weapons system. Pakistan would like to maintain its deterrence strategy by keeping its nuclear assets safe and secure. According to Peter R. Lavoy, Pakistan’s nuclear deterrence strategy consists of the following major components:

1. An effective conventional fighting force and the demonstrated resolve to employ it against a wide range of conventional and sub-conventional threats;
2. A minimum nuclear deterrence doctrine and force posture;
3. An adequate stockpile of nuclear weapons and delivery systems to provide for an assured second strike;
4. A survivable strategic force capable of withstanding sabotage, conventional military attacks, and at least one enemy nuclear strike;
5. A robust strategic command and control apparatus designed to ensure tight negative use control during peacetime and prompt operational readiness (positive control) at times of crisis and war.

Pakistan’s nuclear deterrence strategy has no other objective but to counter Indian aggression. India has prompted Pakistan to increase and modernize its nuclear weapons capabilities. Pakistan’s missile programme is also in the same sequel. Indian Cold Start Doctrine has pushed Pakistan to develop short range-ballistic missiles (SRBM).

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93 International security experts considered them tactical nuclear weapons (TNWs).
to Adil Sultan, to respond to all forms of Indian aggression, “Pakistan developed and tested its short-range missile system ‘NASR’ (Hatf IX) in April 2011, with an objective to have ‘assured deterrence’ for a full spectrum threat, i.e., tactical, operational and strategic levels.” To ensure the credibility of these SRBMs, various safety procedures are involved in their development. According to Dr. Samar Mubarakmand, Pakistan’s short-range ballistic missiles are the best when it comes to evaluating standard and mechanism. They are very advanced and secure maintained by highly trained and certified personnel. Pakistan has operationalized these short-range ballistic missiles after conducting successful tests and procedural measures and they can hit targets with much greater accuracy.

2.6. Constructivist School of Thought

Every state has different identity and interests. Its demands and values change from time to time. States always struggle to keep their social values and identities intact. Alexander Wendt, F.V. Kractochwil, N. Onuf and M. Zehfuss are the leading constructivist theorists. According to the constructivist point of view, “the continued prevalence of nuclear weapons and states’ dominance in the nuclear arena constitute social facts.” Nuclear weapons change the strategic behaviour of states. The social fabric contributes to defining national needs and demands. Nuclear weapons demonstrate, among other things, “states’ commitment to their constructed social purpose, namely, maintaining power and prestige (i.e. identity), and dominance (i.e. identity and interests) – despite the possibility of non-state actors’ access and application of nuclear technology and weapons.” In this anarchic world system, countries are forced to sustain and augment their security and survival by maintaining a strong army and

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95 In an interview with Dr. Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
97 Ibid.
advanced weapon technology. Therefore, states continue to acquire nuclear weapons for their strategic importance, as an instrument to avoid wars. According to Scott D. Sagan, “state behaviour is determined not by leaders’ cold calculations about the national security interests or their parochial bureaucratic interests, but rather by deeper norms and shared beliefs about what actions are legitimate and appropriate in international relations.”98 Pakistan acquired nuclear weapons to secure its national identity, interests and for its survival. According to Van Wyk et al., “Pakistan’s nuclear programme emanates from that country’s insecurity as regards India, while India’s programme is a response to its insecurity as regards China.”99

The building of nuclear weapons is very costly and technically very difficult. But, “once a state has acquired nuclear technology, it is likely to develop it via a dedicated nuclear programme, conduct tests, produce weapons, stockpile such weapons and, in a worst-case scenario, employ these weapons.”100 Pakistan understands that only a safe and secure nuclear-weapons system can provide effective deterrence and, for that matter, a reliable command and control system is very important.

With the analysis of these schools of thoughts and academic frameworks, it has been understood that there is a wide gap between west and Pakistani perspective. Western analysts’ observations usually address the one side of the picture and they have ignored or undermined the Pakistan’s position. While Pakistan has its conditions and realities which it has to address. However, it has been revealed that nuclear weapons’ security is the prime concern of Pakistan’s civil and military leaderships. A safe, secure and operational nuclear weapons system can provide effective deterrence to Pakistan and the country would make every effort to maintain this effective nuclear deterrence. Strong nuclear command and control organization is a

100 Ibid.
guarantee for a robust nuclear weapons’ security management. The Strategic Plans Division of Pakistan (SDP) has all the capabilities. It is armoured with reliable and trustworthy trained professionals to ensure that nuclear weapons remain safe and secure. In the following figure, 2.4, the entire mechanism and correlation among deterrence strategy, safety and security cultures and organization effectiveness have been projected. It further explains the importance of nuclear weapons’ safety and security for effective nuclear deterrence:
This figure provides a comprehensive links among various factors important in nuclear security management. According to Dr. Igor Khipunov, these factors are interlinked and for effective nuclear deterrence, system should be credible, operational and effectively controlled nuclear weapon stockpile.
In this above figure, it is clear that the human factor (organizational effectiveness) has a very important role in managing nuclear safety and security in a system. There are three contributing components to it: safety, security, and reliability. These components can be enhanced through their specific cultures. All three have great significance in maintaining nuclear deterrence. To sustain effective nuclear deterrence, nuclear weapons should be effectively controlled, should be reliable and operable. This is possible only through a good organizational command and control.

Keeping the challenge of global concerns about Nuclear security in view, the role of organizations in nuclear industry has achieved the highest prominence. In all nuclear-weapon states, military organization is responsible for keeping nuclear weapons safe and secure, and for their maintenance and operational control. There are various technical features which provide a comprehensive safety and security mechanism to nuclear weapons. High reliability theory suggests that effective organization maintains a system in any situation. In the presence of highly-trained professionals, the margin of error is very low. Military organization has proved its effectiveness in nuclear weapon industry. Accidents and unauthorized actions can be prevented through a well-trained and reliable security system.

Nuclear weapons have become the vital security need for Pakistan. Islamabad would like to maintain these assets to deter Delhi from any military aggression. The military, being a highly reliable organization in Pakistan, has been successful in keeping nuclear weapons safe and secure. Although, accidents are inevitable in any organization, the historical track record reveals that there has not been a single incident of accidental or unauthorized use of nuclear weapons in Pakistan. The military organization in Pakistan is professionally groomed, highly trained and reliable. The global community has witnessed its professionalism and commitment to defend Pakistan’s national interests. Nuclear weapons fulfil Pakistan’s national security needs and demands. Pakistan believes in the “self-help” security policy. In this anarchic world
political system, a state has to secure its national interests by its own means. To deter the superior Indian conventional forces, Pakistan has acquired nuclear weapons which have become the surety of strategic stability in South Asia. Furthermore, Pakistan believes that its nuclear weapons are a source of survival and it has to maintain these assets to ensure its sovereignty, identity and dignity.

In the context of all this discussion, it is clear that Pakistan has gone through a sturdy and arduous process to gain the nuclear weapon capability. It also proves that after the acquisition of these weapons Pakistan has left no stone unturned to ensure their efficacy, their value for the deterrence purpose and most importantly to keep them safe and secure. It also validates Pakistan's commitment to the responsible use of even the threats related to the use of nuclear weapons. Thus it substantiates the notion that the world perception in general and the propaganda created by certain think tanks, pressure groups and journalists in particular is baseless or driven by vested interests of these groups.

**Figure: 2.5. Role of Nuclear Weapons in Pakistan**
Nuclear weapons have multi-dimensional security and policy impacts. The global community has underestimated Pakistan’s nuclear weapons’ security arrangements and its role within its national security policy. Western analysis and concerns about Pakistan’s nuclear weapons do not describe the true perspective. It lacks the primary source of information. Mostly, reports, analyses and data are based on hypothetical assumptions, perceptions and concern. Additionally, over the last two decades, a series of media campaigns have been conducted against Pakistan’s nuclear weapons. Pakistan’s arrangements to secure its nuclear weapons are highly advanced and under very well trained professionals. To maintain its deterrence strategy against Indian aggression, Pakistan would ensure the safety and security of its nuclear weapons in any situation. Trained units of the military organization have all the capabilities and commitments to manage the nuclear assets.

Analysis through high reliability theory suggests that Pakistan’s nuclear security mechanism is in line with the HRT assumptions, which require a strong organizational structure to ensure nuclear security. Since Pakistan’s Nuclear security structure is under the control of the most efficient and internationally recognized organized military institution, it leaves no doubt regarding nuclear security. While normal accident theory considers the occurrence of an accident as a normal matter in any system, absence of any event regarding safety and security of nuclear weapons in Pakistan is an evidence of a reliable nuclear system of Pakistan. Both theories NAT and HRT validate the credibility of Pakistan’s nuclear security mechanism. Analysis through Noam Chomsky and Herman’s propaganda model along with Oliver Boyd-Barrett’s addition of views about propaganda as a tool for states to pursue their national interests suggest that Pakistan’s nuclear weapon security concerns are being engineered to serve the strategic interests of anti-Pakistan elements.
CHAPTER THREE

PART-A

NUCLEAR SAFETY & SECURITY: INTERNATIONAL STANDARDS, FRAMEWORKS, AND CHALLENGES

Nuclear [weapon] technology is very complex, difficult to acquire and hard to sustain. There are various concepts of nuclear technology and international legal instruments to address nuclear safety and security matters. A discussion would help to understand the basic concepts of nuclear safety and security. What is the difference between nuclear safety and nuclear security? When and how did nuclear safety and security regimes evolve? What are the global efforts to mitigate nuclear safety and security threats? What are the nuclear weapons safety and security guiding principles? How are these safety and security measures and global legal mechanisms are referred in Pakistan’s nuclear programme?

This chapter attempts to provide an overview of international efforts to mitigate nuclear security threats. Since the invention of nuclear technology, various legal instruments have been established in this regard. Pakistan, being a responsible nuclear weapon state, has always endorsed international efforts for safe and secure nuclear programme. After analysing this chapter, it would be very important to understand nuclear weapon technology, legal instruments and to compare with Pakistan’s efforts to secure its nuclear assets. For that matter, a detailed discussion has been carried out in chapter six. Chapter six provides a comprehensive discussion on Pakistan’s efforts to secure its nuclear weapons.

As mentioned earlier, the complexity of nuclear technology makes its acquisition difficult. Both its technical as well as political dimensions are complicated. Since the beginning of the nuclear age, nuclear safety has been a major concern of the international community.
From natural uranium (U238) mining to its reprocessing and to its final stage “highly-enriched uranium (U235), various nuclear safety issues are involved. Thereafter, several more safety and security parameters are involved when this highly enriched fissile material is transformed into nuclear weapons. Currently, there is no global [nuclear weapon] security regime to address nuclear weapons’ politics. Nuclear-weapon states deal individually with their nuclear weapons’ security matters or through some bilateral agreements. Usually, nuclear safety and security debate at the United Nations (UN) or at IAEA forum is on civil nuclear programme. Several treaties, non-proliferation regimes, UN resolutions, and conventions have been adopted to strengthen nuclear safety and security systems. The global community is commonly supporting these efforts. After the dismemberment of the Soviet Union, nuclear security has emerged as a serious global concern. According to Graham Allison, “the collapse of the Soviet Union presented an enormous challenge to nuclear security with the Soviet’s threatening arsenal spread across four separate states.”

The development of nuclear safety and security mechanism is a continuous process. Several preventive and protective measures have also been adopted to mitigate nuclear security threats, e.g., nuclear terrorism, unauthorised or accidental use and new and advanced nuclear security mechanisms have emerged as pertinent to the modern international system. These new mechanisms continue to ensure that nuclear material and weapons are safe and secure. As it has been discussed earlier, nuclear safety and security are two different aspects of nuclear management. Although, the ultimate objective of nuclear safety and security is to secure the

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1 Cases like USA and Russia, USA and UK, USA and France. These states have bilateral agreements on nuclear weapons safety and security issues. Although, these states do not disclose their agreements details.

2 Sometime, IAEA and UN show their concerns over nuclear weapons and security matters but there is no universally accepted guiding principle to cover this issue.

environment and people from the radiological vulnerabilities. Nuclear experts and scientists deal with nuclear safety and security with different mechanisms and approaches. In all of these approaches, diverse technical and conceptual measures are involved. They are utilized for civil and military purposes. In both cases, sufficient safety and security measures are required to keep nuclear technology, material and weapons under effectively good control. Any failure, mismanagement, man-made or natural disaster and security collapse could lead to worst case scenarios.

In the early years of nuclear technology and weapons development, safety and security concept was very narrow, and it was not a matter of much concern to states. According to Nuclear Energy Agency (NEA), “the primary focus was on the development of basic physics and engineering principles, safety system design features, codes and standards, and general design criteria governing such matters as redundancy and diversity of safety systems.” According to Mary Beth Nikitin, “the International Atomic Energy Agency (IAEA) has routinely assisted the member countries with improving their nuclear security practices since 1970s.” According to Nuclear Energy Agency report, “from the mid-1970s and onward the development of Probabilistic Safety Assessment (PSA) brought important insights into the initiation and progression of potential accident scenarios and the contribution that different systems and components make to the overall safety of a facility.” According to James Doyle, the terrorist attacks in the United States on September 11, 2001, were a wake-up call to the

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5 Literature, books, articles and officials statements published before 1990s were mainly focussed on proliferation and deterrence strategy.
8 Nuclear Energy Agency (NEA), The Regulatory Goal of Assuring Nuclear Safety, p.12.
international nuclear community.\textsuperscript{9} Because of the serious threat of nuclear terrorism, the global community has reacted with responsibility. According to Doyle, “In the immediate aftermath of the September attacks, rapid assessments of nuclear security were conducted on many fronts.”\textsuperscript{10} The IAEA has introduced various conventions, regimes and legal instruments to enhance the safety and security of nuclear technology, material, installations and weapons.\textsuperscript{11} However, nuclear safety and security parameters and regimes have developed along different courses of action.

The regime that supports nuclear safety, a combination of national laws and regulations, voluntary international agreements and conventions, matured quickly following the accidents at Three Mile Island and Chernobyl.\textsuperscript{12} The nuclear security regime, on the other hand, has advanced largely in response to the terrorist attacks on September 11, 2001 in the United States.\textsuperscript{13} Furthermore, it covers the physical protection of the nuclear assets from terrorists or non-state actors. Continued threats of nuclear terrorism have posed serious challenges to the global community. As the threats of nuclear terrorism have become real, nuclear safety and security regimes have also considerably improved.

Prior to the September 11, 2001 incidents, threats of nuclear terrorism were not a major source of concern for the global community. It was mainly due to terrorists’ intentions to attack on massive scale that heightened the international concerns on this account.\textsuperscript{14} Today, terrorists’ intentions to use radioactive material or a nuclear device for massive destruction have posed

\textsuperscript{10} Ibid.
\textsuperscript{11} All these documents are available on IAEA Official website.
\textsuperscript{14} Carranza, \textit{South Asian Security and International Nuclear Order: Creating a Robust Indo-Pakistan Nuclear Arms Control Regime}, p.6.
serious threats to the global peace. Global security analysts have developed different nuclear terrorism threat scenarios. All these scenarios have very serious implications for international peace and security.

3.1. Nuclear Safety

Since the beginning of the nuclear age, nuclear safety has remained the prime objective. During discussions on the formation of the IAEA in 1950s, the intimation of an upcoming international nuclear safety regime materialized. Evolution of nuclear safety is a continuous process and developments in nuclear technology have brought fundamental changes. Later on, industry, government and international institutions took several other steps to enhance the international control of nuclear safety. That was done at the given stage, whereas now they are considered as the precise framework for international nuclear and radiation safety regime.

The concept of nuclear safety is technical in nature. It addresses the technical expertise and frameworks required to use nuclear technology in harmless ways. “The fundamental safety objective is to protect people and the environment from harmful effects of ionizing radiation.”

It is the scientific knowledge that involves the implementation of nuclear safety measures. Nuclear safety measures are specific in their scope as compared to the security measures. Nuclear safety measures are very essentials from uranium mining to enrich process as well as handling of nuclear technology. According to Trevor Findlay:

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15 Ibid., p.18.
16 Ibid., p.19.
shutdown, maintenance, decommissioning, dismantlement, site cleanup and disposition of contaminated materials.\textsuperscript{18}

There are standard procedures which are involved in each step of enrichment and material management. Thus, nuclear safety means the achievement of proper operating conditions, prevention of accidents or mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation hazards.\textsuperscript{19} Safety aspects require advanced scientific expertise and technology, i.e., scientists, engineers, technicians, and knowledge. The spread of nuclear technology has given rise to the need to enhance nuclear safety.

The origins of the global safety regime can be traced back to the aftermath of the 1986 Chernobyl accident, when worldwide consensus emerged on two points related to nuclear safety: first, the need for effective international cooperation; and second, the need to effectively separate nuclear power development from nuclear safety oversight functions.\textsuperscript{20}

Nuclear safety culture has been defined by IAEA as, “that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, protection and safety issues receive the attention warranted by their significance.”\textsuperscript{21} Nuclear safety culture provides a comprehensive mechanism to deal with the nuclear technology. The Defense in Depth (DiD)\textsuperscript{22} safety concept has long been recognized as a key element in ensuring

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\textsuperscript{19} Nuclear Energy Agency (NEA), \textit{The Regulatory Goal of Assuring Nuclear Safety}, p.11.


\textsuperscript{22}Defense-in-depth is the key concept on which nuclear safety in design and operation is based. In design of nuclear reactors, defense-in-depth is implemented by providing multiple physical barriers intended to prevent release of radioactive material into the environment which could cause people to be exposed to excessive radiation levels. In most designs, the physical barriers include the uranium dioxide fuel pellets, the cladding
safety. According to Nuclear Regulatory Commission (NRC) of USA, nuclear safety culture is “the core values and behaviours resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment.” Furthermore, NRC has identified nine traits that are viewed to be necessary in the promotion of a positive safety culture:

1. Leadership Safety Values and Actions.
2. Problem Identification and Resolution.
3. Personal Accountability.
5. Continuous Learning.
6. Environment for Raising Concerns.
9. Questioning Attitude.

There are several elements of nuclear safety. There is no unique method of grouping nuclear safety elements, but they can be categorized in the following headings:

1. Technical.
2. Human factors and organizational.29
3. Programmatic and Cross-cutting.30

These three safety elements are composed of several safety components which are interlinked with their functions. From technical assessments to final proceedings, all these factors cooperate with each other. A great deal of accuracy, care and attention is required to handle the technical procedures. The IAEA has constituted the nuclear safety regimes as shown in the following figure:

design specifications and safety analyses. • A strong engineering function that maintains plant, systems and equipment in accordance with the facility design basis, analyses technical and facility ageing issues as they arise, and provides support to operations and maintenance. • Safety assessments of all changes and backfits made during the life of the facility. • A radiological protection programme that ensures all personnel is adequately protected against the harmful effects of the ionizing radiations emitted from the nuclear facility and its fuel cycle. • A programme for utilizing the probabilistically-developed risk insights derived from system analysis and operational experience.

Components of human factors and organizational safety: • Sufficient properly qualified, trained, and fit-for-duty personnel to operate the facility, maintain the equipment, implement the radiation protection programme, and who demonstrate a questioning attitude toward all aspects of the operation of the facility. • An operating staff that follows conservative decision-making principles and has a profound respect for the reactor core and radioactive materials, keeping them under absolute control at all times. • A comprehensive set of operating, maintenance, and accident management procedures, including severe accident management guide-lines that have been developed and tested using established man-machine interaction principles. • A strong corporate management organization with a leadership that establishes a set of values emphasizing the priority of nuclear safety, making it clear that workers should not have a conflict in their daily tasks between safety and other business goals, and that provides adequate resources to ensure that the facility is operated safely. • A facility management organization that has clear lines of authority and responsibility for safety and that facilitates openness, a questioning attitude, confidence between employees and managers, control of quality in all activities, and strict adherence to safety procedures. • A programme and procedures for the management oversight of all safety-related work done by contract workers for or at the facility.

Components of programmatic and cross-cutting safety: • Operational limits and conditions (or technical specifications) that define and govern the safe operating envelope of the facility and ensure that radiation exposures are kept as low as reasonably achievable. Programmes such as fire protection and surveillance testing that are critical components of the defence in depth safety philosophy of maintaining multiple barriers, both physical and procedural, against severe accidents. • A programme of operating experience analysis, trending analysis and feedback to operations. • A programme of initial and continuing training to ensure an operating staff of qualified workers. • A configuration management programme that maintains the safety design basis of the facility as approved by the regulatory body. • An ageing management programme that monitors the potential deleterious effects of ageing on systems, structures and components and requires proactive steps to maintain the safety design basis. • A change management programme that ensures that organizational changes do not inadvertently diminish operational safety. • Effective integrated management systems (including quality assurance, self-assessment and corrective action programmes). • A safety culture that has been instilled throughout the operating organization based on the highest safety values and that fosters an attitude of conservative decision making. • Emergency plans, which have been thoroughly reviewed and tested, to enable actions to protect both onsite workers and offsite populations in the event of a nuclear accident. • Access to a continuing programme of nuclear safety research that is designed to add to the basic knowledge of safety fundamentals. • Facility sitting and environmental policies that promotes offsite protection. • Security plans that are tested and kept current to prevent threats to the facility and to prevent unauthorized use of nuclear materials.
This figure reveals how nuclear safety regime works, and how various socio-political and international intuitions cooperate with each other. Governmental, non-governmental and civil society coordination including media is very important to strengthen the global nuclear safety regime. In addition, the IAEA has identified the following fundamental safety principles:

Table: 3.1. Fundamental Safety Principles

<table>
<thead>
<tr>
<th>General Safety Requirements</th>
<th>Specific Safety Requirements</th>
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<tbody>
<tr>
<td>Part 2. Leadership and Management for Safety</td>
<td>2. Safety of Nuclear Power Plants</td>
</tr>
<tr>
<td>Part 3. Radiation Protection and the Safety of Radiation Sources</td>
<td>2.1. Design and Construction</td>
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<tr>
<td>Part 4. Safety Assessment for Facilities and Activities</td>
<td>2.2. Commissioning and Operation</td>
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These technical guidelines are very essential in dealing with nuclear safety and security management. From technical knowledge to policy making, all aspects have been discussed in these safety guidelines.

Safety of nuclear weapons is an entirely separate matter. A difficulty for the civilian nuclear industry is that the public tends not to distinguish between civilian nuclear facilities

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and defence-related facilities. Nuclear weapons’ facility is highly sensitive and it requires advanced security measures. It is in the interest of the civilian nuclear industry, therefore, to encourage the adoption of global safety and security standards in all aspects of the nuclear enterprise. Furthermore, safety systems have been improved globally and advanced technology has provided some accurate safety measures that can help ensure nuclear safety. According to the World Association of Nuclear Operators (WANO), “the most important Plant-based Performance Indicators of improved safety are: the rate of unplanned “automatic trips” (when the reactor is automatically shut down by safety systems rather than plant operators); radiation exposure of workers; and discharges to the environment.”

Several legal instruments, conventions and regimes of nuclear safety have been introduced by the global community. All these instruments bind the participating states to follow them. Since 1986, five legally-binding conventions that have the aim of increasing nuclear safety and security worldwide, have been ratified in the areas of nuclear, radiation and waste safety. All the participating states have endorsed these conventions. These safety conventions are as follows:

i. Convention on Early Notification of a Nuclear Accident, 1986 (INFCIRC/335).
ii. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, 1986 (INFCIRC/336).

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34 Ibid.
36 Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, Legal Series No. 14, IAEA, Vienna (1986).
37 Ibid.

All these conventions and legal instruments have been implemented by nuclear-power states for the safety of nuclear fissile material, installations, radioactive waste products and safety of nuclear weapons. It should be noted that safety measures of nuclear weapons are highly advanced and even under tighter safety mechanisms in comparison to a civilian nuclear facility.

3.2. Nuclear Security

Nuclear security is a more comprehensively advanced subject than nuclear safety. Nuclear security has multidimensional characteristics. Whilst both “nuclear safety and nuclear security consider the risk of inadvertent human error, nuclear security places additional emphasis on deliberate acts that are intended to cause harm.”\(^{41}\) The IAEA defines “nuclear security” as the “prevention and detection of (and response to) theft, sabotage, unauthorized access, and illegal transfer of or other malicious acts involving nuclear materials and other radioactive substances.”\(^{42}\) The global community has taken sufficient measures to address the nuclear security issues. The IAEA has introduced various legal instruments to make security regimes increasingly effective and stronger. Member states have built mutual consensus in this matter. There are six important multilateral instruments that underpin the emerging nuclear security regime. These include:\(^{43}\)

i. UN Security Council Resolution 1373.\(^{44}\)

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\(^{41}\) IAEA, “Nuclear Security Culture,” p.5.


\(^{43}\) Ibid.

\(^{44}\) UNSC Resolution 1373, adopted in 2001, calls for all states to become parties to the relevant international conventions and protocols relating to terrorism-of which the CPPNM is one-as soon as possible.
With the passage of time, nuclear security is getting more attention in global politics. The post-9/11 era has brought a spectrum of change in the area of nuclear security. The Nuclear Security Summits (NSS) Washington in 2010 and NSS Seoul in 2012, NSS Hague 2014 and final NSS Washington 2016 and, their corresponding nuclear experts’ meetings and a series of related events have provided an opportunity to develop new strategies and policies for the improvement of global nuclear security. There is no doubt that current nuclear security

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45 UN Security Council resolutions 1373 and 1540 are the only universally binding instruments that impose nuclear security obligations on all states. Resolution 1540 goes further than its predecessor, in that it exclusively addresses WMD security commitments, setting these out in a series of provisions. Under the resolution, adopted in 2004, all states are required to adopt and enforce “appropriate effective measures” to prohibit any non-state actor from manufacturing, acquiring, possessing, developing, transferring, or using nuclear weapons, and to establish domestic controls to prevent their proliferation.

46 The Nuclear Terrorism Convention was adopted in 2005 under the auspices of the United Nations. It details offenses relating to unlawful possession and use of radioactive materials, and the use or damage of nuclear facilities.

47 The Convention on the Physical Protection of Nuclear Material is the only international legally binding agreement on the physical protection of nuclear materials used for peaceful purposes. The Convention on the Physical Protection of Nuclear Material entered into force on 8 February 1987. On 8 July 2005, States Parties to the CPPNM adopted by consensus an Amendment to the CPPNM.

48 The Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225) is a set of recommendations to establish effective physical protection measures. INFCIRC/225 provides best practices from which countries can begin to develop their nuclear security systems. It originated from an IAEA document published in 1972; since then it has been revised four times. INFCIRC/225/Rev.4 covers the physical protection of both peaceful and military nuclear materials in use, storage, and transport, whether domestic or international.

49 The Code of Conduct is a nonbinding, international legal instrument that provides guidelines and sets standards for the control of civilian radioactive sources that may pose a safety and/or a security risk. It was originally developed by the IAEA Secretariat in the late 1990s at the request of the Group of Eight (G8) and was reviewed, revised, and strengthened following the terrorist attacks of 9/11.

50 Nuclear Security Governance Experts Group (NSGEG), "Responsibility beyond Rules: Leadership for a Secure Nuclear Future," NSGEG, March 2013, p.3. This document details five steps and 30 recommendations for significantly strengthening the global nuclear security regime and creating the foundation for its long-term effectiveness and adaptability. These steps and the recommendations result from three international workshops held by the Nuclear Security Governance Experts Group (NSGEG) in 2012. The goal is to enable substantial nuclear security regime improvements by 2020.
regimes are not entirely effective to counter all challenges. They also lag behind other regimes that govern nuclear safeguards, safety, and arms control in terms of their binding requirements and assurances of compliance.\textsuperscript{51} The global community understands the increasing demand in nuclear security issues. With both the IAEA and the Nuclear Security Summit (NSS) process emphasizing the multiple aspects of nuclear security, a comprehensive definition would include the security and safety of nuclear materials, radioactive sources, and nuclear facilities, including protection from terrorism, cyber-attacks, or other malicious acts.\textsuperscript{52}

There are several factors attached with nuclear security regimes. The current nuclear material security regime is composed of three major elements:\textsuperscript{53}

i. Domestic laws and regulations that govern security on a nation’s territory;
ii. International agreements and institutions and UN Resolutions that supplement domestic security laws;
iii. Ad hoc, cooperative measures in which nations voluntarily agree to participate.

Such elements are pivotal for the development of nuclear security culture that has great implications for any nuclear weapon state. There are various factors involved in establishing a comprehensive nuclear security culture. “The IAEA security-culture design is based on the organizational-culture model developed by Edgar Schein and this model was successfully used in the 1990s to develop nuclear safety culture after the Chernobyl accident in 1986.”\textsuperscript{54} The IAEA has identified the following general characteristics of nuclear security culture:

\textsuperscript{51}Ibid.
\textsuperscript{52}Ibid., p.7.
The state’s role is very important in enhancing nuclear security culture. It is the responsibility of a state to define and protect general regulations. Also, it is the state’s duty to assign work to the relevant organisation and keep information safe. The organisation’s role is vital in the success of any system. The organisation makes policy statements, manages the system and utilizes resources. Additionally, management and individuals work in their prescribed areas. Nuclear security is a wider concept than nuclear safety. On the one hand, evolution in nuclear technology has made nuclear safety more advanced and safer. On the other hand, nuclear security has become a more serious subject. Both have many common elements and procedures. But, they have a common purpose: protection of people, the environment and

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society. To attain effective nuclear security culture, the IAEA has defined various actors and their roles and responsibilities. In the following figure, characteristics of effective nuclear security culture have been elaborated:

**Figure 3.3. Characteristics of Nuclear Security Culture**

- **GOAL: EFFECTIVE NUCLEAR SECURITY**
  - **Management systems are well developed and prioritize security**
    - a. Visible security policy;
    - b. Clear roles and responsibilities;
    - c. Performance measurement;
    - d. Work environment;
    - e. Training and qualification;
    - f. Work management;
    - g. Information security;
    - h. Operation and maintenance;
    - i. Continual determination of staff trustworthiness;
    - j. Quality assurance;
    - k. Change management;
    - l. Feedback process;
    - m. Contingency plans and drills;
    - n. Self-assessment;
    - o. Interface with the regulator;
    - p. Coordination with off-site organizations;
    - q. Record keeping.
  - **Leadership behaviour**
    - a. Expectations;
    - b. Use of authority;
    - c. Decision making;
    - d. Management oversight;
    - e. Involvement of staff;
    - f. Effective communications;
    - g. Improving performance;
    - h. Motivation.
  - **Personnel behaviour**
    - i. Personnel behaviour
    - j. Professional conduct
    - k. Personal accountability
    - l. Adherence to procedures
    - m. Teamwork and cooperation
    - n. Vigilance.

**PRINCIPLES FOR GUIDING DECISIONS AND BEHAVIOUR**


**BELIEFS AND ATTITUDES**

- a). Credible threat exists; b). Nuclear security is important.


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Nuclear security culture has been recognized as a fundamental mechanism for effective nuclear safety and security system. An effective nuclear security culture helps to maintain robust mechanism in nuclear industry.

3.3. Nuclear Terrorism

In the contemporary time, the most serious challenge that the global community is confronting, is the threat of nuclear terrorism. In September 2008, Mohamed El-Baradei, the then Director General of the International Atomic Energy Agency (IAEA), described nuclear terrorism as the number one threat to world security.\(^{57}\) The global community responded responsibly, and followed the IAEA’s instructions to combat nuclear terrorism. The USA considers nuclear terrorism as a serious threat to its national security. In April 2009, President Barack Obama identified nuclear terrorism as the gravest threat to the United States, and called for stringent international efforts to break the nuclear black market.\(^{58}\) Although there is no history of nuclear terrorism, the threat has become real.\(^{59}\) Nuclear risks are rising as nuclear arsenals expand.\(^{60}\) To achieve their political objectives, terrorists may use nuclear material or resources as a terrorist tactic.

Nuclear terrorism includes actions against nuclear facilities, military or civilian, including vehicles transporting nuclear weapons, components, or material; and those in which nuclear weapons, explosive devices, or materials are used to threaten or actually kill people and destroy property.\(^{61}\) Nuclear terrorism has been categorized in different possible scenarios.

\(^{58}\) Ibid.
\(^{59}\) In an interview with Dr. Annette Schaper, Senior Research Fellow at Peace Research Institute Frankfurt (PRIF), Germany on May 14, 2013 at PRIF Germany.
\(^{60}\) Rolf Mowatt-Larsen, "Four Years from Prague: Bin Laden is gone, Al Qaeda is weakened, yet the threat of Nuclear Terrorism Persists," Courier, No. 77, Winter 2013, p.4.
In their book, *Four Faces of Nuclear Terrorism*, William C. Potter and Charles D. Ferguson have categorized nuclear terrorism in four different scenarios:

i. Theft and detonation of an intact nuclear weapon (NW).

ii. Theft or purchase of fissile material leading to the fabrication and detonation of a crude NW - an improvised nuclear device (IND).

iii. Attacks against and sabotage of nuclear facilities, in particular NPPs, causing the release of large amounts of radioactivity.

iv. Unauthorized acquisition of radioactive material contributing to the fabrication and detonation of a Radiological Dispersion Device (RDD) a "dirty bomb" or radiation emission device (RED).  

In addition, Potter has further elaborated that it is conceivable that terrorist or non-state actors could initiate nuclear aggression by indirect methods involving deception. For example, terrorists might be able to provoke a nuclear exchange in South Asia by inflicting conventional violence in India or Pakistan in such a manner as to suggest the possibility of state complicity. Nuclear weapons are very lethal and destructive in their nature. Not that all terrorist groups intend to carry out attacks with nuclear weapons, but some of them are bent upon causing as much destruction as possible, including Al-Qaeda and the Japanese cult Aum Shinkrikyo. After the September 11 attacks in the USA, threats of nuclear terrorism have increased.

Concerns about terrorists’ utilising weapons of mass destruction (WMD), are also not new. The same concerns have been voiced since the end of 1970s that such an eventuality can lead to very serious repercussions that may endanger the entire world security. Al Qaeda’s

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intentions were very clear in this regard even before the 9/11 incident. According to Paul J. Smith, Osama Bin Laden was keen to get the nuclear bomb.\textsuperscript{66} There is one classical example of unsuccessful weapons of mass destruction (WMD) attack on the Tokyo subway in 1995 when Japan-based terrorist organisation Aum Shinrikyo had used Sarin gas.\textsuperscript{67} Although there are several terrorist organisations in the world, no other organisation has shown or expressed the intention of acquiring nuclear devices or materials. But, the threat of nuclear terrorism cannot be ignored in the future. It is believed that nuclear weapons or materials are the best source to deter or threaten the adversary, but non-state actors can materialise this exercise by threatening or blackmailing a state to achieve their terrorist objectives. While explaining nuclear terrorism, Matin Zuberi has stated that terrorists can blackmail any particular state by threatening it with the use of nuclear device, attacking nuclear installations like nuclear power stations, breeder reactors, reprocessing and enrichment plants, or cooling ponds of spent nuclear fuel, or dispersal of radioactive substances in what is called a “dirty bomb”.\textsuperscript{68}

3.4. Nuclear Security Summits

During the last two decades, nuclear security has attained serious attention of global community. To address this issue, the USA took the initiative and moved forward to mitigate this threat. During his visit to Prague, Czech Republic, on April 5, 2009, President Obama described an ambitious three-tiered strategy to deal with the global nuclear security threat:

i. Proposing measures to reduce and eventually eliminate existing nuclear arsenals.

ii. Strengthening the Non-Proliferation Treaty and halting proliferation of nuclear weapons to additional states.


\textsuperscript{67}Dokos, \textit{Countering the Proliferation of Weapons of Mass Destruction: NATO and EU Options in the Mediterranean and the Middle East}, p.59.

Preventing terrorists from acquiring nuclear weapons or materials.69

In response to Obama’s speech, the first Nuclear Security Summit (NSS) was held on April 12-13, 2010, in Washington, DC.70 In this summit, only 47 states’ representatives were invited, and 38 (81 percent) of the representatives were the head of the states or governments.71 These representatives consisted of nuclear weapon states and non-nuclear weapon states. Furthermore, three heads of the international organizations, the United Nations (UN), the European Union (EU) and the IAEA were also invited.72 The prime objective was to mobilize the world leaders to meet this serious challenge to global peace. It is a fact that NSS only addresses the nuclear material and technology which is linked with civilian nuclear purposes. According to Igor Khripunove, NSS does not address the nuclear weapons or nuclear technology involved in military business.73 The Seoul NSS in 2012 was another step to renew the commitments and further identify useful strategies to address nuclear security issues.74 In the 2012 summit, 53 states’ representatives attended it.75 Nuclear security summit 2014 in Hague has further endorsed the global commitments to counter nuclear security threats. In NSS 2016, Washington, mutual consensus has been developed to carry on such efforts and to engage world leaders and implement NSS commitments at the highest levels to securing nuclear materials.76

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72 Ibid.
73 In an Interview with Igor Khripunove on April 03, 2014 at CITS, University of Georgia, USA.
75 Ibid.
3.5. **International Legal Instruments to Counter any Type of Illicit Trafficking, Proliferation, and Nuclear Safety and Security Regimes**

There are several international legal instruments that have been adopted to stop illicit trafficking of nuclear material, technology, to counter nuclear proliferation and to establish sufficient nuclear safety and security regimes:

1. Treaty on the Non-Proliferation of Nuclear Weapons, 1970.\(^\text{77}\)
2. NPT Exporters Committee — Zangger Committee Guidelines.\(^\text{78}\)
3. Nuclear Suppliers Group Guidelines.\(^\text{79}\)
4. Regional nuclear non-proliferation and arms control treaties.\(^\text{80}\)
5. IAEA safeguards agreements\(^\text{81}\) and additional protocols.\(^\text{82}\)
6. Convention on the Physical Protection of Nuclear Material, 1980 (CPPNM), including an amendment adopted in 2005.\(^\text{83}\)
7. Convention on Early Notification of a Nuclear Accident, 1986 (CENNA).\(^\text{84}\)
8. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, 1986 (CACNARE).\(^\text{85}\)
9. Europol Convention, 1999.\(^\text{86}\)

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\(^{77}\) Treaty on the Non-Proliferation of Nuclear Weapons, IAEA, INFCIRC/140, IAEA, Vienna (1970).

\(^{78}\) Communication Received from Members Regarding the Export of Nuclear Material and of Certain Categories of Equipment and other Material, Guidelines for Nuclear Transfers, INFCIRC/209, IAEA, Vienna (1974).


\(^{81}\) The Structure and Content of Agreements Between the IAEA and States required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons INFCIRC/153 (Corrected), IAEA, Vienna (1972).

\(^{82}\) Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards, INFCIRC/540 (Corrected), IAEA, Vienna (1997).


\(^{84}\) Convention on Early Notification of a Nuclear Accident, INFCIRC/355, IAEA, Vienna (1986).

\(^{85}\) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, INFCIRC/336, IAEA, Vienna (1986).

The global community is seriously addressing the issues related to nuclear technology. From nuclear proliferation to nuclear politics, these are all the prime agendas of contemporary world politics. With the passage of time, stronger and more effective non-proliferation regimes, treaties, conventions and nuclear security regimes are expected.

### 3.6. Nuclear Forensics

The spread of nuclear technology has also posed serious security challenges. To meet these challenges, several functions, principles and frameworks have been introduced. Nuclear

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Forensics is one of the more advanced approaches to handling these challenges. To counter criminal use of nuclear material, smuggling, illicit trafficking or tracking the proliferated nuclear material, nuclear forensics study has become a useful instrument. It was first adopted by the Nuclear Smuggling International Technical Working Group (ITWG). According to IAEA’s definition:

Nuclear forensics and attribution are used to assign responsibility for the intended or actual use of nuclear or radioactive material and devices in criminal acts or acts that threaten national and international security. Nuclear forensics include the collection of isotopic, chemical and physical evidence for determining the source of material used in criminal or unauthorized acts involving nuclear and other radioactive material, including those individuals involved in the unauthorized diversion of such material.

Nuclear forensics study is a new development and it has become a significant tool in controlling illicit trafficking of nuclear material. “IAEA has developed in cooperation with the International Technical Working Group on Nuclear Smuggling (ITWG) a common framework to pursue nuclear forensic investigations and best scientific approaches to the collection and interpretation of nuclear forensic evidence.” There are different procedures and steps to ensure the effectiveness of nuclear forensics examination. The IAEA has further recommended...

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95 International Atomic Energy Agency (IAEA), "Nuclear Forensics Support," IAEA Nuclear Security Series, No. 2, Technical Guide Reference Manual, STI/PUB/1241, Vienna, 2006, p.1. The Nuclear Smuggling International Technical Working Group (ITWG) was created in 1996, with the aim of combating the illicit trafficking of nuclear material and radioactive substances, under the auspices of the G-8 Non-Proliferation Experts Group (NPEG). The primary purpose of the ITWG is to provide technical cooperation and collaboration in the development of nuclear forensics. The members of the ITWG come from a broad range of backgrounds covering law enforcement, safeguards, customs agencies and the scientific community, including most of the laboratories that have the requisite equipment, personnel and experience to perform nuclear forensic analysis. Representatives from more than 28 States and organizations have participated in nine international meetings and round robin analytical exercises to date.


97 Ibid., p.94.
that a qualified individuals’ Forensic Evidence Management Team (FEMT) should be prepared, and that will assist in evidence collection from the targeted area and, furthermore, they will have the assignment to trace the evidence.98

3.7. Nuclear Weapons’ Safety and Security Guiding Principles

To counter any kind of threat in nuclear management or nuclear security, the global community is seriously addressing all the aspects which should be improved or mitigated. The human factor is very important while dealing with nuclear safety and security. With the passage of time, it has received better attention. There are various levels in nuclear safety and security. According to Justin Alger, there is also a need to understand that in the nuclear field, “there is considerable crossover between peaceful and military disciplines of scientific study in the nuclear field.”99 People involved in these disciplines are considered to be very important. There are specific mechanisms to check the reliability and trustworthiness of these persons.

3.7.1. Personnel Reliability Programme (PRP)

Personal reliability programmes also play a key role in nuclear security regimes. Nuclear weapons and material management are very sensitive. Ryan Crow has stated that, “Personnel reliability programmes (PRPs) are designed to prevent the theft, unauthorized or accidental use of nuclear weapons by assessing the loyalty, trustworthiness, and mental stability of personnel with access to nuclear weapons or weapons-usable nuclear material.”100 Furthermore, Nathan E. Buschhas has elaborated that, “PRP is to ensure that only individuals who meet the highest suitability and reliability standards are assigned to nuclear duty

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98 Ibid., p.94.
Every state has different procedures to apply the PRP system. “Two person rule” is one of the best features in this regard. PRP is especially designed for those people who are directly involved in dealing with sensitive nuclear material and weapons. Nuclear engineers, scientists, researchers, technicians, maintenance workers, guards, operators and all those persons who have direct approach to nuclear facilities where weapons or nuclear material is stored; should be examined through PRP. PRP provides comprehensive details of a person. It consists of several types of questions which help understand the personnel’s background, identity, criminal history, character, religious association and reputation. Furthermore, medical and psychological assessments provide the mental health condition and stability in the personality.

3.7.2. Human Reliability Programme (HRP)

With the help of the integrated programme, nuclear security management tries its level best to judge its employees. HRP is also known as Personnel Security Programme (PSP) and Trustworthiness Assessments (TA). The basic principles of HRP or PSP or TA are to mitigate insider threats. According to Martin Hershkowitz:

A Human Reliability Program (HRP) is composed of regular medical examinations and evaluations, psychological evaluations, drug-use testing, alcohol-dependency testing, training in peer behavioural observations, national and local criminal record checks, financial stability investigation, and an integrated employee assistance programme.\(^\text{102}\)

HRP is the most credible and effective programme. According to the Department of Energy (DoE), USA, “the HRP is a security and safety reliability programme designed to


ensure that individuals who occupy positions affording access to certain materials, nuclear explosive devices, facilities, and programmes meet the highest standards of reliability and physical and mental suitability.”

People involved in nuclear security management should be highly trustworthy and reliable. HRP provides very good assessment tools to judge a person for nuclear security management. There is no specific blueprint for implementation of HRP, and every state confronts distinctive circumstances and requirements.

### 3.7.3. Design Basis Threat (DBT)

The design basis threat (DBT) has become a standard threat assessment system all over the world. “The Physical Protection of Nuclear Material and Nuclear Facilities INFCIRC/225/Rev. 4 (Corrected) describes the design basis threat (DBT) tool and recommends development of a notional DBT.” The First DBT was adopted by USA’s Nuclear Regulatory Commission in 1970s. A vital objective was to protect nuclear material and facilities against any malicious acts by adversaries. “The DBT developed analogous to a concept in reactor safety called the Design Basis Accident (DBA).”

The objective of DBT evolved with the passage of time. According to the IAEA, “a DBT is a comprehensive description of the motivation, intentions and capabilities of potential adversaries against which protection systems are designed and evaluated. Such definitions permit security planning on the basis of risk management.”

The purpose of DBT is to evaluate the safety and security challenges to nuclear facilities and material. “A DBT is a tool that provides a common basis

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106 Ibid. (The DBA is “a postulated accident that a nuclear facility must be designed and built to withstand without loss to the systems, structures, and components necessary to ensure public health and safety.”)

for planning for physical protection by the operator and approval of its physical protection plan by the competent authority for nuclear security.”

It is a fact that DBT has provided a comprehensive system which is most credible and reliable in its structure. DBT principles for nuclear weapons is unique. According to Scott Jones, DBT principles for nuclear weapons are highly advanced and reliable, and details about these principles are classified.

3.7.4. Design Basis Accidents (DBA)

The design basis accidents (DBA) is basically designed to control such incidents in nuclear industry that are accidently possible in the given nuclear facility. “DBA is a postulated accident that a nuclear facility must have designed and build a mechanism to withstand, without loss to the systems, structures, and components necessary to ensure public health and safety.”

DBA is usually applicable at nuclear facilities.

3.7.5. Permissive Action-Links (PALs) System

Permissive action links (PALs) system was built to protect nuclear weapons from accidental or unauthorized use. Originally, it was known as prohibited action links. PALs system is the most effective safety mechanism of modern nuclear weapons. This system was first developed by the United States in early 1960s. It was President John F. Kennedy’s initiative in 1962 by his signing the National Security Action Memorandum 160. The then U.S.

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108 Ibid., p.7.
109 In an Interview with Scott Jones, Executive Director, Center for International Trade and Security (CITS), on April 17, 2014.
Secretary of Defence, Robert Strange McNamara, ordered that “locks known as PALs be placed on all Minuteman nuclear weapons to prevent unauthorized use.” According to Bartholomew Elias, PALs are “microchip based cryptographic locks.” These locks are linked with electronic codes. These codes prevent nuclear weapons from unauthorized use. “PALs contain electronic locks, and closely held codes have to be used to unlock a weapon.” After McNamara’s order, “the Strategic Air Command (SAC) in Omaha had all of the codes set to 00000000.”

Initially, the code length was four to six digits which finally increased to 12 digits. To make it more secure and protected several steps were taken. “Devices started to have multiple codes, with separate ‘enable’ and ‘authorize’ commands and also the ability to change codes in the field (to recover from false alarms).” U.S. authorities were worried about their nuclear weapons on foreign soil. According to Grant Elliott, “the first motivation for installing PAL locks on missiles was to prevent the weapons’ use not by an adversary, but by an ally.” The location of PALs in weapons is also believed to be safe and secure. “PALs are known to be buried deep within weapons, to prevent easy bypassing, and are covered by a tamper-resistant skin. In the event that this skin is pierced in an attempt to tamper with the detonation electronics, the PAL may disable or destroy the weapon.”

1962 JFK signed the National Security Action Memorandum 160, which was supposed to ensure that every nuclear weapon the US had be fitted with a Permissive Action Link (PAL).


119 Ibid.


121 Ibid., p.7.
There are different categories of PALs system. Scientific evolution in PALs has made them more reliable and safe system. Early PALs system consisted of a handling device. A complete list of unclassified PALs categories is as follow:

i. CAT-A: The first electro-mechanical PALs used four digit codes entered by a handheld device and there were unlimited attempts allowed.

ii. CAT-B and CAT-C: In these PALs, longer codes were installed (up to six digits) and allowed attempts were limited.

iii. CAT-D and CAT-F: D and F PALs permit the use of multiple arming codes, so that different subsets of weapons may be armed using different codes. Most interestingly, CAT-D and CAT-F PALs are also capable of violently disabling the warhead, in addition to simply locking down. This feature may also be controlled remotely.

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123 Ibid.
The U.S. has always been a trendsetter in nuclear weapons’ management. To control a nuclear weapon, the U.S. uses three sets of codes:124

i. The Go-code (earlier known as the Emergency Action Message): Used for authorizing weapon launch.

ii. PAL: Unlocks the weapons and most of the PALs work through separating the nuclear core from the firing system, physically or electromagnetically.

iii. PES (Permissive Enable System): unlocks the missiles. They were first time introduced in 1975-85.

The USA has been a trendsetter and has taken the lead in introducing nuclear safety and security concept, nuclear vocabulary and nuclear diplomacy. The USA has provided PALs technology to almost every nuclear weapon state. “Most modern U.S. PAL systems include a multiple-code coded switch (MCCS) component.”125 The Code Activated Processor (CAP) is the next generation PALs system which has been developed as a replacement for the MCCS.126 CAP performs the following operations:

i. Maintenance lock.

ii. Recovery of recode status information.

iii. Storage and recovery of weapon state of health data.

iv. Encrypted recode - the ability to recode using encrypted data, thus lessening concerns about bugging and emanation.127

Nuclear experts believe that many significant developments have occurred in nuclear technology. There is a reason to believe that with the passage of time, nuclear weapons’ safety mechanisms would also be improved. The current PALs system is an advanced and secure system.

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127Ibid.
3.7.6. Prescribed Action Protective System (PAPS)

Prescribed Action Protective System (PAPS) is an extra layer of protection. PALs system is developed only for large and complex nuclear weapons because they are sufficient when they are buried in the core of weapon. “In the case of weapons such as atomic demolition munitions, which are not complex enough for the PAL to be made inaccessible in the core of the device, the weapon is also stored in tamper-sensing containers called PAPS.”¹²⁸ PAPS prevent weapons from unauthorized access or theft. In such tactical nuclear weapons which PALs system does not support, similar tamper-sensing containers called Prescribed Action Protective Systems (PAPS) can be used.¹²⁹

3.7.7. Destructive Action Links (DALs)

To stop any accidental or unauthorized use of nuclear weapons, post-launch controls destructive action links (DALs) have been introduced to nuclear weapons. “They have also been called “destruct after launch” or “command-destruct” systems.”¹³⁰ This system has become an effective part of all types of nuclear weapons. Characteristics of DALs provide safe mechanism to NWSs. According to Sherman Frankel, “a system for remote negation of an unauthorized launch would comprise hardware and procedures to a) detect unauthorized launches, b) relay the information to an appropriate control centre, c) make the decision to abort, d) relay the appropriate destruct signals to the errant missile, and e) provide real-time information of the event to relevant countries.”¹³¹

¹³⁰ Frankel, “Aborting Unauthorized Launches of Nuclear-armed Ballistic Missiles through Post-launch Destruction,” p.3.
¹³¹ Ibid.
3.8. Technical Tools of Providing Nuclear Warhead Safety and Security

Safety characteristics of individual nuclear weapons are different. These characteristics vary from weapon to weapon because of NWs model, size, shape and composition, nature of weapon and deployment location. Modern nuclear weapons are designed with several unique safety features which provide a credible assurance that an accident or other abnormal environment\(^{132}\) will not make a nuclear detonation.\(^{133}\)

Nuclear weapons security refers to the range of active and passive measures employed to protect a weapon from access by unauthorized personnel and prevent loss or damage. These measures include department nuclear security policy; security forces; equipment; technology; tactics, techniques, and procedures (TTPs); and personnel security standards. Ensuring security is vital throughout the entire life-cycle of a weapon.\(^{134}\)

On July 26, 1991, during a report to USA congress, R. E. Kidder, discussed a few main principles of providing nuclear warhead safety.\(^{135}\) The principle means of providing for nuclear warhead safety are the use of:

1. Enhanced Electrical Isolation (EEI).\(^{136}\)
2. Insensitive High Explosive (IHE).\(^{137}\)

\(^{132}\)Normal environments are the expected logistical and operational environments, as defined in a weapon’s military characteristics (MCs) and stockpile-to-target sequence (STS) documents, in which the weapon is expected to survive without degradation in operational reliability. Normal environments include a spectrum of conditions that the weapon could be subjected to in expected peacetime logistical situations and in wartime employment conditions up to the moment of detonation. For example, a normal environment may include conditions such as a temperature range of -180 to +155 degrees Fahrenheit, a force of 10G set-back upon missile launch, or shock from an impact of a container being dropped from a height of up to two inches.

\(^{136}\)EEI: Reduces the chance of the warhead’s detonators being fired electrically in an accident to less than one in a million. It was first introduced in the B61-5 tactical bomb in 1977. [This safety feature is referred to in the Drell Panel Report and elsewhere as Enhanced Nuclear Detonation Safety (ENDS).]
\(^{137}\)IHE: A high explosive that is much less sensitive to being detonated by fire or impact than is the HE used in all nuclear warheads that entered the stockpile prior to 1978.
3. Fire-Resistant Pit (FRP).  
4. Mechanical Safing (MS). 
5. Separable Components (SC). 
6. One-Point Safe Design (OPSD). 
7. Environmental Detection Sensors (EDS) also known as Environmental Sensing Device (ESD). 
8. The Enhanced Nuclear Detonation Safety (ENDS). 
9. Active Protection System (APS). 
10. Limited Life Components (LLCs). 
12. Coded Control Device (CCD). 

**FRP:** The pit of a nuclear weapon is the part of the primary, or first stage of the weapon that contains the plutonium. If the plutonium is encased within a ductile, high-melting-point metal shell that can withstand prolonged exposure to a jet fuel fire (1000 °C without melting or being eaten through by the corrosive action of molten plutonium, it then qualifies as an FRP. Although the plutonium itself may melt, it will remain contained within the encasing shell and not be dispersed into the environment.

**MS:** Can virtually eliminate the possibility that any significant nuclear yield will result from an accident in which the warhead’s high explosive is detonated. (A nuclear yield is defined as significant if it exceeds that equivalent to exploding four pounds of HE.) Mechanical safing has been used successfully for more than 20 years.

**SC:** A means of achieving many-point safety by physically separating the plutonium in the warhead from the HE by a sufficient distance and/or barrier before arming the weapon. Accidental detonation of the HE could not then result in either plutonium dispersal or nuclear yield. (No warhead in stockpile utilizes this concept.)

**OPSD:** Insures no significant nuclear yield will result if the warhead’s HE is detonated at anyone point.

**EDS:** The most sophisticated of the early safety and control systems, environmental detection sensors (EDSs) demanded that the weapon undergo the expected sequence of physical motions before the warhead is completed armed. Environmental sensing is highly effective in preventing accidental detonation, but only if not accompanied by an accidental launch or release.

**ENDS:** Initiative outlines a set of principles for ensuring predictable nuclear safety in abnormal environments. In accordance with ENDS, the detonation systems of a nuclear warhead must be isolated from other components by an energy barrier.


**LLCs:** LLCs are similar to the components of an automobile that must be replaced at periodic intervals, such as oil filters, brake pads, and tires. These components are replaced during scheduled LLC exchanges (LLCEs), which are analogous to scheduled maintenance on a car. LLCs in any given warhead-type may include power sources, neutron generators, tritium reservoirs, and gas-transfer systems. These components must be replaced before their deterioration adversely affects warhead function and personnel safety.

**CDS:** CDS allows for manual activation of the non-violent disablement of essential weapons components, which renders the warhead inoperable. The CDS may be internal or external to the weapon and requires human initiation. The CDS is not installed on all weapon systems.

**CCD:** A coded control device (CCD) is a use control component that may be a part of the overall weapons system coded control. The externally transmitted authorization code is received via nuclear control order or emergency action message (EAM).

**SAFF:** Another safety and security mechanism is the SAFF system was found on intact nuclear weapons. SAFF procedures require these weapons to undergo a specific set of environmental effects such as change in altitude and acceleration before the weapons can be detonated. Charles D. Ferguson, “WMD Terrorism,” Nathan E. Busch, Daniel Joyner (ed.), Combating Weapons of Mass Destruction: The Future of International Nonproliferation Policy, Athens: University of Georgia Press, Jan 1, 2009, p.35.
Modern nuclear weapons in the 21st century have the most advanced safety systems, and it is not very easy to break or misuse these safety mechanisms. Due to security reasons, these safety mechanisms are classified. But, it is obvious that modern nuclear weapons have highly advanced safety and security measures in comparison to the pre-1990 nuclear weapons.

To control a nuclear weapon, the U.S. uses three sets of codes:149

i. The Go-code (earlier known as the Emergency Action Message): Used for authorizing weapon launch.

ii. PAL: Unlocks the weapons and most of the PALs work through separating the nuclear core from the firing system, physically or electromagnetically.

iii. PES (Permissive Enable System): unlocks the missiles. They were first time introduced during 1975-85.

Figure: 3.5. Codes to Control a Weapon

Three Sets of Codes to Control a Weapon

Through comprehensively analyzing all the safety and security aspects of nuclear weapons, it is evident that nuclear weapons are not common weapons. They possess various safety and security mechanisms which provide them maximum security against any kind of danger. There should be recognised that nuclear weapons of modern age are highly secured

and under tight control. On the basis of the above stated arguments and references, a figure has been formulated to understand nuclear weapon safety and security mechanisms in all aspects:

3.9. Nuclear Weapons

3.9.1. Categories of Nuclear Weapons

There are generally two categories of nuclear weapons. The first is strategic “theatre” nuclear weapons, and the second is tactical nuclear weapons.\(^{150}\)

3.9.1.1. Strategic Nuclear Force:

Strategic nuclear weapons are known to be land-based intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs) and strategic bombers.\(^{151}\)

3.9.1.2. Tactical Nuclear Force:

Tactical nuclear force can be positioned on land as well as at sea. They are also known as non-strategic force which are specially planned to be used on a battlefield. The land-based forces contain weapons such as ground mobile rockets and missiles, and air-launched bombs and missiles.\(^ {152}\)

3.9.2. Types of Nuclear Weapons

On the basis of their chemical reaction, mechanical disposition, designing and fissile material, nuclear weapons can be divided into three major types. According to Arjun Makhijani and Scott Saleska, there are three kinds of nuclear weapons which have been tested by different states:\(^ {153}\)

i. Pure fission weapons of either the implosion type or gun type.

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\(^{151}\) Ibid., pp.14-15.

\(^{152}\) Ibid., p.15.

ii. Boosted fusion weapons in which tritium-deuterium fusion reactions increase the quantity of neutrons available for a fission reaction.

iii. Thermonuclear weapons, in which a primary fission reaction triggers a secondary thermonuclear reaction.

On the basis of their explosive characteristics, Frank Barnaby has categorized nuclear weapons into three generations:

i. First generation nuclear weapons are ordinary weapons known as Fission Weapons;

ii. The second generation nuclear weapons are Thermonuclear Weapons;
   In the first and second generation nuclear weapons, energy is produced in the shape of explosion, heat and radiation in all directions.

iii. Third generation nuclear weapons do not release energy in all directions, but are designed to release energy in such a way that the explosion is focused in one direction; these weapons are also known as directed-energy weapons. Released energy by an explosion is converted into X-rays, visible light, microwaves or changed particles. The main feature of these weapons is their potential use in anti-ballistic missile systems.\textsuperscript{154}

The evolution of nuclear weapons has made them increasingly sophisticated, highly developed, technically safe and secure. The size and shape of weapons, high yield or low yield, delivery system and fissile material categorize nuclear weapons into different types:

\textsuperscript{154} Frank Barnaby, \textit{The Role and Control of Weapons in the 1990s}, London: Routledge, 2012, pp.148-149.
The figure shows how nuclear weapons’ size, shape and system has evolved since 1945. There are many stories of nuclear weapons which are still classified. The only reason they cannot be accessed or published is the security issue. To keep sensitive information of nuclear weapons classified, tight security parameters have been developed. Academic research, public statements, government spokes-persons and the media are the only sources to acquire knowledge about nuclear weapons and their security aspects. The following figure illustrates how the USA was managing its stockpile during the Cold War era. In general terms, we can say that the following is the life cycle of a nuclear weapon:


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Even in the life cycle of a nuclear weapon, there are various technological procedures are involved to handle the bomb. The last stage of the life cycle of nuclear weapon is “dispose.”
The figure has been drawn after evaluating various nuclear safety and security parameters mostly used by USA. The purpose of this figure to critically analyse the basic mechanism of nuclear weapon safety and security. Here, Enhanced Electrical Isolation (EEI), Insensitive High Explosive (IHE), Fire-Resistant Pit (FRP), Mechanical Safing (MS), Separable Components (SC), One-Point Safe Design (OPSD), Environmental Detection Sensors (EDS) also known as Environmental Sensing Device (ESD), The Enhanced Nuclear Detonation Safety (ENDS), Active Protection System (APS), Limited Life Components (LLCs), Command Disablement System (CDS), Coded Control Device (CCD), Classifies Measures (CM).
All this information illustrates that nuclear weapons and their related technology is very complex. There are many things which are still classified, but there is reason to believe that nuclear safety and security is a highly advanced and sophisticated subject. The evolving characteristics of nuclear safety and security make nuclear weapons more and more safe and secure. Both technical and political dimensions have made this technology almost invulnerable.

The above figure 3.8 illustrates that nuclear weapons’ safety and security principles are highly advanced and complicated. The nuclear security culture is dominated by principles which cover all other measures. Nuclear weapon safety and security guiding principles have been divided into three major measures:

i. Safety measures.

ii. Organizational measures.

iii. Operational measures.

These measures further include various steps which provide maximum safety and security to nuclear weapons. Nuclear safety measures include different kinds of safety features which provide safety in all aspects. Organizational measures are a combination of different kinds of professional features which enhance the credibility of organization that controls nuclear weapons. Operational measures include the coding-decoding systems which are essential factors in launching nuclear weapons or deactivating them. There are several procedural steps in applying these measures. Additionally, nuclear safety culture and security culture plays a significant role in nuclear weapons’ safety and security.
PART-B

CHALLENGES TO NUCLEAR WEAPON STATES

The splitting of the atom has changed everything except the way we think. Thus we drift toward unparalleled catastrophe. We shall require a substantially new manner of thinking if mankind is to survive.

Albert Einstein

National security has always remained a concern of any state. In the contemporary global environment, every state is facing various kinds of socio-political challenges and issues to its national security. No state has a perfect society or an absolute security system. In this anarchic world system, every state maximizes its security to safeguard its national interests. Hans J. Morgenthau and John J. Mearsheimer have categorically elaborated that states’ behave in terms of maximising power. As it reflects from Morgenthau’s principle, “interest is defined in terms of power.” Power enhances a state’s self-confidence and provides moral support. According to Mearsheimer, “great powers maximize their relative powers.” National interest and struggle for power remain a vital objective in human-mind. Security challenges are constant and they prolong with the passage of time. States modernize their defence and fighting capabilities. Development in military fighting techniques and technology reveal the importance of national security for a state.

Today, the world is confronted with both traditional and non-traditional security challenges. These security challenges are rapidly increasing with the passage of time. Although, the nature and level of challenges and social vulnerabilities may vary from state to

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state, no state can ignore this bitter reality. In ancient times, states were primarily concerned about traditional security threats, but, with the passage of time, non-traditional security challenges have emerged and become increasingly dangerous for the contemporary world. Non-traditional security challenges mostly arise due to bad governance, injustice, negligence and many other causes such as domestic factors. Peter Hough has discussed such factors in his book, *Understanding Global Security*. They mainly include terrorism, health issues, energy crisis, social violence, environmental threats, poverty, ethnic problems, unemployment and non-state actors, etc. Terrorism has emerged is one of the serious threat to the contemporary world. To mitigate all these challenges, states have introduced various laws and regulations.

Prevalent socio-political vulnerabilities evolved over the years have further added to the threats of all nuclear-weapon states. Pakistan’s domestic, regional and global challenges are also likewise. Nuclear security has become a global challenge. Although, nuclear weapons provide a stable deterrence, nuclear security itself has become very critical to its possessors. Extra security measures are required to keep nuclear assets safe and secure. Are these nuclear-weapon states (the USA, Russia, China, France, UK, Pakistan, India, North Korea and non-declared state Israel) prepared to face any critical situation? What are the current challenges to these nuclear-weapon states? How can these challenges affect their nuclear weapons’ security? Growing nuclear capabilities of nuclear-weapon states have raised several questions. Threats from non-state actors or terrorists have also increased during the last two decades, and natural disasters have also alarmed the global community. All nuclear-weapon states have an equal responsibility to address such issues. As described earlier, there are eight declared and one non-declared nuclear weapon states. According to SIPRI year book 2017, there are approximately

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14,935 nuclear warheads worldwide. As per SIPRI, the estimates presented here on nuclear forces are based on public information and contain some uncertainties. Current nuclear weapon capabilities of these states are as follows:

Table:3.1.B World Nuclear Force 2017 (All Estimates are Approximate)

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of First Nuclear Test</th>
<th>Deployed Warhead</th>
<th>Stored Warheads</th>
<th>Other Warhead</th>
<th>Total Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>1945</td>
<td>1800</td>
<td>2200</td>
<td>2800</td>
<td>6800</td>
</tr>
<tr>
<td>Russia</td>
<td>1949</td>
<td>1950</td>
<td>2350</td>
<td>2700</td>
<td>7000</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1952</td>
<td>120</td>
<td>95</td>
<td>---</td>
<td>215</td>
</tr>
<tr>
<td>France</td>
<td>1960</td>
<td>280</td>
<td>10</td>
<td>10</td>
<td>300</td>
</tr>
<tr>
<td>China</td>
<td>1964</td>
<td>---</td>
<td>270</td>
<td>---</td>
<td>270</td>
</tr>
<tr>
<td>India</td>
<td>1974</td>
<td>---</td>
<td>120-130</td>
<td>---</td>
<td>120-130</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1998</td>
<td>---</td>
<td>130-140</td>
<td>---</td>
<td>130-140</td>
</tr>
<tr>
<td>Israel</td>
<td>---</td>
<td>---</td>
<td>80</td>
<td>---</td>
<td>80</td>
</tr>
<tr>
<td>North Korea</td>
<td>2006</td>
<td>---</td>
<td>--</td>
<td>(10-20)</td>
<td>(10-20)</td>
</tr>
<tr>
<td>Total</td>
<td>4150</td>
<td>5275</td>
<td>5510</td>
<td>---</td>
<td>14935</td>
</tr>
</tbody>
</table>


Although, the growth of nuclear weapons has been very slow in recent years, nuclear facilities and material for civilian purposes are rapidly increasing. Most importantly, nuclear-weapon states are now extensively engaged in modernizing their nuclear weapon technologies. Now, their focus is shifting to enhancing the quality of nuclear weapons rather than their quantity. The quantity of weapon-grade fissile material is abundantly available in different
It is believed that all nuclear-weapon states have enough weapon-grade fissile material in their storage facilities. According to Global Fissile Material Report 2013, “the current global inventory of highly enriched uranium is estimated to be about 1380 ± 125 tons. About 98% of this material is held by the nuclear-weapon states, and most of it belongs to Russia and the United States.” The exact quantity of weapon-grade fissile material is unknown. In the absence of any legal framework to check the quantity of fissile material, there is no precise accountability. States do not share the details of fissile material or weapons. The other material is weapon-grade plutonium (Pu-239). “The global stockpile of separated plutonium is estimated as 495 ± 10 tons as of 2012 and Russia and the United States have the largest stockpiles of plutonium produced for weapons.” Other nuclear-weapon states have very limited stockpiles of nuclear weapons and fissile material.

The issue of nuclear security gathered more attention after the incident of 9/11 in the United States, which has the longest history of dealing with the nuclear weapons technology and its security over fissile materials is also rigorous. According to James Doyle, evidence also shows that periodic deficiencies may exist at some facilities in the U.S. weapons complex.

One of the recent cases are the intrusion of an 82 year old nun with her two colleagues in 2012 at the Y-12 nuclear weapons production facility, usually known as the Fort Knox of HEU in Oak Ridge, Tennessee. In another case on August 30, 2007, six nuclear-armed cruise missiles were erroneously placed under the wings of a B-52 that flew from Minot Air Force Base in North Dakota to Barksdale, Louisiana without protocol and were missing for the next

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335 It also includes some states which have nuclear programme for civil purposes.
337 Ibid., p.18.
India, who has been rapidly growing its civil nuclear industry, is also facing a similar scenario. According A.K. Trikha, India has a creditable history in confronting the domestic challenges to its security. Another nuclear giant, Russia, also faces a similar situation. According to Gennady Kovalenko, terrorism has become one of the serious threats to the national security of the Russian Federation. The situation in Israel is also not different. Territorial disputes, hostile relations with neighbouring states, domestic challenges and terrorism have been the major threats to Israel’s national security for the last forty years. All nuclear weapon states have similar kinds of issues. According to James Doyle:

In sum, perfect security for nuclear weapons and fissile materials cannot be achieved by any country. Every nation faces challenges to applying the mellowest potential measures of security for these items (nuclear weapons). Russia and Pakistan face particularly difficult fissile material security issues, but all states have weaknesses in their security systems. Given the potential outcomes of loss of nuclear weapons or fissile material to terrorists, it is extremely important that such weaknesses be addressed quickly and fully.

Expansion of nuclear technology has raised very serious concerns, and the fears that terrorists or non-state actors can launch an attack on nuclear power installations, and especially, after the 9/11 incident, the perception of the potential terrorist threat to nuclear installations has enhanced significantly. Nuclear security is certainly a common challenge for all nuclear states. Nuclear security summits have been conducted to highlight such threats at the global

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level. The global community has developed a consensus that non-state actors and terrorists are actively trying to obtain fissile material or nuclear device to launch a massive attack for the accomplishment of their political objectives. Nuclear terrorism has been considered a reality and it is not only a threat to a specific state or region. The apprehension must be equally dealt by all nuclear weapon states by securing their nuclear weapons with responsibility. And so far, all nuclear weapon states are presumably taking sufficient measures to avoid any eventuality of nuclear terrorism in accordance with their capacity. This has necessitated the evolution of nuclear security culture. Safety and security measures have been improved from time to time.

Similarly, the peaceful uses of nuclear technology are also widely appreciated by the power deficient states. According to the IAEA database on Nuclear Power Reactors, currently, there are 438 nuclear power reactors in operation worldwide with gross capacity of 379261 megawatts (MWe). Furthermore, there are 67 nuclear power reactors that are under construction. There are about 45 states worldwide which are considering to embark upon nuclear power programmes.

Nuclear-weapon states are continuously engaged in enhancing their national security parameters, and nuclear-weapons provide them with, “absolute security”. On the other hand, all these nuclear-weapon states are confronting various kinds of domestic challenges. Terrorists or non-state actors are the most common challenge for all of them. War on terrorism has transformed the world politics in many ways. The September 11, 2001, terrorist incidents in

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347 Ibid.
349 Ibid.
the USA have drastically changed global politics. “It has been widely described as constituting a ‘focusing event’ for American and world politics that has ‘changed everything,’ at least in the United States.”351 Because of terrorism, the global economy has also suffered.

What are the non-traditional security challenges to all nuclear-weapon states? An effort has been made to elaborate the following questions:

i. What serious security implications do these challenges pose for nuclear-weapon states?
ii. What is the correlation between nuclear security and social vulnerabilities?
iii. How can these socio-political and security challenges pose threat to nuclear weapons’ security?

It would be difficult to estimate nuclear weapon states’ capabilities and their potentials to mitigate all challenges. Socio-political vulnerabilities are intangible. It does not matter how strong an economy or military a state possesses. These challenges exist everywhere. Even strong security measures are not enough to address all challenges. States frequently revise their national security parameters and update their security arrangements as per needs and demands. This chapter discusses in detail the challenges to all nuclear-weapon states:

United States of America

The USA has the most advanced nuclear security mechanisms as well as a strong nuclear security culture. It has the highest number of nuclear facilities/ power reactors and the second largest number of nuclear weapons after Russia. Apart from its extraordinary achievements in nuclear weapon technology and nuclear diplomacy, the USA has experienced various challenges to its nuclear weapon complex such as (i) “the intrusion by an 82-year-old

nun and two other protesters at the Y-12 nuclear-weapons sites in Tennessee in 2012.\textsuperscript{352}; (ii) in another case on August 30, 2007, six nuclear armed cruise missiles were mistakenly placed under the wings of a B-52 that flew from Minot Air Force Base in North Dakota to Barksdale, Louisiana, without protocol and they went missing for the next 36 hours\textsuperscript{353}; (iii) the cheating scandal of a U.S. Air Force Officer at Malmstrom Air Force Base in Montana in 2014.\textsuperscript{354} There are several other cases of misconduct by senior military officials, who have been directly involved in nuclear missiles and weapons control in the past.\textsuperscript{355}

The USA has made extraordinary achievements in every sector of socio-political development. However, it is confronting many domestic challenges as well. Terrorism is one of the most serious challenges to USA’s national security. USA’s policy-makers consider terrorism as one of the leading threats to its economy and foreign interests. In response to Global War on Terror (GWoT), USA’s allocated budget for home defense is higher than any other state in the world.\textsuperscript{356} According to Congressional Research Service (CRS) report, since September 11, 2001, terrorist attacks FY2001 to FY2014, USA government has provided $1.6 trillion to the State Department, Department of Defence, and the Department of Veterans Administration for various operations.\textsuperscript{357} Despite all these facts, this war has had no fruitful results. While analysing the Global War on Terror, Nicolas J S Davies has summarized it in a single sentence that after America’s twelve years in its “war on terror,” it should be admitted

that it has failed terribly, promoting ferocity, war and insecurity in an “arc of terror” extending from West Africa to the Himalayas and beyond.\(^{358}\) This War on Terror has raised many questions on the credibility of USA’s foreign policy. Many challenges emerged because of this war and still its future is not clear. In addition, home-grown terrorism is one of the major challenges to USA’s security, and these terrorist groups will pose a serious and frequent threat to its security as the tragic incident in Boston in April 2013.\(^{359}\) Furthermore, the USA spends $60 billion annually on homeland security to counter any kind of terrorism on its territory.\(^{360}\) Other than terrorism, the USA is confronting many other major issues as well, such as unemployment and various social issues.

**France**

France conducted its nuclear weapon test in 1960\(^{361}\) and, according to the SIPRI Fact Sheet 2017, it is the third major nuclear-weapon power. “France’s nuclear weapons Research & Development is supervised by the Ministry of Defence, which delegates the direction of these programmes to the French Atomic Energy Commission or CEA.”\(^{362}\) The French civil nuclear programme is very large. “France has 58 nuclear reactors operated by Electricité de France (EdF), with total capacity of over 63 GWe, supplying 421 billion KWH per year of electricity (net), 78% of the total generated there in 2011.”\(^{363}\) There is no specific data available on French safety and security issues. However, the French nuclear industry has never


experienced a major safety issue. France signed a nuclear treaty with the United Kingdom on November 2, 2010, for cooperation between the two states “on the safety and security of nuclear weapons, stockpile certification and countering nuclear and radiological terrorism.”

France’s nuclear weapons’ programme acquired sufficient assistance for its nuclear weapons’ safety and security. Declassified documents from the U.S. National Archives have revealed that the USA cooperated with France in its nuclear-weapons programme. According to Matthew Harries:

The United States assisted the French nuclear-weapons programme from the early 1970s, by authorizing U.S. officials to advice on missiles (eventually including re-entry vehicle and missile hardening, and multiple independently targetable re-entry vehicle (MIRV) technology), safety of nuclear weapons, and high-speed computing.

On September 16, 2013, France and the United States signed an agreement at Vienna, Austria, for the exchange of technical information and cooperation in nuclear safety matters. France, which has a huge civil nuclear industry, can possibly face issues with nuclear waste management. According to Greenpeace International, very few states such as France, Russia and the UK conduct reprocessing on a commercial scale and, therefore, “dangerous nuclear waste and separated plutonium are repeatedly transported across oceans and borders and through towns and cities.”

Nuclear waste poses a serious threat, and can create problems if not controlled timely. As for proliferation, France has been accused of supplying nuclear weapon technology to Israel. It has been widely known that France helped Israel in developing

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365 Ibid., p.10.
its nuclear weapons.\textsuperscript{368} There were several security reasons behind this French-Israel cooperation. “In the early 1950s Arab hostility towards France (chiefly because of the war in Algeria) and Israel drove the two nations into an unwritten military and nuclear alliance.”\textsuperscript{369}

**United Kingdom**

The United Kingdom had acquired nuclear weapon capability in 1952. British nuclear complex has confronted several security challenges. There are many reported incidents of security breaches at British nuclear power reactors.\textsuperscript{370} Safety and security issues of nuclear submarines carrying Trident nuclear missiles are also on record.\textsuperscript{371} In the Atlantic Ocean in 2009, the collision of the British HMS Vanguard and the France’s FNS Le Triomphant, both nuclear-powered, ballistic missile-carrying submarines (SSBNs) are the evidence of the fragility of nuclear activities.\textsuperscript{372} These incidents expose the weaknesses of the British nuclear command and control system.

Both UK and France are also confronting many domestic challenges. Terrorists are one of the leading threats to their national security. The bombing in London in 2005 was the deadliest terrorist activity in the UK in which 52 persons were killed and more than 700 were injured.\textsuperscript{373} There are several other terrorism incidents. The attacks on Paris on November 30,
2015, left 130 people killed and hundreds wounded.\(^{374}\) In an attack on the Charlie Hebdo offices in Paris on January 7, 2015, 12 people were killed and several injured.\(^{375}\) Sleeper cells are most probably present everywhere. Both the countries are also confronting some other socio-political issues such as racism, religious fanatics and hate speeches during various political campaigns. However, the UK and France have better security situations than other nuclear weapon states. A sudden change or any major incident like 9/11 may affect the domestic security situation.

**China**

According to SIPRI Fact Sheet 2017,\(^{376}\) China has approximately 270 nuclear weapons. It became a nuclear-weapon state in 1964. “In recent Nuclear Materials Security Index reports from the Nuclear Threat Initiative, China received relatively poor overall marks, largely because of its lack of nuclear transparency.”\(^{377}\) China has updated its nuclear security measures since September 11, 2001. It was primarily using traditional security measures, e.g., guns, gates and guards approaches. China’s nuclear weapons’ management system was not mature until 1990s. While elaborating the Chinese nuclear warhead management in early 1990s, Mark A. Stokes has stated that:

> Until the early 1990s, problems with warhead safety and reliability appeared to have continued. In a 1991 assessment, Second Artillery Equipment Department analysts lamented excess prioritization of missiles over nuclear warhead stockpile management. In addition to inadequate launch battalion training on live warheads, few engineers from the Second Artillery unit tasked with stockpile reliability had hands-on experience in inspecting warheads. Increasing the risk was the lack of follow-on


technical support from China’s civilian nuclear industry after delivery of new warheads to the Second Artillery. The analysts recommended a major programme to improve China’s nuclear stockpile management, especially as a new generation of warheads would be entering the operational inventory.  

Furthermore, Phillip C. Saunders and Jing-dong Yuan have pointed out that “China’s strategic forces have a variety of other weaknesses, including deficiencies in early warning systems, limited C3I, poor mobility and dispersal capabilities, and vulnerability to future antimissile defences.” China’s decision-making elites took serious measures to address these challenges. China upgraded its security measures in response to increasing nuclear security threats. “China continues to modernize its nuclear arsenal, not so much in quantitative terms, but focusing more on the survivability and effectiveness of a credible second-strike capability.” According to David Albright et. al., “China appears self-sufficient in maintaining and improving its nuclear arsenal, but suspicions remain that it seeks classified know-how and advanced equipment from other nations to improve its nuclear forces.” China’s nuclear command and control system is primarily under the control of the military. According to Mark A. Stokes, “the Chinese Communist Party’s Central Military Commission (CMC) maintains strict control over China’s operational nuclear warheads through a centralized storage and handling system managed by the People’s Liberation Army (PLA) Second Artillery.” The Cultural Revolution in China shaped the advanced mechanisms for nuclear weapons storage and handling system. “A key event in nuclear warhead security was

381 Albright, Brannan, and Stricker, “Detecting and Disrupting Illicit Nuclear Trade after A.Q. Khan,” p.87.
the “223 Incident,” an uprising in February 1967 in Qinghai Province, the centre of nuclear
weapon R&D and location of initial storage facilities.\textsuperscript{383}

Nuclear weapons’ safety, security and reliability have become very sensitive issues in
China’s national politics. For that matter, “the specific regimental-sized organization under the
22 Base’s authority that is responsible for warhead reliability and safety is the 96411 Unit, also
known as the “Equipment Inspection Institute.”\textsuperscript{384} Furthermore, to counter any kind of nuclear
accident, China has introduced various safety and security principles. China has applied Design
Basis Threat principles at its nuclear civil and military nuclear facilities. According to Hui
Zhang and Tuosheng Zhang, prior to September 11 attacks in the USA, China’s nuclear
facilities were generally planned to survive natural calamities and accidents. Since 9/11 attacks,
China has implemented the notion of shielding its nuclear facilities against a Design Basis
Threat (DBT) that might comprise both outsider and insider challengers.\textsuperscript{385}

Furthermore, China has also introduced U.S. S type PALs system in its nuclear
weapons. China’s nuclear transparency policy is also not very clear. According to the data of
International Panel on Fissile Materials, “China, like most other nuclear weapons states, has
kept secret information about its stocks of fissile materials and nuclear weapons.”\textsuperscript{386} Due to
some strategic reasons, China maintains this nuclear secrecy. China, therefore, values secrecy
over transparency, China believes transparency undermines its confidence in the survivability
of its nuclear arsenal.\textsuperscript{387} No current data is available about Chinese nuclear weapon security
systems.


\textsuperscript{384} Ibid., p.76.

\textsuperscript{385} Zhang and Zhang, “Securing China’s Nuclear Future,” pp.3-38.


\textsuperscript{387} Gregory Kulacki, “China’s Nuclear Arsenal: Status and Evolution,” Union of Concerned Scientists, 2011, p.3.
China is confronting many internal challenges which include corruption, poverty, health issues, environmental issues, injustice, terrorism and unemployment, etc. Social unrest is rising. Incidents of social unrest rose at an alarming rate, from 8,700 in 1993 to 87,000 in 2005 and 230,000 in 2009.\textsuperscript{388} According to national defence White Paper, “China still faces multiple and complicated security threats and challenges. The threats posed by ‘three forces,’ namely, terrorism, separatism, and extremism, are on the rise.”\textsuperscript{389} There are several factors which promote social violence at different levels. The other nuclear-weapon states have almost the same serious challenges from terrorist groups. Although the gravity of social vulnerabilities is not as bad as it is in developing states like Pakistan, India, North Korea and Israel, terrorist groups’ insurgencies have increased during the last decade.\textsuperscript{390}

Russia

Russia is also facing many severe internal and security challenges. Russia has the largest numbers of nuclear warheads. After the dismemberment of USSR, security of its nuclear warheads was a key challenge. Currently, Russia is confronting various socio-political challenges such as terrorist insurgencies, domestic violence, poverty, unemployment, corruption, separatist groups are the serious security challenges. Russia has observed the deadliest terrorist attacks during the last two decades. “According to the U.S. government’s Open Source Centre, there were 5,472 terrorist incidents in Russia over the past five years, averaging to about 2-3 per day, with a decline from 1,381 in 2009 to 741 in 2013.”\textsuperscript{391}

\textsuperscript{388} Christian Gobel and Lynette H. Ong, ”Social Unrest in China,” Europe China Research and Advice Network (ECRAN), 2012, p.22.
\textsuperscript{390} Since September 11, 2001.
North Korea

The North Korean nuclear-weapons programme has been considered as one of the most serious issue, which has negatively affected regional stability. On October 9, 2006, North Korea conducted its nuclear test without considering the repeated warnings from the United States, China, and other states.\textsuperscript{392} According to SIPRI Year Book 2013, North Korea has approximately six to eight nuclear weapons. The United States and neighbouring countries immediately condemned the test and convened a United Nations Security Council (UNSC) meeting to coordinate an international response.\textsuperscript{393} The policy and strategic consequences of a sustained North Korean nuclear-weapons programme are immensely troublesome, both to the future of regional security and the non-proliferation regime.

North Korea is the first country ever to leave the Non Proliferation Treaty (NPT), a move that has created a very negative precedent for other states that might contemplate such an action. One of the serious implications of the North Korean nuclear explosion is that it could trigger a domino effect in its region and beyond, significantly undermining the Nuclear Non-Proliferation Treaty (NPT) and opening the way to a more perilous situation in many parts of the world.\textsuperscript{394} North Korea is facing global, economic and commercial sanctions because of its nuclear ambitions. Strict policies have made it globally isolated. Socio-political issues have made its society vulnerable to many challenges. “North Korea continues to suffer from serious food shortages and periodic natural disasters. Most notably, periodic flooding has further

damaged or destroyed the limited food supplies available.\textsuperscript{395} Insufficient and less developed civil infrastructure is visible all over the country.

\textbf{Israel}  

Israel is known as a non-declared nuclear-weapon state. “Israel follows a policy of strategic ambiguity or nuclear opacity regarding its nuclear weapons programme, neither confirming nor denying its existence.”\textsuperscript{396} According to SIPRI Fact Sheet 2017, Israel has approximately 80 nuclear weapons. Israel’s nuclear weapons programme has always been controversial. “From 1959 to 1965, France provided sensitive nuclear assistance to Israel. This greatly enhanced Israel's ability to produce nuclear weapons. France constructed a large plutonium nuclear reactor and plutonium reprocessing facility at Dimona.”\textsuperscript{397} Israel is the only (non-declared) nuclear weapon country in the Middle East. There is no specific information about Israel’s nuclear weapons’ safety and security system. But, it has been assumed that Israel has Permissive Action Links (PALs) technology.\textsuperscript{398}

Israel is also confronting many domestic and regional challenges. Territorial disputes with Syria and the Palestinian question have a serious impact on Israel’s domestic situation. History of a conflictual relationship with neighbouring states has seriously impacted on Israel’s internal security. Terrorism, domestic violence and other social vulnerabilities are the major challenges to the Israeli entity. Challenges to Israel’s national security will remain till it resolves territorial disputes with the neighbouring states and agrees to an amicable settlement on the Palestinian question. According to Efraim Inbar, “despite its economic and military

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{395} William Boik, \textit{Understanding The North Korea Problem: Why It Has Become The “Land of Lousy Options"}, Carlisle, PA: Strategic Studies Institute, July 2011, p.16.
\item \textsuperscript{397} Matthew Kroenig, \textit{Exporting the Bomb: Technology Transfer and the Spread of Nuclear Weapons}, New York: Cornell University Press, Mar 11, 2010, p.158.
\end{itemize}
\end{footnotesize}
strength, Israel remains a small state with limited resources and diplomatic leverage to shape its environment.”399 Regional instability has very severe implications for Israel. Violence in neighbouring Arab states also has a serious impact on all over the region, and that may lead to social, ethnic and religious violence in all states including Israel.

**India**

India conducted its nuclear test on May 18, 1974.400 According to SIPRI Fact Sheet 2017, India has approximately 120-130 nuclear weapons. According to the International Panel on Fissile Materials’ report, India is still producing highly-enriched uranium for weapon purposes.401 It is continuously developing its nuclear forces and the civil nuclear deal with the U.S. has boosted its capabilities in this regard. Its cooperation with the U.S. is expected to facilitate the sharing of safety-related technology for its nuclear weapons.402 The rapid development in Indian nuclear infrastructure through nuclear deal with the USA has raised several safety and security issues. There is very little information available about Indian nuclear safety and security arrangements. “India’s Strategic Forces Command (SFC) and the civilian nuclear programme reportedly have an armament safety authority as well as human and personnel reliability programmes to guard against insider threats.”403

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401 The International Panel on Fissile Materials (IPFM), *“Global Fissile Material Report 2013: Increasing Transparency of Nuclear Warhead and Fissile Material Stocks as a Step toward Disarmament,”* Seventh annual report of the International Panel on Fissile Materials, October 2013, p.10. this report also includes Pakistan and North Korea in this category.


India’s widely spread programmes are however, not mature. “India’s extensive nuclear complex both in the civilian and military sectors already presents a target-rich environment.”^404 These facilities are vulnerable to terrorist attacks. There have been several nuclear-related incidents in the Indian nuclear complex. “There are huge nuclear security issues in India because it is prone to insurgent groups and separatist rebels.”^405 These concerns have become more serious in recent years. “According to a Daily Mail report, most of India’s top nuclear facilities are located in exceedingly Naxal terrorists’-struck districts of India or in the ‘Red Corridor’.”^406 “Bhabha Atomic Research Centre (BARC) security was reportedly breached 25 times in two years, both from land and sea.”^407 Other incidents include, “in July 1998, the Central Bureau of Investigation seized more than eight kilograms of natural uranium stolen from the Indira Gandhi Centre for Atomic Research (IGCAR) in Chennai.”^408 Overall, Indian nuclear safety and security issues are also increasing. In 2014 Nuclear Threat Initiative (NTI) Nuclear Materials Security Index, India has been ranked below its two nuclear-armed neighbours; Pakistan and China.”^409

India’s internal situation is also not satisfactory. Although, India claims that it is the largest democracy in the world, it has failed to provide equal justice and rights to minorities in the country. India is facing various socio-political issues, including terrorism, corruption,

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^406 Ibid., Some of the sensitive nuclear installations situated in this Red Corridor are: Uranium Corporation of India Limited, Talcher Heavy Water Plant, Institute of Physics, Ceramic Fuel Fabrication Facility, Nuclear Fuel Complex, Seha Institute of Nuclear Physic and Atomic Minerals Directorate. Around 90% of the Red Corridor areas are a No-Go-Zone for the Indian troops and Air Force. The Naxal rebels are in full control and there is no writ of the Indian government in these areas.


injustice, poverty, unemployment, energy and food crisis, health issues, growing disparity between rich and poor, and territorial disputes. Terrorism and corruption are the most serious challenges to the Indian government. There are many groups which are actively involved in various terrorist activities. It has been documented that “there are about 100 terrorist groups operating in the country and Indian government has already outlawed 36 terrorist organizations which have carried out operations and have a physical presence across the country.” The threat from terrorism and insurgency in India remains complex, with a number of attacks and plots by different militant groups all over the country in 2013. Terrorist insurgencies are growing and causing increasing damage to the state’s security structure. According to South Asia Terrorism Portal (SATP) reports, from 1994 to 2014, 64,995 persons have been killed by terrorists and separatists in India.

Overall, terrorism has become a global challenge. Global terrorism has alarmed the entire world community. All nuclear-weapon states acknowledge that terrorism is a serious challenge and it is destabilizing the domestic peace of the states. Socio-political development can come only in a peaceful environment. Prior to 9/11, states were confronting various internal and external challenges, but they had no dreadful implications. At least people’s lives were not in danger on massive scale from non-state actors. After 9/11 incidents global politics has changed entirely. Every state is witnessing various internal and external challenges. By now, terrorists have targeted almost everywhere. Even the most powerful states are confronting this challenge. According to a Daily Mail report, nuclear-weapon states: the USA, Russia, China,

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410 Animesh Roul, “100 More Terrorist Groups Banned in India: What are India’s Counterterrorism Priorities?” Terrorism Monitor, Volume VIII, Issue 22, June 5, 2010, pp.6-7. Roul has further mentioned that “India, one of the most terrorism-troubled countries in the world, is finally pursuing the idea of proscribing nearly 100 terrorist entities, both regional and international.”


413 Wayne Morrison, Criminology, Civilization and the New World Order, New York: Routledge, 2013, p.16.
India, and Pakistan are facing serious threats from terrorist groups. However, Pakistan, India and Russia are among the top ten terrorist-hit nations.414

The story of Pakistan’s nuclear weapons programme is not very long. The evolution of Pakistan’s nuclear programme is divided into two sections. The first section provides a comprehensive historical account of Pakistan’s nuclear programme. It further discusses the role of various political and decision making elites in the national nuclear programme. The second section deals with Pakistan’s post-1998 nuclear development.

- Pre-1998 era: The Evolution of Nuclear Weapon Programme.
- Post-1998 era: Institutional and Doctrinal Development.

4.1. Pre-1998 era: The Evolution of Nuclear Weapon Programme

Pakistan’s nuclear programme was for peaceful purposes. The prime objective was to pursue nuclear technology for civilian purposes. It had no intentions of making a nuclear bomb.

After the partition of the Subcontinent in 1947, Pakistan was conventionally weak in comparison to India. Asymmetry in conventional forces did not push Pakistan to acquire unconventional weapons at that time. Surprisingly, Pakistan was successful in the 1948 and 1965 wars to curtail the mighty Indian conventional force. Even until the late 1960s, there was no scientific or political move for the acquisition of nuclear weapons. Zulfqar Ali Bhutto, during 1960s, when he served in the cabinet of President Ayub Khan was keen for Pakistan to acquire nuclear technology for both civil energy and security purposes.\(^1\) Bhutto, as Foreign

Minister, urged President Ayub Khan to acquire a nuclear bomb, but, the then Chairman of the Pakistan Atomic Energy Commission (PAEC), I.H. Usmani, advised Ayub Khan to resist from the nuclear option. Ayub Khan was never interested in the nuclear weapon programme.

Pakistan initiated its pursuit for nuclear technology for the purpose of civil nuclear energy under the US President D. Eisenhower’s 1953 “Atoms for Peace Plan.” In 1955, under the Chairmanship of Dr. Nazir Ahmad, Pakistan established a 12-member Atomic Energy Committee to work out strategy for the development of nuclear energy for peaceful purposes in Pakistan. The prime objective was to find out the opportunities in the nuclear field. After the recommendations of this committee in 1956, Pakistan established the Council of Atomic Energy (CAE), consisting of a Governing Body and the Atomic Energy Commission. Nazir Ahmad became the first Chairman of newly established PAEC. In 1957, Pakistan became the member of IAEA. Later on, several developments occurred in the civilian nuclear program. Those included the establishment of the Atomic Energy Centre, Lahore in 1961, the foundation stone laying of the Pakistan Institute of Nuclear Science and Technology (PINSTECH) in 1963, establishing a number of research facilities in various disciplines of nuclear science and technology, sending scientists and engineers to the USA for various trainings and courses. Many young nuclear scientists and engineers were also recruited and offered attractive packages and facilities under the close surveillance of Intelligence agencies. The whole exercise was to achieve better results in civil nuclear technology. According to I.H Qureshi, “Pak Atom” started in 1969, but remained irregular for some years. Furthermore, PAEC also

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6 Ibid.
published a list of its scientists and engineers in 1967 and also in 1970. But later on, its publication was suspended for security reasons.”

Z.A. Bhutto failed to convince President Ayub Khan in 1960s to start a nuclear programme. He however, kept his ambitions alive until he became the President of Pakistan in 1972. The embargo on military supply imposed by the USA right after the 1965 Pakistan-India war further provoked Pakistani authority to pursue a policy of self-reliance and self-defence strategy. The loss of East Pakistan in 1971 and the Indian nuclear test in 1974 were the major factors apprising Pakistan’s decision to acquire nuclear weapons for security purposes. In 1972, Bhutto finally decided to start Pakistan’s nuclear weapon programme. “Bhutto apparently held a meeting of top officials and scientists on January 20, 1972 in Multan, where they decided on a crash programme [nuclear weapon programme], through reprocessing of Plutonium.” In the early 1970s, political and military elites were totally convinced that Pakistan had to build its own nuclear bomb to deter Indian aggression. But, Pakistan's nuclear industry was not mature and advanced at that time. There was a will, but technology was insufficient to build a bomb.

A new shift was witnessed in Pakistan’s nuclear weapon program in 1974. In September 1974, a young Pakistani scientist, A.Q. Khan, who had been associated with Netherlands for a subcontract of the European Enrichment Consortium (URENCO), wrote a letter to Prime Minister Z.A. Bhutto offering to assist Pakistan build a nuclear bomb. A.Q. Khan got full

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7 Ibid., p.10.
support from the Prime Minister. In 1976, the Engineering Research Laboratory (ERL) was established under A.Q. Khan’s control (which later came to be known as Kahuta Research Laboratory (KRL) which became central to Pakistan’s nuclear weapon programme.

During late 1970s, Pakistan got sufficient achievements in the nuclear weapon programme. KRL and PEAC did their best in the national security interest of Pakistan. In 1982, A.Q. Khan was successful in producing enough highly-enriched uranium (HEU-235) to build a bomb. The next step was to work on the nuclear device. Munir Khan, the then Chairman of the PAEC, claimed that PAEC had conducted a cold test for a nuclear device on March 11, 1983. Subsequently, there was a series of developments in the nuclear weapon programme. The first time Pakistan tested its nuclear deterrence strategy successfully against possible Indian aggression was in 1986-87. In response to Indian Brasstacks Exercise in Northern Rajasthan, on January 28, 1987, A.Q Khan stated categorically that Pakistan had enough weapons-grade enriched uranium, and he further confirmed that “a nuclear device could be tested by simulation techniques.” During the 1990 crisis over Kashmir issue, the nuclear factor was apparent in controlling the situation between Pakistan and India.

After acquiring weapon-grade enriched uranium, Pakistan concentrated on developing the delivery system. In the mid-1980s, Pakistan began its ballistic missile programme. There was a substantial development in the ballistic missile programme. On May 28, 1998, Pakistan

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18 Ibid., pp.16-17.
successfully conducted its nuclear tests in response to the Indian nuclear tests earlier the same month. In the following figure, various nuclear facilities of Pakistan have been highlighted:

**Figure: 4.1. Pakistan’s Nuclear Facilities Until 1998**

![Image of Pakistan’s Nuclear Facilities Until 1998]


### 4.2. Post-1998 Era: Institutional and Doctrinal Development

After conducting nuclear tests, Pakistan focused on the development of command and control system and doctrinal development. The 1999 Kargil crisis provided an opportunity to fill the missing links in nuclear strategy and to further strengthen the deterrence strategy. The

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military standoff in 2002-2003 was a test case for nuclear deterrence in South Asia. Most importantly, Pakistan enhanced its nuclear missile delivery system and also introduced tactical nuclear weapons (TNW) to counter any kind of Indian aggression.

Pakistan considerably enhanced the institutional framework for controlling its nuclear weapons. The National Command Authority (NCA) was created on February 2, 2000.\textsuperscript{21} The Prime Minister heads the NCA. The National Command Authority exclusively manages the activities and supervision of all such organizations engaged in nuclear weapons research, development, and employment; as well as the military services that operate the strategic forces.\textsuperscript{22} The Strategic Plans Division (SPD) is the secretariat of the NCA which is located at the Joint Services Headquarters. The other very effective body is the Pakistan Nuclear Regulatory Authority (PNRA). “Under the Pakistan Nuclear Regulatory Authority Ordinance, 2001, the Pakistan Nuclear Regulatory Authority (PNRA) was established in 2001 as an independent regulatory body to regulate and supervise all matters related to the safety of nuclear and radiation facilities in the country.”\textsuperscript{23} PNRA’s function is primarily regarding the civil nuclear programme. Pakistan has developed a nuclear management system in all civil and military domains. The country has also achieved a important development and outcome in nuclear-related activities. It has also ensured the safety and security of all nuclear-related technology and weapons. Pakistan has advanced its nuclear warhead delivery system and introduced ballistic and cruise missiles system. Pakistan has developed the following nuclear warhead delivery systems:

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\textsuperscript{23} Pakistan Nuclear Regulatory Authority (PNRA), PNRA Report 2011, p.1.
### Table: 4.1. Pakistan’s Short-Range Ballistic Missiles (SRBM)\(^{24}\)

<table>
<thead>
<tr>
<th>Missile</th>
<th>Propellant</th>
<th>Deployment Mode</th>
<th>Range (Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatf 9</td>
<td>Solid</td>
<td>Road mobile</td>
<td>60</td>
</tr>
<tr>
<td>Hatf 1</td>
<td>Solid</td>
<td>Road mobile</td>
<td>50</td>
</tr>
<tr>
<td>Shaheen I</td>
<td>Solid</td>
<td>Road mobile</td>
<td>750</td>
</tr>
<tr>
<td>Ghaznavi</td>
<td>Solid</td>
<td>Road mobile</td>
<td>250</td>
</tr>
</tbody>
</table>

*Source: US National Air and Space Intelligence Center with contributions from the Defense Intelligence Agency Missile and Space Intelligence Center and the Office of Naval Intelligence.*

| Hatf III Ghaznavi\(^{25}\) | 290 |

### Pakistan’s Medium-Range & Intermediate-Range Ballistic Missiles (MR/IRBM)\(^{26}\)

<table>
<thead>
<tr>
<th>Missile</th>
<th>Number of Stages</th>
<th>Propellant</th>
<th>Deployment Mode</th>
<th>Range (Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghauri</td>
<td>1</td>
<td>Liquid</td>
<td>Road mobile</td>
<td>1250</td>
</tr>
<tr>
<td>Shaheen 2</td>
<td>2</td>
<td>Solid</td>
<td>Road mobile</td>
<td>2000</td>
</tr>
</tbody>
</table>

### Pakistan’s Land-Attack Cruise Missiles (LACM)\(^{27}\)

<table>
<thead>
<tr>
<th>Missile</th>
<th>Launch Mode</th>
<th>Warhead Type</th>
<th>Range (Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA’AD</td>
<td>Air</td>
<td>Conventional or nuclear</td>
<td>350</td>
</tr>
<tr>
<td>Babur</td>
<td>Ground</td>
<td>Conventional or nuclear</td>
<td>350</td>
</tr>
</tbody>
</table>

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\(^{26}\) National Air and Space Intelligence Center with contributions from the Defense Intelligence Agency Missile and Space Intelligence Center and the Office of Naval Intelligence.

\(^{27}\) Ibid.
NTI has elaborated Pakistan’s nuclear missiles with their design characteristics:

Table: 4.2. Design Characteristics of Pakistan’s Ballistic Missiles

<table>
<thead>
<tr>
<th>Name</th>
<th>Other Names</th>
<th>Type</th>
<th>Length (m)</th>
<th>Diameter (m)</th>
<th>Payload (kg)</th>
<th>Range (km)</th>
<th>Circular Error (CEP) (m)</th>
<th>Propellant</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatf-1</td>
<td></td>
<td>SRBM</td>
<td>6.0</td>
<td>0.56</td>
<td>500</td>
<td>60-70</td>
<td>Unknown</td>
<td>Solid</td>
<td>Operational</td>
</tr>
<tr>
<td>Hatf-1A</td>
<td></td>
<td>SRBM</td>
<td>6.0</td>
<td>0.56</td>
<td>500</td>
<td>100</td>
<td>Unknown</td>
<td>Solid</td>
<td>Operational</td>
</tr>
<tr>
<td>Hatf-1B</td>
<td></td>
<td>SRBM</td>
<td>6.0</td>
<td>0.56</td>
<td>500</td>
<td>100</td>
<td>Unknown</td>
<td>Solid</td>
<td>Operational</td>
</tr>
<tr>
<td>Hatf-2</td>
<td>Abdali-Shadoz</td>
<td>SRBM</td>
<td>6.5</td>
<td>0.56</td>
<td>500</td>
<td>180-200</td>
<td>150</td>
<td>Solid</td>
<td>Operational</td>
</tr>
<tr>
<td>Hatf-2A</td>
<td></td>
<td>SRBM</td>
<td>6.5</td>
<td>0.56</td>
<td>500</td>
<td>180-200</td>
<td>30</td>
<td>Solid</td>
<td>Operational</td>
</tr>
<tr>
<td>Hatf-3</td>
<td>Ghaznavi</td>
<td>SRBM</td>
<td>8.5</td>
<td>0.80</td>
<td>700</td>
<td>290-400</td>
<td>50-250</td>
<td>Solid</td>
<td>Operational</td>
</tr>
<tr>
<td>Hatf-4</td>
<td>Shaheen-1</td>
<td>SRBM</td>
<td>12.0</td>
<td>1.00</td>
<td>700</td>
<td>750</td>
<td>200</td>
<td>Solid</td>
<td>Operational</td>
</tr>
<tr>
<td>Hatf-4</td>
<td>Shaheen-1A**</td>
<td>SRBM</td>
<td>12.0</td>
<td>1.00</td>
<td>700</td>
<td>900</td>
<td>Unknown</td>
<td>Solid</td>
<td>Unknown</td>
</tr>
<tr>
<td>Hatf-5</td>
<td>Ghauri, Mark III</td>
<td>MRBM</td>
<td>15.9</td>
<td>1.35</td>
<td>700-1,500</td>
<td>1,500-1,800</td>
<td>2500</td>
<td>Liquid</td>
<td>Operational</td>
</tr>
<tr>
<td>Hatf-6</td>
<td>Shaheen-2</td>
<td>MRBM</td>
<td>17.2</td>
<td>1.40</td>
<td>700</td>
<td>2,500</td>
<td>350</td>
<td>Solid</td>
<td>Operational</td>
</tr>
<tr>
<td>Hatf-7</td>
<td>Babur/Babar</td>
<td>Cruise</td>
<td>6.2</td>
<td>0.52</td>
<td>450-500</td>
<td>750</td>
<td>20-50</td>
<td>Turbojet/Solid</td>
<td>Operational</td>
</tr>
<tr>
<td>Hatf-8</td>
<td>Ra’ad</td>
<td>Cruise</td>
<td>4.85</td>
<td>0.53</td>
<td>1100</td>
<td>350</td>
<td>20-50</td>
<td>Turbojet</td>
<td>Operational</td>
</tr>
</tbody>
</table>


*Updated version with speculated GPS or terminal guidance.**Variant of an improved Hatf-4 reported in April 2013

Roberts Norris and Hans Kristens have estimated the following nuclear force of Pakistan in 2015:

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Table: 4.3. Pakistan Nuclear Delivery Systems in 2015

<table>
<thead>
<tr>
<th>Type</th>
<th>Numbers of Launchers</th>
<th>Year Deployed</th>
<th>Range (Km)</th>
<th>Warhead X Yield (Kilotons)</th>
<th>Numbers of Warheads</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aircrafts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-16 A/B</td>
<td>~24</td>
<td>1998</td>
<td>1,600</td>
<td>1 x bomb</td>
<td>~24</td>
</tr>
<tr>
<td>Mirage III/V</td>
<td>~12</td>
<td>1998</td>
<td>2,100</td>
<td>1 x bomb or Ra-ad</td>
<td>~12</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td>~36</td>
<td></td>
<td></td>
<td></td>
<td>~36</td>
</tr>
<tr>
<td><strong>Land-based ballistic missiles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdali (Hatf-2)</td>
<td>few</td>
<td>2015-</td>
<td>180</td>
<td>1 x 12kt</td>
<td>few</td>
</tr>
<tr>
<td>Ghaznavi (Hatf-3)</td>
<td>~16</td>
<td>2004</td>
<td>290</td>
<td>1 x 12kt</td>
<td>~16</td>
</tr>
<tr>
<td>Shaheen-1 (Hatf-4)</td>
<td>~16</td>
<td>2003</td>
<td>750</td>
<td>1 x 12kt</td>
<td>~16</td>
</tr>
<tr>
<td>Shaheen-1A (Hatf-4)</td>
<td>—</td>
<td>2017</td>
<td>900</td>
<td>1 x 12kt</td>
<td>N.A.</td>
</tr>
<tr>
<td>Shaheen-2 (Hatf-6)</td>
<td>~8</td>
<td>2014</td>
<td>1,500</td>
<td>1 x 12kt</td>
<td>~8</td>
</tr>
<tr>
<td>Shaheen-3 (Hatf-?)</td>
<td>—</td>
<td>2018</td>
<td>2,750</td>
<td>1 x 12kt</td>
<td>N.A.</td>
</tr>
<tr>
<td>Ghauri (Hatf-5)</td>
<td>~40</td>
<td>2003</td>
<td>1,250</td>
<td>1 x 12kt</td>
<td>~40</td>
</tr>
<tr>
<td>NASR (Hatf-9)</td>
<td>~6</td>
<td>2013</td>
<td>60</td>
<td>4 x 12kt</td>
<td>~6</td>
</tr>
<tr>
<td>Subtotal</td>
<td>~86</td>
<td></td>
<td></td>
<td></td>
<td>~86</td>
</tr>
<tr>
<td><strong>Cruise missiles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Babur (Hatf-7)</td>
<td>~8</td>
<td>2014</td>
<td>3507</td>
<td>3 x 12kt</td>
<td>~88</td>
</tr>
<tr>
<td>Ra’ad (Hatf-8)</td>
<td>—</td>
<td>2017</td>
<td>350</td>
<td>1 x 12kt</td>
<td>N.A.</td>
</tr>
<tr>
<td>Subtotal</td>
<td>~8</td>
<td></td>
<td></td>
<td></td>
<td>~8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>~130</td>
</tr>
</tbody>
</table>

4.3. Fissile Material and Nuclear Weapons: Estimated Amount

What the actual numbers of nuclear weapons in Pakistan would remain an ambiguity. That is no surprise as every nuclear weapon state (NWS) do not share the actual statistics of their nuclear weapons and fissile material quantity they possess. On the basis of some technical and mathematical calculations, world nuclear experts estimate the strength of nuclear warheads and fissile material each individual state possesses.

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The International Panel on Fissile Materials’ (IPFM) annual report, “Global Fissile Material Report 2013,” has estimated that “as of the end of 2012, Pakistan could have produced about 3 ± 1.2 tons of weapon-grade HEU. An additional 0.1 tons may have been consumed in Pakistan’s six nuclear weapon tests in 1998.”\textsuperscript{30} Furthermore, Pakistan also has Plutonium (Pu-239) weapons. In its 2013 report, IPFM has estimated that at the end of 2012, “Pakistan has a stockpile of about 0.15 ± 0.05 tons of weapons plutonium and this has been produced at the 40–50 MWt Khushab-I and Khushab-II reactors, which have been operating since 1998 and late 2009 or early 2010, respectively.”\textsuperscript{31} The exact status of the number of nuclear weapons is yet ambiguous. However, the Stockholm International Peace Research Institute (SIPRI) has estimated that Pakistan has approximately 100-120 nuclear weapons.\textsuperscript{32} However, Samar Mubarakmand, the former chief of Pakistan's renowned scientist in the field, denied authenticity of the global reports, data, and calculations about fissile material and total number of nuclear weapons or weapon-grade uranium (HEU) or Pu-239 in Pakistan, and held them incorrect.\textsuperscript{33}

Like other nuclear weapon states, Pakistan has never revealed its numbers of nuclear weapons. Every state maintains this (confidentiality) policy. However, nuclear experts and analysts, on the basis of various parameters, heat generated from power plants, research reactors, intelligence reports, public data and technical know-how, estimate the number of Pakistan’s nuclear weapons’. Hans M. Kristensen and Robert S. Norris have estimated Pakistan’s past, present and future nuclear weapons and fissile materials as follows:

\textsuperscript{31} Ibid., p.21.
\textsuperscript{33} In an interview with Dr, Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
Figure: 4.2. Estimated Pakistani Nuclear Weapons and Fissile Materials

Deployment locations, storage facilities, size and category of weapons will always be kept a secret. It is also a part of the deterrence strategy to keep weapons safe and secure at every location. Some sources believe that Pakistan has also established some dummy warheads and nuclear facilities to mislead the adversary.

Table: 4.4. Estimated Nuclear Weapon Storage and Deployment Sites

<table>
<thead>
<tr>
<th>Location/Facility</th>
<th>Name of Location</th>
<th>Region/Province</th>
<th>Weapon System</th>
<th>Functions/Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fateh-Jang National Defense Complex</td>
<td>Punjab</td>
<td>SSM</td>
<td>Missile development and potential warhead storage capability</td>
<td></td>
</tr>
<tr>
<td>Masroor Weapons Depot</td>
<td>Sindh</td>
<td>Various</td>
<td>Potential storage of bombs for Mirage Vs at Masroor Air Base, and/or warheads for SSMs</td>
<td></td>
</tr>
<tr>
<td>Sargodha Weapons Depot</td>
<td>Punjab</td>
<td>Various</td>
<td>Potential storage site for bombs for F-16s at nearby Sargodha Air Base, and warheads for SSMs</td>
<td></td>
</tr>
<tr>
<td>Shanka Dara Missile Complex</td>
<td>Punjab</td>
<td>SSM</td>
<td>Missile development and potential warhead storage capability</td>
<td></td>
</tr>
<tr>
<td>Near Quetta Air Base</td>
<td>Balochistan</td>
<td>Bombs</td>
<td>Potential storage site with underground facilities in high-security weapons storage area</td>
<td></td>
</tr>
</tbody>
</table>


The above-stated weapon storage facilities are based on some technical calculations of nuclear experts. There is no official or authentic statement available to endorse these calculations. According to Zia Mian;

There is no official information on Pakistan’s fissile material production sites—although Pakistan and India each year exchange lists of nuclear facilities as part of their 1988 Agreement on the Prohibition of Attack against Nuclear Installations and Facilities.37

Due to the security reasons, complete agenda of meetings is not made public and this list may include both civil and military facilities.38

Fissile material-related facilities in Pakistan have been highlighted in the figure below:

**Table. 4.5. Pakistan’s Fissile Material Related Facilities**39

<table>
<thead>
<tr>
<th>Location</th>
<th>Facility Type</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dera Ghazi Khan</td>
<td>Uranium mine, ore concentration plant, conversion plant</td>
<td>Uranium</td>
</tr>
<tr>
<td>Kahuta</td>
<td>Enrichment (Khan Research Laboratories)</td>
<td>HEU</td>
</tr>
<tr>
<td>Gadwal (Wah)</td>
<td>Enrichment (secondary plant)</td>
<td>HEU</td>
</tr>
<tr>
<td>Chaklala</td>
<td>Enrichment (pilot plant)</td>
<td>HEU</td>
</tr>
</tbody>
</table>

38 Ibid.
39 Ibid., p54.
<table>
<thead>
<tr>
<th>Location</th>
<th>Facility Type</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sihala</td>
<td>Enrichment (pilot plant)</td>
<td>HEU</td>
</tr>
<tr>
<td>Golra</td>
<td>Enrichment (pilot plant)</td>
<td>HEU</td>
</tr>
<tr>
<td>Khushab–I</td>
<td>Heavy-water reactor 40–50MWt</td>
<td>Plutonium</td>
</tr>
<tr>
<td>Khushab–II</td>
<td>Heavy-water reactor 40–50MWt</td>
<td>Plutonium</td>
</tr>
<tr>
<td>Khushab–III</td>
<td>Heavy-water reactor 40–50MWt (under construction)</td>
<td>Plutonium</td>
</tr>
<tr>
<td>Khushab–IV</td>
<td>Heavy-water reactor 40–50MWt (under construction)</td>
<td>Plutonium</td>
</tr>
<tr>
<td>Chashma (Khushab)</td>
<td>Reprocessing facility (under construction)</td>
<td>Plutonium</td>
</tr>
<tr>
<td>Rawalpindi</td>
<td>Reprocessing facility–I (New Laboratories)</td>
<td>Plutonium</td>
</tr>
<tr>
<td>Rawalpindi</td>
<td>Reprocessing facility–II (New Laboratories)</td>
<td>Plutonium</td>
</tr>
<tr>
<td>Khushab–I and II</td>
<td>Tritium production</td>
<td>Tritium</td>
</tr>
<tr>
<td>Chashma (Kundian)</td>
<td>Reactor fuel-fabrication plant</td>
<td></td>
</tr>
<tr>
<td>Multan</td>
<td>Heavy-water production facility</td>
<td></td>
</tr>
<tr>
<td>Khushab</td>
<td>Heavy-water production facility</td>
<td></td>
</tr>
</tbody>
</table>

Figure: 4.3. Estimated Pakistan’s Special Weapons Facilities’ Map


However, all nuclear weapons related information are classified such as number of weapons, quantity of weapon grade HEU or Pu, locations, and other relevant details. The only purpose of Pakistan’s nuclear weapon programme is deterrence against Indian aggression. Pakistan will maintain its nuclear assets safe and secure and under reliable command and control system to assure the nuclear deterrence capability.

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CHAPTER FIVE

INTERNATIONAL PERCEPTIONS ABOUT PAKISTAN’S NUCLEAR WEAPONS SECURITY

Misperception involves a discrepancy between psychological environment of the decision-makers and the operational environment of the “real world”.¹

Jack S. Levy

Pakistan is placed at a very critical geo-political location with world focus costantly glaring at it for many decades. Not only the neighbours of Pakistan are in perpetual pull and push but international political and strategic scenario also constantly keeps Pakistan in limelight. Everything related to Pakistan goes through strict scrutiny and especially its nuclear programme. Overall, the nuclear security has become a core issue in global politics. Rapid expansion of nuclear technology and fissile material has raised several security threats worldwide. After the 9/11 terrorist attacks in the United States, it was generally perceived that terrorists might use nuclear devices, fissile material or radioactive dispersal devices (RDD) against any state to accomplish their political objectives. Therefore, nuclear fissile material, radioactive sources, storage facilities and nuclear installations are under serious potential security threats since the tragic events of September 11, 2001.²

Though the threat of nuclear weapon security has been addressed by the global community in a very seriously manner but unfortunately it has not been able to develop an effective strategy to counter this threat. According to Pavel Podvig, current global nuclear

security regimes are not sufficient to address nuclear material and installation safety and security. Pavel further states that in every country, security culture is different. While developing nuclear security culture, every state has placed its own priorities and regulations. However, the ultimate objective of all nuclear-weapon states is to keep their nuclear weapons under effective command and control with infallible security. Nuclear-weapon states protect their nuclear weapons in their national security interests. Prior to the September 11, 2001, attacks, nuclear terrorism was not perceived as a serious threat as there were no fears regarding terrorists using fissile material or nuclear weapons. The general concern was the transfer of nuclear fissile material, nuclear weapons or technology required to build bombs by the (so-called) rogue states. After the terrible incidents of September 11, it has been realized that terrorists might use nuclear weapons or fissile material to accomplish their political objectives. Al-Qaida’s quest to acquire nuclear weapons was taken seriously after 2001. This threat perception has now shifted to a real threat. In realistic view, nuclear terrorism has been transferred from perception to reality. Terrorist groups want nuclear weapons or material to fulfill their terrible motives. This threat is not linked with any particular nuclear-weapon state or region. It is applicable to all nuclear-weapon states and has a wide range of implications.

In the wake of perilous situations after 9/11, Pakistan’s nuclear weapons security has attained prime focus in an international debate. Fears have been generated that non-state actors, terrorists or their sympathizers might get control over Pakistan’s nuclear weapons. It is imperative to understand international perspective on Pakistan's nuclear weapons’ security.

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Why is there such a perception that Pakistan’s nuclear weapons are not secure? What are the main global concerns about Pakistan’s nuclear weapons’ security? These questions further lead to various assumptions and actual facts. It is obvious that international worries about Pakistan’s nuclear weapons are generally communicated and emphasized by the Western mass media. The international community knows mainly what it learns through the media. In the age of electronic and print media, it has become very easy to make or break a perception about any individual, group or state. Pakistan's perspective/response to such perceptions is equally important to comprehend. Similarly, challenges to Pakistan's national security and how they are undermining its nuclear security management is the scope of the chapter to ponder upon. There are various other questions and concerns raised by Western security experts and analysts. However, these questions and concerns are mostly based on self-threat assessments, secondary sources and deductive arguments. Yet, there is a need to address these concerns with logical arguments and fact-based information.

Since 1998, when Pakistan became a nuclear-weapon state, the international community has raised various security concerns about its nuclear programme. According to Naeem Salik, “Pakistan’s nuclear weapon programme has always been at the centre of one controversy or another.” From nuclear proliferation to nuclear security matters, the global community has raised several questions over Pakistan’s nuclear weapons. In the post 9/11 scenario, concerns have been shown by USA and some Western states over the security of Pakistan's nuclear weapons and fissile material. They have deliberately tried to discredit national command and control system. Ian Bremmer and Maria Kuusisto have elaborated the causes and consequences of nuclear weapons security in Pakistan. In their article, they have

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explained that although Pakistan has significantly developed its national command and control system, and impressively established its operational procedures, ‘the 9/11 terrorist attacks, A. Q. Khan case in 2004, and the recent instability in Pakistan, triggered concerns in the international community that Pakistan’s control over its nuclear weapons may be weak. This perception has wide ranging strategic diplomatic, political, and economic implications for Pakistan.”

Pakistan believes that these concerns are exaggerated and they have no credibility. Thus many questions arise, like: “Why is the international community so pessimistic about Pakistan’s nuclear weapons? Why is Pakistan isolated in global nuclear politics?

In Evan Braden Montgomery’s view, “in Pakistan, ongoing political instability and popular unrest, as well as suspicions that members of Pakistan’s military, intelligence, and scientific establishments continue to sympathize with and perhaps even support violent Islamist groups, have exacerbated fears that Pakistan’s nuclear weapons may be vulnerable.” Arian L. Pregenzer, while mentioning the nuclear security threats in Pakistan, has also argued that greater political instability in Pakistan and uncertain reactions towards terrorist organizations lead to the global worries about Pakistan’s nuclear weapons’ security. He has added that the absence of “no-first-use” nuclear doctrine may lead to a crisis situation. The role of command and control authority in Pakistan has also been criticized by many Western analysts. Furthermore, while stating the global concerns, Bruno Tertrais has categorized the threat in three different scenarios:

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10 Evan Braden Montgomery, “Understanding the Threat of Nuclear Terrorism,” Backgrounder, Center for Strategic and Budgetary Assessments, April 2010, p.4.
• WMD-related Transfers
• Losing Control of Nuclear Weapons
• Deliberate Nuclear Use

He has stated that in Pakistan, there is a possibility of horizontal proliferation of weapons of mass destruction. In another scenario, there is a possibility that the command and control system collapses and nuclear weapons fall in the hands of non-state actors. In the worst case scenario, there is a possibility of unauthorized use of nuclear weapons. While talking about changing global perception about Pakistan, Toby Dalton has categorized the following trigger points:  

• September 11, 2001 incident in USA
• Terrorist attack on Indian Parliament in December 2001
• A.Q. Khan case in 2004
• TTP emergence in 2007
• Mumbai attacks in 2008
• Attacks on military installations in Pakistan
• U.S operation in Abbotabad against Osama Bin Laden in May 2011

According to Toby Dalton’s point of view, the above stated incidents have brought about a major change in global thinking about Pakistan’s nuclear image. A.Q. Khan episode has always been repeated while dealing with Pakistan in its nuclear security management. The weak social fabric with a loud religious faction supporting violence and causing disruption to the smooth flow of general social life and ever-changing types of terrorism in Pakistan have added fuel to the fire.

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13 In an Interview with Dr. Toby Dalton, deputy Director of the Nuclear Policy Program, Carnegie Endowment, Washington DC, May 12, 2014.
The case of A.Q. Khan has created the ultimate sense of mistrust in Pakistan’s commitment to nuclear non-proliferation. According to Christopher Clary, “Pakistan’s past inability or unwillingness to control the A.Q. Khan nuclear supplier network further amplifies international concerns.”\textsuperscript{14} Veda V. N has narrated his views about Pakistan in such a way that the A.Q. Khan network misused its authority, and that the international community observes Pakistan as irresponsible and an unreliable state that is involved in nuclear proliferation worldwide.\textsuperscript{15} While mentioning nuclear security concerns, he has further articulated four threat scenarios about Pakistan’s nuclear weapons:\textsuperscript{16}

- Threat from within the organization
- Terrorists attempting to steal nuclear material or technology
- Loss of control over nuclear weapons due to political instability
- Non-state actors and the threat to nuclear weapons

These scenarios illustrate that Pakistan’s nuclear weapons are not only insecure from terrorists or non-state actors, but there are threats from within the relevant organizations. Terrorists or non-state actors, with insider help, can steal or control nuclear weapons. Chaim Braun, while addressing nuclear security threats in Pakistan, has highlighted several security threats associated with Pakistan's nuclear plants expansion plans:

- Protection of Spent Fuel Storage Pools.
- Fissile Material Diversion from Nuclear Power Stations.
- Terrorists Could Attack, Seize, and Take over These Nuclear Stations.
- Using a Means of Transport to Attack Station.\textsuperscript{17}

\textsuperscript{14} Christopher Clary, “Thinking about Pakistan’s Nuclear Security in Peacetime, Crisis and War,” \textit{Institute for Defence Studies and Analyses}, Occasional Paper No. 12, September 2010, p.3.
\textsuperscript{16} Ibid., pp.59-63.
Chaim Braun perceives that terrorists can attack civil nuclear storage facilities. In his view, terrorists can also attack during the transportation of fissile material of nuclear weapons from one facility to another. Bruce Riedel’s articulation and worries about Pakistan’s nuclear weapons are also very similar. He has further added that Pakistan is rapidly developing its nuclear weapons. In his writing, Riedel has “explored” that “Pakistan has more terrorists per square mile than any place else on earth, and it has a nuclear weapons programme that is growing faster than any place else on earth.”

According to Michael Krepon, violence and terrorism is rapidly growing in the country. What is the state doing to counter such serious threats? It is a fact that Pakistan is continuously facing a series of terrorist attacks. According to Bruno Tertrais, due to the continued production of fissile materials, unstable political system, corruption, non-state actors being motivated to steal nuclear material, the non-ratification of numerous international agreements, Pakistan has been ranked 31 out of 32 in a list of states with the best security of weapon-usable nuclear material. He has added that Pakistan’s official statements do not address the security of fissile material in storage facility. There is a perception that Pakistan only addresses the security of nuclear weapons, but makes little efforts to secure its civil nuclear facilities. On the other hand, Pakistan declares its nuclear research and development programme as properly managed and well protected. Nevertheless, conspiracies about Pakistan’s nuclear weapons’ security are growing day by the day.

Pakistan’s nuclear weapons are also labelled an “Islamic Bomb”. While explaining the international concerns, Naeem Salik has stated that Pakistan’s nuclear programme was also

19In an Interview with Michael Krepon, Co-Founder/Senior Associate, Stimson Center, Washington DC, May 12, 2014.
incorrectly judged as the “Islamic Bomb” which creates sensitivity and political opposition amongst the pro-Israel lobbies in the United States. In this mistrust further speculations were created about Pakistan.21 While explaining this notion, Parvez Musharraf has categorically addressed the Western concern:

No one else’s bomb is called Hindu, Jewish, Christian, capitalist, or communist, yet somehow our bomb becomes “Islamic”, as if that makes it illegitimate. The idea is illogical and essentially racist. This is an example of how Muslims continually feel unjustly singled out and alienated.22

By giving Pakistan's nuclear weapons programme a religious identity, the world is more exposed to pessimistic approach. Various hypothetical scenarios have been developed to assess the threats to Pakistan’s nuclear weapons. There are a lot of ambiguities and misperceptions while addressing Pakistan's case. Due to lack of the primary sources, access to concerned people or authorities, weak representation at international forums and deficiency in research work, etc., are also challenges in this regard.23 According to Ian Anthony, “because of the serious security situation in Pakistan, we can assume that its nuclear weapons are not secure”.24 He has referred to the terrorist attacks on military installations in Pakistan, domestic and regional security environment and insider threats. While elaborating the characteristics of the state, Paul Podvig has mentioned that Pakistan has a fragile society with numerous domestic security issues. According to his point of view, no state has a perfect nuclear security system. While discussing Pakistan’s nuclear security issues, Paul Podvig has also expressed the same concerns.25

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23 While taking interviews, discussions/ debates, it was identified that most of the analysts, academicians and researchers do not have primary sources to know about Pakistan’s nuclear and other security issues. They mostly get information/ knowledge through books, research papers, journals and newspapers available to them.
24 In an Interview with Dr. Ian Anthony, Programme Director, Arms Control and Non-proliferation Programme, SIPRI, March 28, 2013.
Since the War on Terror started in 2001, Pakistan has witnessed serious security challenges, thousands of deaths, and huge economic and infrastructural losses. These factors have created a perception of “insecurity” about Pakistan’s nuclear weapons. According to Mathias Dembinski, after North Korea, Pakistan is the second country where rogue elements or terrorists could get control over its nuclear weapons. He has argued that ambiguity in nuclear warheads and fissile materials is a big challenge, and nuclear security arrangements are not good enough in Pakistan.

There are also optimistic opinions about Pakistan’s nuclear weapons’ security system. They have a firm belief that Pakistan has adopted multiple security systems to keep its nuclear assets in safe hands. The ambiguities against Pakistan’s nuclear programme prevail due to a lack of communication and access to primary sources of information. According to Kathryn Schultz, Foreign Affairs Specialist, Regional Affairs, Department of State, United States, Pakistan has significantly improved its nuclear safety and security, and the United States has firm confidence that Pakistan's nuclear weapons are safe and secure. Some of the strategic commentaries perceive Pakistan's nuclear weapons as “insecure weapons”, whereas some have trust in Pakistan’s security management system. This “secure-insecure” debate has put more pressure and concerns about Pakistan such as; What are the serious threats to Pakistan’s nuclear weapons? What is the current status of Pakistan’s nuclear weapons’ security? What has Pakistan done so far? What are the perceived threats to its nukes? Has Pakistan been able to counter all these security threats to its nuclear assets? While analyzing the global perspectives and assumptions, some scenarios have been highlighted here.

26 In an Interview with Dr Matthias Dembinski, Member of the Executive Board and Senior Research Fellow at the Peace Research Institute Frankfurt (PRIF) Germany, on May 15, 2013.
27 In an Interview with Kathryn Schultz, Foreign Affairs Specialist, Regional Affairs, Department of State, Washington DC, May 14, 2014.
5.1. Western Perspective

What is the western community thinking about Pakistan’s nuclear weapons’ security? This issue has been taken seriously during the last few years. Unfortunately, Pakistan has not been able to address Western concerns effectively. Various scenarios and perceptions have been developed by the international community regarding threats to Pakistan’s nuclear weapons. While analyzing, interviewing and understating the concerns of the global community, the following threat scenarios have been identified:

5.1.1. Insider Threats

It is the most serious concern of the international community that Pakistan's nuclear weapons industry has an insider threat which may lead to some dangerous consequences. This perception has been developed by some of the Western security analysts and policy-makers on the basis of some personal information and sources.28 According to Christopher Clary, “the insider threat is perhaps the most serious hazard faced by the Pakistani arsenal.”29 During the last few years, terrorist attacks on different military installations have clearly shown to that some insider elements were involved. This factor has led to further conspiracy theories and ambiguities about nuclear weapons’ security in Pakistan.

It has always been repeated by some of the Western analysts that Pakistan’s nuclear industry has insider threats which could bring severe challenges for Pakistan. According to Matthew Bunn, “there is a very real possibility that sympathetic insiders might carry out or assist in a nuclear theft, or that a sophisticated outsider attack (possibly with inside help) could overwhelm even the most stringent defences.”30 Pakistan is consistently developing its nuclear

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28 This concern usually refers to A.Q Khan Network.
stockpiles and increasing its fissile material. Pakistan is also developing some new nuclear power plants. As the number of nuclear facilities is increasing in the country, they would generate more vulnerability to insider threats. In Paul K. Kerr and Mary Beth Nikitin’s argument, “the main security challenges for Pakistan’s nuclear arsenal are keeping the integrity of the command and control structure, ensuring physical security, and preventing illicit proliferation from insiders.”  

31 People involved in nuclear management affairs possess all the know-how about nuclear technology. Their intentions and motivations are very important to understand. In the case of Pakistan, it has been perceived that people in the nuclear profession have more tendencies to be inclined towards “religious extremists”.  

32 So, the probability of insider threat is serious.

Insider threat has been further categorized into different forms and scenarios. The role of military units and civil scientists that are directly involved with nuclear weapons’ development, has been further divided in various stages and parts.

32 The term "Religious Extremist" is still unclear and vague in nature.
5.1.1.1. Threat Perception at Civilian Level

Civil nuclear scientists and management have their role in the principal part of nuclear weapons’ development. They are mainly involved in mining, milling, uranium/plutonium enrichment, weapon designing, loading, mantling and coding of weapons. Nuclear scientists have more insight information and access. There is a history of scientists’ involvement worldwide in illegal activities like proliferation, selling sensitive information, weapon designs and architectures.

Pakistan has always been taken as a test case after the issue of A.Q. Khan network and two renowned Pakistani scientists’ visit to Afghanistan.\(^{33}\) The brain drain of nuclear scientists is another concern.\(^ {34}\) Pakistan has developed a large nuclear infrastructure with thousands of nuclear scientists and engineers. So, there are assumptions that if the state collapses or is in a situation of crisis, scientists may leave, migrate or join some other private companies. Furthermore, there is a threat perception that civil nuclear scientists can sell or transfer the sensitive nuclear material, technology, designs or device to rogue elements like Al-Qaeda.\(^ {35}\)

5.1.1.2. Threat Perception at Military Level

The role of the military in Pakistan has been a dominant factor. The global community perceives the military as the prime authority to control and manage nuclear weapons and related technology in Pakistan.\(^ {36}\) There are various factors that influence the military’s decision-making abilities. Pakistan’s society is composed of various ethnic groups, diverse cultural and

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\(^{33}\) Sultan Bashiruddin Mahmood and Chaudiri Abdul Majeed.

\(^{34}\) Brain Drain is basically when a professional shifts job from one place to another place. In case of nuclear industry, it is shifting of one nuclear scientist or engineer from one country to another country.


social backgrounds. Presence of diverse elements in military force that may have sympathy with extremist groups, would be a highly worrisome issue. In addition, there are assumptions that accidental use of nuclear weapons in times of crisis may occur because of rogue elements in military units. Some nuclear experts have expressed their views that a few threat perceptions are plausible in the military:37

**Figure: 5.1. Threat Perception at Military Level**

![Threat Perception Diagram](https://via.placeholder.com/150)

Accidental or unauthorized use of nuclear weapons in crisis time.

Leakage of sensitive information.

Takeover of nuclear weapons by rogue elements during internal instability.

Breakdown of communication between command and control, and operational units in crisis time.

These concerns suggest that nuclear weapons, even under military control, are not safe. There are concerns of accidental or unauthorized use of nuclear weapons in situations of crisis. Furthermore, there could be an insider source or sympathizers in relevant military unit or rank which could leak sensitive information to non-state actors or they can take control over nuclear devices. The most worrisome concern is the breakdown of communications between the command and control authority and operational units during a situation of crisis. Although,

37 Although these nuclear experts acknowledge that there is no reported incident of these perceived threats.
there is no specific parameter to judge the degree of threats to Pakistan’s nuclear weapons from insider threats, assumptions and perceptions are not in favour of Pakistan. Many analysts claim that insider threat will be the core challenge for Pakistan's nukes. According to Paul K. Kerr and Mary Beth Nikitin, “The main security challenges for Pakistan’s nuclear arsenal are keeping the integrity of the command structure, ensuring physical security, and preventing illicit proliferation from insiders.”

5.1.2. Threats from Al-Qaeda and Taliban

After the withdrawal of the Soviet Union in 1989, the Taliban emerged as a strong group in Afghanistan. Later on, the Taliban strengthened their structure and set up their government. A large number of mujahedeen and war lords who participated in the Afghan-Soviet war, supported Taliban’s regime in the country. The arrival of Osama Bin Laden with his fighting force, “highly experienced from Afghan-Soviet war” boosted the Taliban's control over the disturbed land. Thereafter, Bin Laden introduced Al-Qaida and showed his intention to acquire nuclear devices. After the September 11, 2001 incidents, the U.S. started war against terrorism to eliminate Al Qaida and its associates, including the Taliban regime.

Since then, it has been assumed that Taliban or Al-Qaida are trying to attain nuclear devices and they might get some help from nuclear Pakistan. These assumptions and speculations are further linked to other conspiracy theories. There have been several reports published during the last decade that Al-Qaida was pursuing nuclear material and know-how to make nuclear bombs. According to Bruno Tertrais, “Al-Qaeda and other jihadist groups showed an interest in gaining access to nuclear weapons and materials, and some attacked

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nuclear-related facilities in Pakistan." A few letters, handmade designs to develop a bomb and process for HEU were found in Afghanistan. Similarly, a Taliban-type of regime has been assumed to take control inside Pakistan itself. Fears have been raised that religious extremists who are close to or have sympathies with the Taliban would take over the government in nuclear Pakistan. So, there will be severe consequences of this regime change in Pakistan. Militant control in the Swat Valley in 2007-08 and then military operation Rah-e-Najat, 2009 in response raised several questions.

The emergence of Tehreek-e-Taliban Pakistan (TTP) in Waziristan and other places in 2007 and their activities in urban areas have also been observed as a threat. The interlinked threat is the penetration of Al-Qaeda elements in TTP and their mutual terrorist activities in Pakistan. There are assumptions that both have an interest in Pakistan's nuclear weapons directly or indirectly. There is another aspect that the Taliban and Al-Qaeda have sympathizers in the country who could help these elements. According to Matthew Bunn, et. al., Pakistan is facing a high-risk situation. This is because of the current turmoil in different areas of Pakistan. Furthermore, elaborating the threat scenarios, Bunn et al., argues that “with Al-Qaeda’s core leadership located there, a dangerous Taliban insurgency, and a range of highly-capable terrorist groups with links to the Pakistani state, Pakistan’s nuclear assets face a greater threat from extremists seeking nuclear weapons than any other stockpile on earth.”

41 (The Tehrik-e-Taliban Pakistan was officially established in December 2007 and its office bearers announced. Militant commander BaitullahMehsud was appointed its emir or leader.) Qandeel Siddique, "Tehrik-e-Taliban Pakistan an Attempt to Deconstruct the Umbrella Organization and the Reasons for its Growth in Pakistan’s North-West," Danish Institute for International Studies (DIIS), Report 2010:12, p.7.
42 Bunn, Harrell and Malin, Progress on Securing Nuclear Weapons: The Four-Year Effort and Beyond, p.5.
43 Ibid.
5.1.3. Stealing of Nuclear Weapons

This is another menacing scenario which has been developed by Western analysts. Terrorists or rogue elements can steal nuclear devices from the nuclear weapon facilities in Pakistan. Although the chances of stealing nuclear devices are not very high, still, there are many risks present. During the last few years, Pakistan has increased its nuclear stockpiles and quantity of weapon grade highly enriched uranium and plutonium.\(^{44}\) This development can provide more vulnerability to nuclear weapons. In Bhumitra Chakma’s view, theft of nuclear weapons from Pakistan does not seem possible because it does not keep its nuclear weapons in assembled form.\(^{45}\) But, he further argues that there is a serious concern about fissile material which is more likely to fall in the hands of terrorist groups which may use it in Radiological Dispersal Devices (RDDs) and materialize it.\(^{46}\) Michael Levi argues that “subversion of state control over Pakistan’s nuclear weapons or materials could lead terrorists to acquire nuclear materials or weapons.”\(^{47}\)

5.1.4. Lack of Transparency

Nuclear transparency is one of the leading issues in nuclear non-proliferation regimes. Lack of transparency creates doubts and threats of secondary proliferation. What is the exact number of nuclear weapons, exact quantity of fissile material and locations of nuclear installations? None of the nuclear-weapon states have answered these questions. Records predict that not a single nuclear-weapon state has declared the accurate numbers of its nuclear weapons and weapon-grade material. “Lack of transparency in nuclear programmes leaves

\(^{44}\) In an Interview with Ian Anthony, Programme Director, Arms Control and Non-proliferation Programme (SIPRI), Stockholm, Sweden, March 28, 2013. Same views have been expressed by Dr. Matthias Dembinski, Member of the Executive Board, Senior Research Fellow, PRIF, Germany, May 15, 2013 and Dr. Paul Podvig, Programme Lead, United Nations Institute for Disarmament Research, (UNIDIR), Palais des Nations, Geneva, Switzerland, December 12, 2013.


\(^{46}\) Ibid.

room to doubt the security surrounding each country’s nuclear arsenal and the safeguards preventing accidental launches." Nuclear transparency concerns regarding Pakistan’s nuclear weapons programme are high. According to Annette Schaper, there is a lack of transparency in Pakistan’s nuclear weapon programme, so it is very difficult to understand its efforts and arrangements to secure its nuclear weapons. Furthermore, it is difficult to estimate its cooperation with the global community.

Transparency in nuclear development will clarify Pakistan’s position. Many nuclear experts have the same view about Pakistan’s nuclear programme. Lack of transparency further multiplies with many assumptions, challenges and threats. According to Michael A. Levi and Michael E. O’Hanlon, “Pakistan is the most worrisome case: it has nuclear weapons, little transparency, and a brittle government that might someday be replaced by much more extreme regime with sympathies toward terrorist groups.” Lack of transparency further affects the accountability process. According to Annette Schaper “transparency of stockpiles would avoid unnecessary ambiguities and would contribute to the prevention of potential new arms races and competitions.”


In an interview with Annette Schaper, Senior Research Fellow, PRIF, Germany, May 14, 2013.

In an interview with Hans-Joachim Schmidt, Research Fellow, PRIF, Germany, May 16, 2013. Manfred Ruck, former Director at the German Federal Office of Economics and Export Control, where he had been since 1975, on May 27, 2013. PRIF Germany. Matthias Dembinski, Member of the Executive Board; Senior Research Fellow, PRIF, Germany, May 15, 2013. Keith Krause, Graduate Institute of International and Development Studies, Geneva, Switzerland, July 08, 2013. Klaus Peter Ricke. He is a visiting research scientist at the PRIF from 1989 to 2006, he was with the German Customs Criminological Office (headquarters of the German Customs Investigation Service). Ian Anthony, Programme Director, Arms Control and Non-proliferation Programme (SIPRI), Stockholm, Sweden, March 28, 2013.


5.1.5. Attack on Nuclear Facilities

Nuclear facilities are soft targets for non-state actors. Many Western analysts strongly assume that nuclear facilities in Pakistan are under threat. Pakistan has confronted many suicide attacks and terrorists' struggle to enter into the sensitive military installations. There have been several incidents of terrorists' attacks on military installations during the last few years. Some Western analysts assume that a few of the targeted installations were keeping nuclear weapons. Attacks on Mehran Base, General Headquartares (GHQs), Wah cantonment, Kamra airbase and military generals' assassinations have always been quoted on several occasions.53 “Since late-2000s, Pakistan-based terrorists have attacked several military installations suspected of holding nuclear weapons-related facilities or research.”54

Although there is no known history of terrorist attacks on nuclear facility, the current wave of terrorism may affect Pakistan’s nuclear facilities. Global nuclear security analysts assume that the expansion of nuclear programme would offer increased threats and vulnerabilities. It is further assumed by the western analysts that terrorist groups can attack nuclear facilities to accomplish their objectives. Chaim Braun has categorized terrorists’ motivation to attack nuclear installations in Pakistan in three parts:

1. The desire to obtain radioactive or fissile material for the construction of radioactivity dispersion devices or nuclear weapons;

53NirodeMohanty in his book America, Pakistan, and the India Factor states that “In December 2008, there was a suicide bomb assault on an airbase at Kamra. In August 2008 teams of suicide bombers (aspiring martyrdom) staged coordinated attacks on the armament complex at the Wah cantonment, where Pakistan’s nuclear weapons are believed to be assembled. On May 22, 2011, a team of ten terrorists attacked the Mehran Naval Aviation base in Karachi. They stormed the high-security base from several places and appeared to know the location of its intruder detection cameras. Using rocket-propelled grenades (RPG) explosives, and small arms, they destroyed several aircraft, took hostages, and occupied the base for nearly 18 hours. The Karachi attack mirrored an equally stunning 2009 raid by radical Islamists on the Pakistan army’s general headquarters in Rawalpindi. A Pakistan Air Force bus was attacked near Sargodha nuclear weapon sites, resulting in 8 deaths and 40 injured personnel. Dr. Shaun Gregory, director of Pakistan Unit at the University of Bradford in Britain, says, “The modalities of this attack add up to a virtual blueprint for a successful attack on a nuclear weapons facility.” NirodeMohanty, America, Pakistan, and the India Factor, New York: Palgrave Macmillan, 2013, p.64.

2. The intent to create significant damage to the station, nearby population, the environment, and the country as a whole as revenge for some government actions inimical to terrorist interests; or
3. The desire to force the government to accede to some terrorists' demands and modify its policies accordingly.55

Terrorists do understand the catastrophic capabilities of nuclear technology. Terrorists estimate that it would be very helpful for them to attack any nuclear facility and pressurize the government to fulfil their demands.56 It has been proved that terrorists have always tried to acquire advanced and sophisticated weapons to accomplish their political objectives. There are perceptions that the Taliban, Al-Qaida or their sympathizers can attack nuclear installations in Pakistan. In 2012, there was a reported threat by the Taliban to attack the nuclear facility in Dera Ghazi Khan, Punjab.57 However, according to Bruno Tertrais, “radical Islamists are generally proud of Pakistan's nuclear capability and have so far shown little interest in attacking the country's nuclear infrastructure.”58

5.1.6. Civil-Military Relations

While having concerns over many other issues in Pakistani society, one of the most debatable issues is the state of the civil-military relationship. It has become a common perception that it is the military that controls the entire nuclear day-to-day affairs. The military not only has control over the state's defence and foreign affairs, but also controls domestic politics. While elaborating the historical background, Sebastien Miraglia explains that since

56Osama Bin Laden was keen to get the nuclear bomb. There is one classical example of unsuccessful weapons of mass destruction (WMD) attack on the Tokyo subway in 1995 when Japan-based terrorist organization AumShinrikyo had used Sarin gas. Currently, ISIS could be potential threat to get nuclear device or fissile materials.
1978 when General Zia-ul-Haq took control of the government and sent Zulfiqar Ali Bhutto to prison, the military eventually debarred the civil leaderships from all kinds of decisions of nuclear weapon development.\textsuperscript{59} With the passage of time, military's influence has increased in all kinds of decision-making in the nuclear field in Pakistan. At present, although, Pakistan has established a command and control system which includes both civil and military leadership, the final say remains under military command. Bruno Tertrais suggests that even though the Prime Minister is the head of the National Command Authority (NCA), there is a conviction that Pakistan's military is the actual authority to take the final decision to use nuclear weapons, because all armed forces chiefs are involved in the Employment Control Committee.\textsuperscript{60} This narration further deepens on the theory that a country which possesses nuclear weapons and has a war history cannot establish a strong nuclear command and control system. While implementing the organizational theory, Sebastien Miraglia elaborates that a nuclear weapon state cannot adopt a fully assertive nuclear command and control system if it has disturbed civil-military relations and complicated nuclear doctrines.\textsuperscript{61}

The distance between institutional leaderships has put a negative impact on decision-making abilities. It is believed that due to the lack of strong political leadership and effective governance, there is an imbalance in the nuclear management system. The unhealthy relationship between civil-military leadership keeps both sides distant in times of crisis. While discussing civil-military relations during peacetime and crisis time, Miraglia has elaborated that even in peacetime, the military leadership keeps the civil leadership's role limited in national security policy and inside details of nuclear weapons’ development.\textsuperscript{62}


\textsuperscript{60} Tertrais, "The Unexpected Risk: The Impact of Political Crises on the Security and Control of Nuclear Weapons," p.5.

\textsuperscript{61} Miraglia, "Deadly or Impotent? Nuclear Command and Control in Pakistan," p.843.

\textsuperscript{62} Ibid., p.850.
Feroz Hassan, while narrating the global worries about Pakistan's nuclear programme, has elaborated three interdependent components that are at the base of this oscillation in national politics:

1. First is the debate between the presidential versus parliamentary system.
2. Second are poor civil-military relations, which have bedevilled the evolution of stable democratic governance in the state.
3. Third is the dominance of bureaucratic power over the representative government or elected leaders. The civil bureaucracy is believed to be heavily under the influence of the military and intelligence agencies, which are euphemistically referred as the "establishment."63

Further assumptions discussed by Western analysts are that civil leadership does not know about the size and characteristics of the nuclear weapons' programme. According to Sebastien Miraglia, without having concrete knowledge of a state's nuclear weapon programme development, civil-military relations will remain troublesome.64 The history of civil-military relations has always been quoted while defining the influence of military in the country. Civil leadership and bureaucracy have always searched for a soft corner while establishing relations with military bureaucracy. This image has no positive reflection at global level. Further questions have been raised on the role of military leadership during a crisis situation. The distance between civil-military leadership during peacetime further increases during times of war or crisis. Some analysts believe that there are several factors that determine the civil-military relationship in Pakistan:

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64 Sebastien Miraglia states that without shared information regarding the size, characteristics and capabilities of Pakistan’s nuclear arsenal, civilian and military leaders appear far less likely to reach a consensus about the deployment or release of nuclear weapons. See for details, Sebastien Miraglia, "Deadly or Impotent? Nuclear Command and Control in Pakistan,” The Journal of Strategic Studies, Vol.36, No.6, December 2013, p.851.
Western analysts believe that the above stated factors are enough to determine civil-military relationship in Pakistan. Weak political culture and bad governance have undermined the credibility of civil institutions. Nuclear weapons under direct control of military command and absence of strong civil leadership in nuclear establishment multiplies the chances of threats. In such scenarios, a strong and efficient nuclear command and control system is not possible, according to the Western perspective.

5.1.7. A New A. Q. Khan?

The A.Q. Khan incident in 2004 was a serious test case for Pakistan which later on became a source of embarrassment for the country. According to Joseph Cirincione “the case of Pakistan’s A.Q Khan, now known as the infamous leader of a black market proliferation ring that sold nuclear technology to Iran, Libya and other nations, illustrates this point.”65 There are

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also some analysts who believe that Pakistan failed to pursue A.Q. Khan’s case in a proper way. A.Q. Khan incident provided a chance for the global community to comment, criticize, and challenge the credibility of Pakistan’s nuclear weapon program and propagate whatever is wanted to spoil the country’s image. According to Dr. Manfred Ruck, because of A.Q. Khan issue, everything has been closed for Pakistan.\textsuperscript{66} He has added that Pakistan lost its credibility after Khan’s case. The A.Q. Khan network also provided a reason to believe that Pakistan is not serious about non-proliferations efforts and has no control over its nuclear scientists. In addition, various other assumptions have been developed about the credibility of nuclear scientists in Pakistan. European policy-makers have raised concerns many times. Their core argument is that Pakistani scientists’ activities in proliferation of technology have been suspicious in the past and still in progress at certain levels. After passing almost a decade, Pakistan’s nuclear industry still has an insider challenge, they maintain. There is a vague perception that there would be “a new A.Q. Khan” in Pakistan’s nuclear industry.\textsuperscript{67} This character may be more dangerous than A.Q. Khan. Further, that the current nuclear weapons’ status in Pakistan is completely different from the era of A.Q. Khan. In such conditions, risks are high and vulnerabilities are increasing.

There are also assumptions that A.Q. Khan’s network was not completely shut down. There are some reports that some of “Khan’s associates successfully escaped the law enforcement attention and could resume black market business.”\textsuperscript{68} According to Bruce O. Riedle, “although Parvez Musharraf took action against A.Q. Khan, but neither CIA nor International Atomic Energy Agency (IAEA) was allowed to inquire Khan about his decades

\textsuperscript{66} In an Interview with Dr. Manfred Ruck, former Director at the German Federal Office of Economics and Export Control, where he had been since 1975, on May 27, 2013.

\textsuperscript{67} This statement was given by a Western security experts during an academic conversation in ISDP Stockholm, Sweden.

\textsuperscript{68} Kerr and Nikitin, “Pakistan’s Nuclear Weapons: Proliferation and Security Issues,” pp.22-23.
of nuclear deals with Iran, North Korea and most probably with Syria and Saudi Arabia.\textsuperscript{69} There are still many conspiracy theories about A.Q. Khan’s network and the situation could become more serious in the future. His media trial, house arrest and then his clearance from all such allegations have created further suspicions.

CHAPTER SIX

PAKISTAN’S NUCLEAR SAFETY & SECURITY: ARRANGEMENTS AND CHALLENGES

Our nuclear weapons are safe, secure and under complete institutional and professional control.¹


Pakistan believes that its nuclear weapons and installations are safe and secure. Pakistan claims that its arrangements are according to universally charted regulations and standards. Western assumptions and worries are based on their various hypothetical scenarios. However, there is a need to address these concerns with objectively rational arguments. Recently, Pakistan's introduction of tactical nuclear weapons in its defence system has once again alarmed the global community. Its tactical nuclear weapons have been treated in the same manner. Pakistan maintains that these Western apprehensions have been devised to malign Pakistan's nuclear security management and its efforts to guard its nuclear weapons. Global concerns and worries are mostly based on assumptions and perceptions which lack primary sources of information. There is a difference between threat and threat perception.² It is a fact that Pakistan's nuclear weapons' capability has always been suspected and labelled as “Islamic bomb”, as discussed earlier. According to Zameer Akram, there is a discriminatory environment against Pakistan at the international level.³ Most of the literature that is available on Pakistan's nuclear weapons' security is primarily preconcieved. It is a reality that nuclear

² In an Interview with Ishtiaq Ahmed, Professor Emeritus of Political Science, Stockholm University, Sweden, March 28, 2013.
³ In an Interview with Ambassador Zameer Akram, Pakistan Permanent Mission to Geneva on July 11, 2013.
security has emerged as a serious threat and it has become a common threat for all nuclear-weapon states as well as for non-weapons states.

Pakistan’s drive to acquire nuclear weapons was purely based on their deterrence capability in order to guarantee its survival. Pakistan’s motives to acquire nuclear weapons are comprehensively described in the principles of neoliberalism. According to Pavel Podvig, Pakistan cannot eliminate its nuclear weapons as they are a vital factor in its national security matters. Global misperceptions about Pakistan’s nuclear weapons have exaggerated the reality. The global community considers Pakistan’s nuclear weapons insecure and have made them a “prime focus” of twisted and contorted global media propaganda. Media has a prominent role in shaping world opinion. Edward Herman and Noam Chomsky’s propaganda model, also known as “five filters”, describes the phenomenon of media’s role in domestic, regional and global politics. “The propaganda model describes forces that shape what the media does,” says Herman and Chomsky. Oliver Boyd-Barrett’s sixth model elaborates how media sources were utilized in the case of Iraq’s weapons of mass destruction (WMD) programme and the March invasion of the country. This also describes the way media was involved in global politics and how the states and agencies use it to manipulate reality.

Since 1998 when Pakistan, contrary to the international expectations, conducted its nuclear tests, the Western community, Israel, and India have been successful in developing negative perceptions about Pakistan’s nuclear weapons programme. Most of the available literature, research data and opinions about Pakistan’s nuclear weapons security are based on

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4 According to Kenneth N. Waltz, States continue to coexist in an anarchic order. Self-help is the principle of action in such an order, and the most important way in which states must help themselves is by providing for their own security, Kenneth N. Waltz, “The Origins of War in Neorealism Theory,” Journal of Interdisciplinary History, Vol. 18, No. 4, The Origin and Prevention of Major Wars, Spring, 1988, p.624.


myths and fictions. Since most of their analysis are based on media-related sources, their authenticity is not established. In fact, Pakistan’s nuclear weapons have been targeted by various means and ways. Similarly, few probable scenarios and concerns have been raised by some security analysts, “a circle of firing squad”. They would refer to each other to support their arguments.

To tackle the question of whether Pakistan’s nuclear weapons are in real danger or not, the study observes that all the above stated threat scenarios are portrayed by western analysts and are based on some hypothetical statements and calculations. The credibility of such scenarios is not as strong as is projected by media. Pakistan has a strong confidence that its nuclear assets are safe and secure, and it has established extraordinary security measurements for this purpose. According to Matthew Bunn, Pakistan and the USA have a very good understanding on the matter of nuclear safety and security. The evolving characteristics of terrorism have posed very serious security challenges to all the states in general, and to nuclear-weapons states in particular. Security needs in Pakistan have increased because of the regional security environment. Pakistan has updated its security parameters according to its needs and demands. Major developments occurred in Pakistan’s nuclear arrangements during the last few years. Although characteristics of nuclear security developments are secret, but they have been called the best in their practices. According to Matthew Bunn,

Major upgrades of Pakistan’s nuclear security apparatus began even before the four-year effort commenced; the United States, however, has reportedly broadened its cooperation with Pakistan since 2009. The specifics of this cooperation are classified, however, and what has been accomplished during the four-year nuclear security effort is not known.8

9 Bunn, Harrell and Malin, Progress on Securing Nuclear Weapons: The Four-Year Effort and Beyond, p.6. Here Four-Year Efforts refer to Barack Obama’s plan to secure nuclear weapons from terrorists. In April 2009, President Obama warned that terrorists were trying to get nuclear weapons or the materials needed to make them, a danger he called “the most immediate and extreme threat to global security.” In response, he called for
Nuclear security development is an endless process. Pakistan has modified its nuclear safety and security mechanism according to the needs and demands of its national security interests. According to Nuclear Threat Initiative (NTI) Nuclear Materials Security Index 2014, Pakistan has improved its nuclear security, improved three points as compared to 2012 which depicts the highest improvement of any nuclear-weapon state.\textsuperscript{10} According to this Index, Pakistan has taken various measures to enhance its nuclear security regulations and to enforce nuclear security best practices.\textsuperscript{11} In addition, Pakistan has improved its scores by introducing new regulations in the On-Site Physical Protection indicator.\textsuperscript{12} According to NTI report 2016, Pakistan has been ranked 21\textsuperscript{st} in terms of theft ranking of quantities and sites, which is equal to India and Japan ranking; and Pakistan scored two additional points since 2014 in terms of security and control measures.\textsuperscript{13} Pakistan and India have scored equal position at 36 with a score of 54 points each in the case of sabotage ranking. Furthermore, Pakistan has enhanced its status in sabotage ranking of a number of sites at number 15 with 80 points, whereas India stands below at number 30 with 60 points. In sabotage ranking, Pakistan has also achieved tremendous progress in its domestic commitment and capacity and stands at number 25 with 87 points; whereas, India stands below at number 40 with 47 points.\textsuperscript{14} NTI report has also quoted that by passing new cyber security regulations, Pakistan has improved its score in the security and control measure category.

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\textsuperscript{11} Ibid.

\textsuperscript{12} Ibid.


\textsuperscript{14} Ibid.
Since insider threat has become a universal challenge. All nuclear-capable states are facing various threats in their nuclear industries, and insider threat is one of the most serious threats to all nuclear power states. Nuclear-weapon states have, therefore, established tighter security mechanisms in their nuclear weapons complex. To mitigate this security threat, all nuclear-weapon states have adopted almost the same guiding principles, i.e., Personnel reliability programme and human reliability programme (personnel security programme and threat assessment). Moreover, the civilian nuclear facilities are following the IAEA guiding principles. The role of IAEA has been very effective in addressing safety and security issues. Insider threat is one of the serious threats because it deals directly with the people who are associated with nuclear facilities and nuclear weapons.

Pakistan has effectively benefited from the IAEA guided principles to mitigate insider threat at civil nuclear plants. Pakistan has also enhanced its control system over its nuclear weapons complex. Personnel reliability programme (PRP) and human reliability programme (HRP) are universally accepted. All nuclear weapon states are utilizing these programmes. Pakistan has applied the same programmes in its nuclear weapons security management. As a result, Pakistan has achieved positive developments in nuclear weapons’ security management.

Nuclear security culture is a vital area in handling nuclear weapons’ security. In Pakistan, nuclear security culture is not very old. According to Feroz Hassan Khan, “nuclear security culture evolved in Pakistan after the September 11 attacks.” To enhance its nuclear security culture, Pakistan has taken very significant steps during the last few years. The creation of the Nuclear Security Action Plan (NSAP) under the Pakistan Nuclear Regulatory Authority (PNRA) was a key development in Pakistan’s nuclear security management. Furthermore, in

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16 Ibid., p.17.
the recent developments, Pakistan has ratified the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material. According to Sartaj Aziz, in line with the commitment made during the 2014 NSS, Pakistan has ratified CPPNM which shows Pakistan’s confidence in its national nuclear security regime, which is consistent with the contemporary international standards.\(^{17}\) Pakistan has made enormous efforts in its nuclear security development, but, due to security concerns, these arrangements have been kept secret. Global misperceptions about Pakistan’s nuclear weapons’ security have underestimated the country’s efforts in this regard. In the age of media war, it has become very easy to give a negative twist to any state’s image. Therefore, various threat scenarios have been developed by Western analysts and have been disseminated through the mass media for creating negative perceptions worldwide.

Oliver Boyd-Barrett has identified how the media misinformed the global community about Iraq’s alleged WMDs and its association with Al-Qaida. In the same way, media campaign has been launched against Pakistan’s nuclear weapons. All these media campaigns have had serious impact on Pakistan’s image globally.\(^{18}\) In reality, all such ‘news’ and ‘informations’ lack any reference to primary source data. The growing misperceptions against Pakistan’s nuclear weapons could be dangerous in the future which can subsequently undermine the deterrence strategy. In the era of media, effective nuclear deterrence is only possible if Pakistan maintains its positive image.

There has been no reported incident of insider threat to Pakistan’s nuclear weapons’ complex. A.Q. Khan was allegedly transferring knowledge about centrifuges and was involved in nuclear black-market. But, again, at that time Pakistan’s nuclear command and control system was in its developing stage. Secondly, he did not sell fissile material or any nuclear

\(^{17}\) Sartaj Aziz, Advisor to the Prime Minister on Foreign Affairs, “Pakistan’s Non-Proliferation Efforts & Strategic Export Controls,” Inaugural address in a Seminar at ISSI, May 03, 2016.

\(^{18}\) Global community knowledge about Pakistan’s nuclear security and, command and control architecture is based on secondary sources and mass media.
weapons device. Most importantly, nuclear export control laws were put in practice in 2004. Prior to that, there were no global nuclear export laws. Almost every nuclear-weapon state has acquired nuclear weapon technology from other states. According to David Albright, “in fact, most states have depended heavily on coveted overseas acquisition of vital equipment, materials, and know-how to create the industrial infrastructure to build nuclear weapons, a trend that continues today.”\footnote{David Albright, Paul Brannan, and Andrea ScheelStricker, “Detecting and Disrupting Illicit Nuclear Trade after A.Q. Khan,” The Washington Quarterly, CSIS, APRIL 2010, p.85.} After the revelation of A.Q. Khan’s network, Pakistan’s government took serious measures to mitigate such challenges in future. UNSC 1540 was implemented to control the illicit trafficking of nuclear technology. But, threats are still there. Albright has further stated that “the A.Q. Khan network did not survive, but other transnational networks might still exist or arise in the future.”\footnote{Ibid., p.87.} After the experience of A.Q. Khan’s case, Pakistan has reacted responsibly and has established extraordinary measures to avoid such situations.

Pakistan's nuclear weapons' complex faces no threat from Al-Qaida or the Taliban. Al-Qaida's important leaderships have either been killed or captured. After the death of Osama bin Laden, Al-Qaida has lost its effectiveness. US' impending total withdrawal from Afghanistan depicts that now Al-Qaida and other mainstream fundamentalist groups have been successfully tackled. In this instance, it will be illogical to state that Al-Qaida still poses a serious threat to Pakistan or to its nuclear weapons. Even during the time of Osama bin Laden, there was no serious threat from Al-Qaida.

Pakistan has established advanced security mechanisms to counter any serious threat to its nuclear facilities. Nuclear safety and security guiding principles provide adequate protecting measures to these nuclear weapons. Design Basis Threat principles, safety measures, strong
organizational control and advanced operational mechanisms provide sufficient safety and security architecture. Personnel reliability programme and human reliability programme have become outstanding techniques in nuclear weapons’ security management. Most importantly, Pakistan’s nuclear weapons’ designs are equally advanced as those of the other nuclear-weapon states. It should be noted that the nuclear weapon is a combination of various technical safety and security tools. Nuclear weapons’ safety, security and operational control are interlinked. All these technical measures prevent any accidental or unauthorized use. "Nuclear weapons system safety integrates policy, organizational responsibilities, and the conduct of safety-related activities throughout the life-cycle of a nuclear weapon system."\textsuperscript{21} Pakistan has adopted all safety and security tools, and it has placed an effective command and control system.

This is a fact that Pakistan has failed to project its message in a proper way at international fora. Its nuclear diplomacy has been ineffective. Effective representation is very important for any state to convey its message. Weak representation can isolate a state at a global level. Weak representation at global scene has been a serious challenge for Pakistan. Dearth of nuclear experts to represent Pakistan’s point of view has been a major cause. Infact, Pakistan shares this scarcity with the rest of the third world countries who have been unsuccessful in promoting their objectives assertively. Pakistan’s inefficiency in nuclear diplomacy has created many challenges for it.

Since the inception of its nuclear programme, there has been no single attack on Pakistan’s nuclear facilities. Unfortunately, some very wrong reporting has been done by some analysts about militant attacks in Pakistan. Militants attack on Pakistan’s Army G.H.Qs in 2009, the Karachi Mehran air base in 2011 and the 2012 attack on the Minhas airbase\textsuperscript{22} have been


referred as attacks on nuclear facilities. Pakistan's nuclear weapons are located at unidentified locations and in dispersed forms. In recent reports, Pakistan has assigned 25,000 troops to guard its nuclear weapons. Furthermore, Matthew Bunn has elaborated that:

In our recent survey, Pakistan’s nuclear security expert reported “dramatic” changes in the organizations governing nuclear security; in the numbers, training, and equipment of guard forces; in approaches to screening personnel; in requirements for nuclear material accounting; and in approaches to strengthening security culture, and substantial changes in every other aspect of nuclear security covered in the survey.

Pakistan has significantly progressed in its nuclear weapons security. But there is still room for improvement where the nuclear security culture is concerned. Nuclear security culture is strong in scientific community and military organization but unfortunately, this culture is very weak in civil institutions which include politicians, bureaucrats, civil society and civil law enforcement institutions. Nuclear security culture plays very effective role in nuclear security management. “As one U.S. nuclear security official put it: “good security is 20 percent equipment and 80 percent culture.” For an effective security culture, all stakeholders must play their roles accordingly. According to Igor Khripunov, “Security culture is a vehicle to improve the performance of the human component at nuclear facilities and organizations exposed to outside and insider threats.” IAEA model of nuclear security culture depicts the roles of various factors and actors in a particular environment. According to Igor, for a better

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23 Ibid., p.17.
24 Ibid.
nuclear security culture, all civil and military institutions have equal role and responsibility. Weak political culture has negatively impacted on Pakistan’s nuclear security arrangements.

**Nuclear Policy of Pakistan**

Pakistan has maintained its ambiguity in nuclear policy. This policy of ambiguity has become a vital part of nuclear deterrence. Pakistan has kept its nuclear weapons under tight secrecy since their initial development in the early 1970s. Global concerns about Pakistan’s nuclear transparency policy have no logical means. Almost all nuclear weapon states have kept their nuclear weapons and materials under high secrecy. Although, U.S.A, U.K and France have revealed some information publically but Russia and China have a strong secrecy policy. According to SIPRI Year Book 2013:

> France, the UK and the USA have recently disclosed important information about their nuclear capabilities. In contrast, transparency in Russia has decreased as a result of its decision not to publicly release detailed data about its strategic nuclear forces under New START, even though it shares the information with the USA. China remains highly non-transparent as part of its long-standing deterrence strategy and little information is publicly available about its nuclear forces and weapon production complex.

All these P-5 nuclear weapon states even do not share the nuclear data and information with each other. According to many nuclear experts in West, all P-5 NWS do not trust each other in terms of sharing information about nuclear weapons and materials because of security reasons. In the same way Pakistan does not disclose information about its nuclear weapon

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27 In an Interview with Igor Khripunov, Distinguished Fellow, Center for International Trade and Security (CITS), University of Georgia, USA on April 17, 2014.
30 In an Interview with Scott Jones, Executive Director, Center for International Trade and Security (CITS), University of Georgia, USA on April 17, 2014. Other experts like Matthew Bunn and Igor Khripunov have the same opinions.
programme and has maintained its secrecy. “The most important reason why states might prefer to keep information on nuclear warhead deployments and arsenals secret is the fear that its revelation would weaken the security of a state and its allies because it would encourage a first strike and therefore undermine deterrence,” says Annette Schaper. In sync with the nuclear culture maintained by the nuclear weapon states, Pakistan would also like to keep its nuclear policy a secret to exercise its right of maintaining minimum credible deterrence. Pakistan is compelled to maintain its strategy of ambiguity to keep its nuclear weapons and materials safe and secure. Pakistan's deterrence strategy is more to counter conventional asymmetry vis-à-vis India on one hand, and on the other, ensure peace in the region. In Annette Schaper’s views “smaller nuclear powers might additionally favour a policy of quantitative ambiguity as a way of protecting nuclear deterrence until they have built a survivable nuclear retaliatory force.”

It is also in the interest of Pakistan to keep ambiguity in its nuclear policy intact to strengthen its national interest and keep its command and control system fairly transparent. Pakistan has displayed transparency in its nuclear safety and security architectures at some level. In comparison to the other nuclear weapon states like China and India, Pakistan is more transparent.

Pakistan’s nuclear complex is small as compared to other nuclear weapon states. Approximately 70,000 people work in Pakistan’s nuclear complex which also include 7,000 to 8,000 scientists and about 2,000 have “critical knowledge.” Military is usually involved in providing security, command and control system and organizational matters. It is also a fact that in all nuclear weapon states, it is the military that manages nuclear security matters and

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32 Ibid.
33 It includes total numbers of nuclear facilities, enriched Uranium/plutonium, number of scientists, total numbers of weapons and capacity to develop its nuclear weapon programme.
plays effective role in nuclear command and control. In Pakistan, military performs similar duties. It is a reality that civil military relation in Pakistan has had a very tumultuous history. Although, the historical balance of civil-military relationship in Pakistan has been oscillating, nonetheless, during the last decade, the situation has improved significantly and “healthy civil military relations are witnessed”. National command authority (NCA) is comprised of both top civil and military elites. It reflects a very positive image of nuclear decision making structure in Pakistan.

Pakistan has firm belief that international community has completely misperceived its nuclear weapons and underestimated its safety and security mechanisms. In addition, a media campaign has been launched to create insensitivity in common public. International worries are based on secondary sources or assumptions based scenarios.

There are two major reasons which have made Pakistan’s nuclear weapons programme so questionable:

(a) Baseless world perceptions on its security and safety, mainly due to Pakistan’s ambiguous nuclear policy. This perception has largely been reinforced by Western and Indian propaganda.

(b) Pakistan’s inefficiency in defending its programme despite having a reasonable transparency accessible for inquiry.

Pakistan has significantly improved its nuclear safety and security architecture and it has established an effective command and control system. It is a reality that there is no single incident of nuclear theft, attack on nuclear facility, insider-outsider threat or any unauthorized use of nuclear weapon. Every nuclear weapon state has some bad episodes in its nuclear history

but all nuclear weapon states understand the dangers of these weapons. A.Q Khan incident was a test case for Pakistan and it has learnt from this episode. Currently, Pakistan’s nuclear complex is stronger, more effective, mature and reliable. Pakistan has taken various safety and security measures to increase global confidence in its nuclear weapons security. Pakistan has stored its nuclear weapons in components form. This is also a fact that “the United States has provided substantial assistance to improve the security of Pakistan's arsenal, such that today it is largely safe and secure during peacetime.” According to Matthew Bunn, the United States has cooperated with Pakistan in improving its nuclear security. According to Jeffrey Lewis, “the United States has provided approximately $100 million to Pakistan in the form of training and equipment.” Pakistan's civil military authorities have shown full confidence over its nuclear weapons’ safety and security arrangements. Pakistan believes that only credible, safe and secure nuclear weapon system can guarantee its national security and survival against its traditional rival. Pakistan has complete understanding that nuclear weapons are very important component of its deterrence policy and Pakistan has to keep these weapons safe, secure and under reliable command and control system.

38 In an Interview with Matthew Bunn, Harvard Kennedy School, John F. Kennedy School of Government, Cambridge, Massachusetts, USA, February 07, 2014. He further pointed out that the details of cooperation are highly classified.
39 Lewis, "Managing the Danger from Pakistan’s Nuclear Stockpile," p.3.
6.1. Arrangements

Nuclear security is a sacred responsibility.\textsuperscript{40}

General Raheel Sharif

Nuclear weapons’ safety and security management has become a vital subject in contemporary global political environment. To maintain an effective and sustainable safety and security structure for nuclear weapons, a reliable organization is very important. There are two fundamental characteristics to manage nuclear weapons;

(a) the safety and security mechanism

(b) the organization or command and control structure.

Two very prominent sociological schools of thought, high reliability theorists (HRT) and normal accident theorists (NAT), have discussed the organizational characteristics of nuclear weapons’ safety and security.\textsuperscript{41} High reliability theory emphasizes the effective role of an organization.\textsuperscript{42} An effective organization maintains the system in a good working condition by showing high professionalism. Normal accident theory suggests that accidents are inevitable in any system. It argues that no organization can sustain good performance all the time.

The debate between HRT and NAT theorists provides the basis to understand the nitty-gritty of nuclear weapons’ safety and security issues. Nuclear weapon states have significantly improved their organizational capabilities to safeguard and manage their nuclear assets. In


\textsuperscript{42}A detailed discussion on High Reliability Theory and Normal Accident Theory has been done in Chapter Number Two.
contemporary global security situation, states have advanced their military technologies, fighting techniques and, most importantly, they have highly disciplined and trained organizations. The question arises as to what have nuclear-weapon states done so far to maintain their nuclear safety and security system robust and advanced. Nuclear-weapon states have modernized their techniques to keep their nuclear weapons safe and secure. What are these safety and security measures? Who controls the keys of nuclear weapons? What are the locations of nuclear weapons? Very little knowledge is available about such aspects. It is only the USA that has declassified some data regarding nuclear safety measures. Most of the details will remain classified due to states’ policies to keep ambiguity regarding security policies. But, it has been recognized that innovations in nuclear technology have reduced the dangers of accidental or unauthorized use of nuclear weapons.

In this chapter, an effort has been made to discuss Pakistan's nuclear safety and security efforts and command and control system, separately. What are the safety and security parameters Pakistan has applied in its nuclear weapons? What is Pakistan’s engagement with international community to address nuclear safety and security issue? What is the current nuclear command and control system? In the light of available resources, an effort has been made to ensure that all the stated concerns are addressed.

Pakistan has taken following measures in this regard:


44 In an interview with Dr. Scott Jones, Executive Director, Center for International Trade and Security (CITS), University of Georgia, USA on April 17, 2014. Same views shared by Dr. Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
6.1.1. Nuclear Safety and Security

Pakistan has developed a comprehensive nuclear weapons’ safety and security system. Since its nuclear tests in 1998, nuclear weapons’ safety and security mechanisms have greatly improved, along with nuclear command and control system. Technological advancement has further strengthened safety features of nuclear weapons. As a matter of secrecy, safety and security; these parameters have always been kept classified. No nuclear-weapon state has disclosed its nuclear safety and security principles. Some basic information has, however, been declassified by USA. Like other nuclear-weapon states, Pakistan keeps the location of nuclear weapons secret and exact numbers of weapons are also not disclosed. To ensure a safe and secure nuclear-weapon system, an advanced nuclear safety and security system has been developed. According to Dr. Samar, Pakistan has applied the best nuclear safety and security parameters to secure its nuclear assets. These safety and security parameters have been applied after several successful tests. They further enhance the reliability and credibility of the nuclear management system. Various nuclear institutions and training and regulatory authorities have been established in the country. These institutions and authorities are involved in nuclear safety and regulatory matters of the country. Pakistan has also signed several international nuclear safety and security regimes and legal instruments. These legal instruments are applicable only to the civilian nuclear programme. Pakistan is not a signatory to the nuclear non-proliferation treaty (NPT), and there is no global jurisdiction which could apply on its nuclear weapons’ programme.

45 In an interview with Dr. Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
46 It should be noted that there is no global nuclear weapon security regime and Pakistan is not bound to share information about its nuclear weapons.
To systematically understand Pakistan’s efforts to improve its nuclear safety and security, there is a need to review its other-nuclear related developments. For this purpose, this section has been divided into three parts:

Figure: 6.1 Pakistan’s Developments in Nuclear Safety & Security

6.1.1.1. Institutional Development

Nuclear safety has always remained a potential concern in nuclear management. Pakistan has established and adopted various nuclear safety protocols offered by the International Atomic Energy Agency (IAEA) and United Nations (UN). Pakistan Atomic Energy Commission (PAEC) was initially engaged in civil nuclear technology as Pakistan had no intention to build the nuclear weapon. The PAEC was an autonomous institution which was under direct control of Prime Minister's Secretariat. Later on, it was shifted to National Command Authority's (NCA) supervision.\textsuperscript{47} Safety and security of nuclear weapons is a

\textsuperscript{47}For detail discussion, see Command and Control section.
completely different task from civilian programme. Pakistan's engagement with the UN and IAEA on nuclear safety and security programme are partially applied on nuclear weapon program. To maintain and keep things under reliable control, Pakistan's creation of the Centre of Excellence for training under the Strategic Plans Division (SPD) in 2012, is an outstanding achievement and its commitment to enhance nuclear safety and security. This institute provides specialized courses and training in various aspects of nuclear safety and security, personnel reliability programme (PRP), human reliability programme (HRP), and physical protection of nuclear material and facilities. It also provides specialized training courses on material’s accounting and transport of nuclear material or weapons. The Strategic Export Control Division (SECDIV) in the Ministry of Foreign Affairs (MOFA) is the main authority for making and applying essential rules and regulations for the effectiveness of export controls. SECDIV, includes experts from the Ministry of Foreign Affairs, the Federal Board of Revenue, the PAEC, the PNRA and the SPD.

Pakistan government promulgated the Pakistan Nuclear Regulatory Authority Ordinance No. III of 2001, under which the Directorate of Nuclear Safety and Radiation Protection (DNSRP), formerly a part of Pakistan Atomic Energy Commission (PAEC), was transformed into Pakistan Nuclear Regulatory Authority (PNRA). PNRA is an autonomous institute to.

….ensure safe operation of nuclear facilities and to protect radiation workers, general public and the environment from the harmful effects of radiation by formulating and implementing effective regulations and building a relationship of trust with the licensees and maintain transparency in its actions and decisions.

51 Ibid.
The PNRA also issues no objection certificates (NOCs) for radioactive resources’ to importers and exporters. It also coordinates with international organizations like the IAEA in various training and technical workshops. The School for Nuclear and Radiation Safety (SNRS) at the PNRA is for training of newly recruited officers. In addition, the National Institute of Safety and Security (NISAS) has also been established at the PNRA for education of national and international officials in nuclear security-related courses.\textsuperscript{52} Also, the Nuclear Security Training Centre (NSTC) is being set up. The PNRA also provides consultancy services and technical expertise to the IAEA in strengthening nuclear infrastructure worldwide.\textsuperscript{53} To promote nuclear safety culture, various other technical courses have been introduced. IAEA’s initiative of the Agency’s Collaborating Centres has been acknowledged by Pakistan “which are designed to standardize technology, disseminate information, and facilitate research and training.”\textsuperscript{54} To enhance nuclear security system in its nuclear complex, the PNRA has implemented the National Security Action Plan (NSAP) with the cooperation of IAEA in 2006.\textsuperscript{55} It is responsible to manage “radioactive sources, secure orphan sources, detect radiation and prepare for emergencies.”\textsuperscript{56} This plan comprises national security laws and nuclear regulations and procedures. Overall, the PNRA has emerged as an autonomous body which has effectively progressed in nuclear complex of Pakistan. The IAEA and other international agencies has appreciated the role of the PNRA. The organizational structure of PNRA is as follows:

\textsuperscript{52} Pakistan’s National Statement in Nuclear Security Summit 2014 at Hague, Netherlands, p.02.
\textsuperscript{53} Pakistan Nuclear Regulatory Authority (PNRA) Report 2014, p.02.
\textsuperscript{54} Pakistan’s National Statement in Nuclear Security Summit 2014 at Hague, Netherlands.
\textsuperscript{55} Ibid.
\textsuperscript{56} Ibid.
From this chart, the rules and responsibilities of various directorates in the PNRA can be observed. Prime Minister is the executive authority of this organization. Chairman is the head of this organization. There are two full time members (i) member executive and (ii) member corporate and there are seven part time members. Under member corporate and

Source: [http://www.pnra.org/Organizational-Chart.pdf](http://www.pnra.org/Organizational-Chart.pdf)

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executive, there are two Director Generals (DGs). There are various directorates under these DGs. These directorates perform their roles and responsibilities in specified areas. There are two other DGs in the organization i.e. Chairman Secretariate and, Evaluation and Feedback.

To promote and strengthen the culture of nuclear politics in civil society, higher education in nuclear studies has been introduced in several public sector universities. These efforts would be very useful in developing nuclear strategies and policies for the state. Furthermore, SPD has introduced “a system which is involved in regular and surprise inspections to tally material production and waste in order to maintain transparency and accountability.”

6.1.1.2. Safety and Security Protocols

What are the principal safety and security measures Pakistan has applied in its nuclear weapons and missile systems? This question has been raised by many security experts. These nuclear secrets will remain classified. There is a reason to believe that Pakistan’s nuclear safety and security system is based on the best international practices available globally. It is as much advanced and robust as any other nuclear-weapon state's infrastructures. Pakistan has Permissive Action Links (PALs) technology to prevent unauthorized use or launching of its nuclear weapons. It should be noted that Pakistan's nuclear weapons are not on “hair-trigger alert,” but in de-mated conditions. Ballistic missiles are not nuclear-tipped, and there is a geographical separation between missiles (delivery systems) and the fissile core under the tight

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60 Khan, Eating Grass: The Making of the Pakistani Bomb, p.332.
control of nuclear command.\textsuperscript{61} Furthermore, the two-man rule, in some cases three-men rule, has been applied to prevent any unauthorized use of nuclear weapons.\textsuperscript{62} There is also an assumption that Pakistan has a Destructive Action Links (DALs) system.\textsuperscript{63} Pakistan has comprehensively applied design basis threat (DBT) approaches. DBT security principles for civilian nuclear facilities are generally different from nuclear weapon storage facilities. A Physical Protect System (PPS) has been designed for its nuclear facilities against any security threat. PPS comprises three fundamentals:\textsuperscript{64}

\textbf{Figure: 6.3. Composition of Physical Protect System (PPS)}

![Diagram of Physical Protect System (PPS)](image)

This design has been considered very effective for nuclear security. Pakistan has also developed indigenous safety and security measures for its nuclear weapons. Pakistan's nuclear weapons remain in disassembled form.\textsuperscript{65} This strategy prevents the capture or unauthorized use of weapons. In ballistic missiles and tactical nuclear weapons (TNW), highly advanced safety and security mechanisms have been installed.\textsuperscript{66} In terms of warhead safety measures, Pakistan has developed highly sophisticated safety standards as are practiced by other nuclear-weapon states. All these measures have been applied after several tests and procedures. From safety

\begin{thebibliography}{99}
\bibitem{63} There is no confirm source about this information. Source is classified.
\bibitem{65} Khan, \textit{Eating Grass: The Making of the Pakistani Bomb}, p.332.
\bibitem{66} In an interview with Dr, Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
\end{thebibliography}
measures to operational measures, organizational measures play a decisive role. All these three measures are in their best standards and coordination.

**Figure: 6.4. Nuclear Safety and Security Principles**

Pakistan has successfully advanced its nuclear weapons’ safety and security principles by enhancing its capabilities in all these three dimensions. USA has also helped Pakistan in nuclear security matters. According to Michael Karepon, USA’s help to Pakistan in nuclear weapons security was in some limited areas and it does not cover nuclear weapons’ safety, e.g., fencing, barriers, etc.67 Although, USA has offered its assistance to reduce nuclear danger, but Pakistan has some concerns that “there is a possibility that U.S. devices might contain a ‘kill switch’ or other Trojan-horse like features, Pakistani officials may have had more concerns related to the disclosure of sensitive national security information.”68

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67 In an Interview with 24 Michael Krepon, Co-Founder/Senior Associate, Stimson Center, Washington DC, May 12, 2014.

That is mainly because both states have a long history of mistrust between them. Pakistan did not get any nuclear assistance from any other country for its nuclear weapons’ safety and security. Pakistan has adopted indigenous nuclear safety and security measures. There are several safety and security protocols which are unknown to the public. These are classified even for heads of different institutions, bureaucrats, politicians, and some high ranks in military and defence department.

6.1.1.3. International Cooperation

Pakistan’s support to global initiatives on nuclear issues illustrates Pakistan’s readiness for international cooperation and development. Since the inception of the Council of Atomic Energy (CAE) in 1956, later changed to PAEC, Pakistan is continuously engaged with the international community in various nuclear safeguards. Pakistan has signed and rectified various international legal conventions. These binding instruments consist of different safety and security conventions, treaties and regimes. It should be noted that international legal instruments are applicable only to civilian nuclear-related programmes. The following nuclear installations (shown in table) are under IAEA safeguards:

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>FACILITY</th>
<th>AGENCY PUBLICATION</th>
<th>DATE OF SIGNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pakistan Research Reactor-1 (PARR-1)</td>
<td>INFCIRC/34</td>
<td>March 05, 1962</td>
</tr>
</tbody>
</table>

69 In addition, USA’s contingency plan to take control over Pakistan’s nuclear weapons in one of the major concerns for Pakistani establishment. For details see, Robert A. Friedlander, *Catastrophic Possibilities Threatening United States Security*, New York: Oxford University Press, 2012.

IAEA inspectors frequently check the material records and operating record. In addition, they also inspect the safeguards. Furthermore, Pakistan has signed and committed to various international safety conventions, export control laws, and is participating in all global efforts against nuclear terrorism. Details of these engagements have been listed below:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>International Nuclear Engagements</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Convention on Early Notification of a Nuclear Accident, 1986 (CENNA).</td>
</tr>
<tr>
<td>3</td>
<td>Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, 1986 (CACNARE).</td>
</tr>
</tbody>
</table>

71 The two nuclear power stations (C-3/C-4) are under construction.
Pakistan has endorsed several other UN Security Resolutions in support of nuclear safety and security and eliminating nuclear terrorism. According to Daniel Painter, “other Pakistani initiatives include strengthened export controls, the implementation of a National Security Action Plan (NSAP) with the IAEA’s collaboration, and involvement in international nuclear security programmes such as the U.S. and Russian-led Global Initiative to Combat Nuclear Terrorism.” While elaborating the features of Nuclear Security Action Plan, Khalid Kidwai stated that, we are implementing our NSAP to manage radioactive sources, secure orphan sources, detect radiation, and prepare for emergencies. Nuclear Emergency Management System has also been established to handle nuclear and radiological emergencies.

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72 For complete national statement of Pakistan, see Annexure A, B, C and D.
It should be noted that Pakistan has not signed any nuclear convention, treaty or regime which involves its nuclear weapons’ security.

However, Pakistan has received some support from the USA in nuclear security. Pakistan has also acknowledged the global efforts for nuclear safety and security. The U.S. initiative of Nuclear Security Summit has further strengthened the efforts against nuclear terrorism. Although the Nuclear Security Summit process does not include the nuclear use for military purposes/ weapons in its agenda, it has considerably promoted the idea of nuclear security culture in both civil and military domains. Pakistan’s active participation in Nuclear Security Summits 2010, 2012 and 2014 has proved its sincere commitment to a safe nuclear world. Pakistan not only supports the global efforts for nuclear safety and security, but also follows these instructions with sincerity.

6.1.2. Command and Control System

Nuclear command and control system varies from state to state. “Command and control systems are the medium by which the use of nuclear weapons can enter into military operations and these systems necessarily involve military knowledge and action.” In almost all nuclear-weapon states, nuclear command and control system is comprised of civil and military leadership. Their coordination plays an effective role in assessing and fulfilling the demands and direction of the country’s nuclear weapon development programme and military doctrine. Largely, there are three traditional characteristics of robust nuclear command and control system:

1. NCC System should be placed under tight and exclusive civilian control.
2. Must respond to a highly centralized hierarchy.

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3. Nuclear weapons must include physical protection against unauthorized assembly or detonation.

Many new developments have occurred during recent years in the domain of nuclear command and control system. Mutual coordination and consensus between civil and military leadership has been considered a very important factor for a robust nuclear command and control system. Technological advancement has further enhanced the capabilities of this system. Nuclear weapon modernization, weapons’ coding and locking mechanism have further tightened the security system. After Zulfikar Ali Bhutto, Pakistan's military took complete control over the country's nuclear weapon programme. In the post-nuclearization environment (1998), Pakistan was in dire need of a system which could oversee and regulate policies about nuclear weapons. In the absence of a formal functional organization to manage the techno-political matters of nuclear weapons’ security, nuclear weapon development and strategies were not under a single command. The Combat Development Directorate (CD Directorate) was the centre of nuclear programme from 1993 to 1998.\textsuperscript{77} The creation of robust nuclear command and control system was not only "to establish a harmonized command and control mechanism, operational policy, and development strategy, but also to provide credibility to strategic deterrence."\textsuperscript{78} To fill this vacuum, Pakistan took many steps. After taking power in October 1999, National Security Council (NSC), a committee of 13 members was instituted by former President General Parvez Musharraf.\textsuperscript{79} To establish a more effective and highly centralized hierarchy, Pakistan took affirmative decisions in the best national interest. In this regard, Lt.

\begin{flushright}
\textsuperscript{77} Khan, Eating Grass: The Making of the Pakistani Bomb, p.325.
\textsuperscript{78} Mahmud Ali Durrani, "Pakistan's Strategic Thinking and the Role of Nuclear Weapons," Cooperative Monitoring Center, Occasional Paper 37, Sandia National Laboratories, July 2004, p.49.
\textsuperscript{79} Chakma, Pakistan's Nuclear Weapons, p.75. For details of NSC and Legal Framework Order, 2002 (Chief Executive’s Oder Number 24 of 2002). These 13 members were as follow: The President (Chairman of the National Security Council) other members, the Prime Minister, the Chairman of the Senate, the Speaker of the National Assembly, the Leader of the Opposition in the National Assembly, the Chief Ministers of the Provinces, the Chairman Joint Chiefs of Staff Committee, and the Chiefs of Staff of the Pakistan Army, Pakistan Navy and Pakistan Air Force. See details, Legal Framework Order, 2002, Gazette of Pakistan, Extraordinary, August, 2002, \url{http://www.pakistani.org/pakistan/constitution/musharraf_const_revival/lfo.html}, Accessed on April 11, 2015.
\end{flushright}
General Khalid Kidwai, the first Director General of SPD, has played a vital role in setting the constitution of nuclear command and control in late 1990s.\textsuperscript{80}

On February 2\textsuperscript{nd}, 2000, Pakistan successfully crafted its comprehensive nuclear command and control system, also known as, “Strategic Command Organization (SCO)”. SCO has essentially three constituents:\textsuperscript{81}

1. The National Command Authority (NCA).
2. The Strategic Plans Division (SPD).
3. The Strategic Forces Commands (SFC).

With the establishment of National Command Authority, Pakistan successfully introduced a robust nuclear command and control system. The National Command Authority (NCA) emerged as the sole authority to control all nuclear-related activities in the country. All nuclear facilities and assets, either for civil or military purposes, are under NCA’s control. The NCA has complete control over research, development, production and use of nuclear and space technology.\textsuperscript{82} Strategic organizations such as Kahuta Research Laboratory (KRL), Pakistan Atomic Energy Commission (PAEC), Space and Upper Atmosphere Research Commission (SUPARCO) are under the direct control of NCA.

The NCA is the supreme authority to decide on deployment of nuclear weapons in times of crisis. It is composed of top civil and military leadership and includes the Employment Control Committee (ECC) and the Development Control Committee (DCC). The Strategic Plans Division (SPD), the second tier of the NCA, functions as the secretariat of the NCA. Pakistan’s command and control system is “based on ‘C\textsuperscript{4}ISR’ Command, Control,

\textsuperscript{80} Earlier, General Kidwai was appointed as a Director General Evaluation & Research (E & R) Directorate in late June 1998. Feroz Hassan Khan in his book Eating Grass: The Making of the Pakistani Bomb has comprehensively discussed the evolution of strategic organization in Pakistan.


\textsuperscript{82} Gazette of Pakistan 2010, Extraordinary, NCA Act 2010.
Communication, Computers, Intelligence, Information, Surveillance and Reconnaissance.\textsuperscript{83} C\textsuperscript{4}ISR system has advantages in both nuclear deterrence strategy and nuclear security.

From 2000 to 2010, the NCA was chaired by the President, with the Prime Minister acting as vice-chairman.\textsuperscript{84} The President had all powers to run the NCA. Major changes occurred after the 2008 general elections. After 18\textsuperscript{th} Amendment to the Constitution, NCA’s chairmanship has been shifted to the Prime Minister. Now, the Prime Minister is the supreme authority of NCA.\textsuperscript{85} The Prime Minister has been given a decisive role in final decision-making. Other members of the NCA are the Defence Minister, Interior Minister, Finance Minister, Chairman Joint Chiefs of Staff Committee (JCSC), Chief of Army Staff, Chief of Naval Staff, Chief of Air Staff and Director General SPD as secretary of the NCA. The Foreign Minister performs as a Deputy Chairman of the ECC and the Chairman of the Joint Chiefs of Staff is the Deputy Chairman of the DCC. The following chart reflects the hierarchy of the NCA:


\textsuperscript{84} Khan, \textit{Eating Grass: The Making of the Pakistani Bomb}, p.334.

ECC is the vital component of NCA. It has the mandate of nuclear policy and decision-making of the NCA with the consensus of civil and military leadership.\textsuperscript{87} Functioning through the SPD, “DCC directs the systematic evolvement of nuclear weapon classifications to

accomplish the potential objectives established by regulatory committee. DCC includes nuclear scientists and military leadership only. There is no role of political leadership in this committee. DCC is mainly involved in nuclear weapons development and oversight. SPD, the secretariat of NCA, located at Joint Services Headquarters, has emerged as a strong organ in the post-nuclear test environment in Pakistan. According to Feroz Hassan Khan, "within a year of its creation, the SPD had evolved into a true nuclear enclave in Pakistan." Overall, SPD has developed and proved its capabilities in a very limited time period.

Figure: 6.6. Organizational Structure of SPD

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90 Khan, Eating Grass: The Making of the Pakistani Bomb, p.331
91 Ibid., p.330.
At present, SPD has a strong hold over nuclear policy and development matters of the country. In addition, it is not only involved in nuclear policy and decision-making, but also engaged in day-to-day activities, training, education and briefings on nuclear-related matters. The SPD has evolved rapidly in Pakistan’s defence system and it has systematically controlled Pakistan’s nuclear programme and all other strategic organizations and institutes. Pakistan has deployed 20,000 highly-trained personnel under the command of Security Division of the NCA and strength of 28,000 men has been projected in the next few years.\textsuperscript{92} The Centre for Excellence has become a vital institution for providing training and education for security personnel involved in nuclear security. Personnel reliability programme (PRP) (for military personnel) and human reliability programme (HRP) (for civilian) have been successfully applied.

Pakistan has utilised every resource to safeguard its nuclear weapons. As already noted, to ensure a credible nuclear deterrence, a reliable and effective organization has been established which consists of both civil and military leadership. However, unfortunately, Pakistan’s efforts have always been under-rated. A pragmatic approach has been applied below to address such concerns. Generally, global concerns are based on assumptions and hypothetical scenarios of social scientists.

Pakistan has significantly advanced its nuclear safety and security system and, most importantly, its command and control authority. The existing nuclear safety and security framework is based on the measures adopted by the United Nations (UN), the International Atomic Energy Agency (IAEA), Legal Conventions and Nuclear Export Control Laws. For nuclear weapons’ safety and security, Pakistan has applied an indigenously developed

advanced safety and security mechanism. After analysing Pakistan’s nuclear safety and security disposition, it is very important to understand the characteristics of nuclear command and control system. From technical advancements to organizational developments, Pakistan has significantly improved its nuclear weapons’ management system. Pakistan’s decision-making elites are fully aware of the importance of a safe, secure and reliable nuclear weapons management system. Pakistan has not only learnt from its own regional experience, but also from other nuclear powers’ past experience. Credible nuclear deterrence is achievable only through a safe and secure nuclear weapon system. If weapons are not safe, a deterrence strategy would be undermined. In addition, ambiguity in the total number and location of nuclear weapons is also a part of the strategy of deterrence.

The military as an organization has a significant part in managing, maintaining, securing and operationalising nuclear weapons, if necessary. Professional expertise of nuclear scientists is always available to the nuclear weapon management authority. Scientific support helps in updating technical areas. According to Dr. Samar Mubarakmand, during the last three decades, Pakistan has significantly improved its nuclear safety and security management system. In addition, civil-military relationship has mutual agreement in nuclear development in the country. To ensure a safe and secure nuclear weapon programme in national security interest, all national stakeholders have their roles and responsibilities to play. After acquiring nuclear weapon capability, Pakistan has significantly developed its nuclear command and control structure. The most vital area where Pakistan has done key efforts is safety and security of nuclear weapons. Development of the national nuclear security regime is one of the major

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93 In an interview with Dr, Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
94 Although, due to security reasons there is very less data available about nuclear safety and security mechanisms.
95 In an interview with Dr, Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
96 Ibid.
achievements in nuclear management policy. During the Nuclear Security Summit 2014, Pakistan defined five essential pillars of national nuclear security regime:97

1. A well-defined, robust command and control system. The National Command Authority (NCA), the apex decision-making body, works under the chairmanship of the Prime Minister.

2. Pakistan's nuclear security regime is anchored in the principle of multi-layered defence for the entire spectrum of any nuclear threat - insider, outsider or cyber threat - and is guided by the concept of five Ds - deter, detect, delay, defend, and destroy.

3. A rigorous regulatory regime encompasses all matters related to nuclear safety and security, including physical protection of materials and facilities, material control and accounting, transport security, prevention of illicit trafficking, border controls, and plans to deal with possible radiological emergencies.

4. A comprehensive export control regime.

5. International cooperation, consistent with our national policies and interests as well as international obligations.

Pakistan’s continuous engagement in improving its nuclear management and safety and security matters has been appreciated by U.S. government officials.98 Furthermore, some non-government organizations have also concluded, in their research studies, that Pakistan is successfully developing its nuclear safety and security mechanism. According to Nuclear Threat Initiative (NTI) Index 2014, Pakistan is the most improved nuclear-weapon state among nuclear armed states.99 Pakistan has taken serious steps in updating its nuclear safety and security regulations, and proved the largest enhancement by three points. Pakistan improved its scores in the On-Site Physical Protection and also contributed to new bilateral and multilateral assistance.100

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98 Kathryn Schultz, Regional Affairs, Department of State, USA, Washington DC. May 14, 2014.
100 Ibid. Although Pakistan’s score for Voluntary Commitments was already high.
The history of Pakistan's nuclear weapons’ programme provides satisfactory statistics in terms of nuclear safety and security. The nuclear weapon programme has been professionally managed by the capable and reliable military organization, Strategic Planing Division (SPD). A well-disciplined, organised and reliable military organization that has always protected national interest and maintained high professionalism. While learning from its own experience and of other nuclear-weapon powers, Pakistan has developed a fool-proof nuclear safety and security system under a reliable command and control system. Accidents, errors, mishandling and miscalculations are inevitable in any system. Fortunately, Pakistan’s nuclear history data provides a satisfactory record. Whatever Pakistan has done so far in its nuclear weapon complex will remain classified and ambiguous. The exact number of nuclear weapons, their locations, safety and security protocols is very confidential information. This information is not publicly available. With a realistic point of view, no nuclear-weapon state has provided exact figures about its nuclear-weapon programme. It is also a part of deterrence strategy and nuclear weapons’ security.

Most of the studies about Pakistan's nuclear command and control system are based on analytical arguments, rather than primary evidence. The SPD frequently facilitates international security analysts, academicians, journalists and government officials in various discussions and briefings. The most important feature of any nuclear-weapon state is its nuclear doctrine. In case of Pakistan, it has not officially defined its nuclear doctrine. Ambiguity in nuclear doctrine once again creates uncertainties amongst the international community. But, Pakistan considers it as part of its deterrence strategy. However, General Kidwai stated in the late 2000s that Pakistan’s nuclear weapons are only against Indian aggression. He described the focused points of Pakistan's nuclear strategy:¹⁰¹

i. The spatial threshold: India attacks Pakistan and
conquers a large part of its territory.

ii. The military threshold: India destroys a large part
either of its land or air forces.

iii. The economic strangling: India proceeds to the
economic strangling of Pakistan.

iv. Domestic destabilization: India pushes Pakistan into
political destabilization or creates a large-scale
internal subversion in Pakistan.

Furthermore, Pakistan's government has unofficially announced various key factors of
its unstated nuclear doctrine such as "restraint and responsibility, a minimum deterrent posture,
avoidance of an arms race, non-use against non-nuclear states, and participation in universally
applicable non-discriminatory multilateral arms control negotiations."102

Efforts to secure its nuclear weapons are reflected in its commitments and sincere
efforts. A secure and credible system is vital for its nuclear deterrence strategy. After almost
15 years of struggle, Pakistan can now confidently state that it has a stout nuclear command
and control system. Strategic organizations have rapidly developed their characteristics under
one command and control system. The NCA has professionally managed its solid control over
all national strategic organizations and proved its credibility in a very limited time period.
Safety and security of nuclear weapons is the supreme priority of the National Command
Authority. There was a need for a central command to control all nuclear-related activities in
the pre-1998 scenario. Since the inception of its nuclear weapon programme, Pakistan has not
observed any nuclear safety and security crises. In the shape of the SPD, Pakistan has been
successful in developing an epic organization to operate a highly credible nuclear programme.
The military is a highly reliable organization that has effectively proved its commitment to
guard the country's nuclear assets. The PNRA has also proved its professional credibility in a
short period of time. The IAEA and other international organizations have appreciated PNRA's

102Durrani, "Pakistan's Strategic Thinking and the Role of Nuclear Weapons," p.23.
role. Pakistan has ensured a fool-proof mechanism in every aspect of each nuclear institution in Pakistan. Safety and security of nuclear weapons is a prime concern for Pakistan. Pakistan believes that it has the best safety and security protocols to safeguard its nuclear weapons. To maintain its minimum credible deterrence, Pakistan will ensure that its nuclear weapons remain under tight command and control.

6.2. Challenges

Pakistan is confronting serious security challenges. Like other nuclear-weapon states, Pakistan is confronting various internal and external traditional and non-traditional challenges. Traditional rivalry with India and instability in Afghanistan have posed very serious security challenges to Pakistan's national security. Security threats from India have always been considered very serious to its national security. The Kashmir dispute is the root cause of conflict between the two big powers of South Asia. Both the states have fought three major wars (1948, 1965 and 1971), a limited war in Kargil and still there are serious territorial disputes between two nuclear neighbours.

The Afghan-Soviet war (1979-1989) has damaged Pakistan most dangerously in the recent past. It has multiplied Pakistan's challenges. From drug trafficking to terrorism, all have their roots in Afghanistan. The troubled situation in Afghanistan has an adverse socio-political impact on Pakistan. Indian RAW is using Afghanistan’s soil against Pakistan by conducting terrorist activities, supplying arms, resources and training to local militants. To counter such threats, Pakistan has also established different policy mechanisms like other NWS.

Furthermore, there are various issues contributing to the instability in the society of Pakistan. Domestic, regional and global factors are also as crucial along with minor issues. Do

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these challenges have any impact on Pakistan's nuclear weapons' security? What are the implications of these challenges on Pakistan's domestic structure? Despite having gone through daunting socio-political problems, Pakistan's Armed forces enjoyed comprehensive national cooperation and support in their War on Terror. Zarb-e-Azb has been the most successful operation against the militants in North Waziristan to flush them out.

Current domestic challenges are worsening Pakistan's image at the international level. Furthermore, Pakistan's foreign policy, particularly towards its neighbour, the turbulent Afghanistan needs amendments. It has been a vital factor in the peace and development of the South Asian region. Pakistan must formulate an effective strategy in the case of Afghanistan. The situation in Afghanistan has always posed serious threats and challenges to Pakistan and its tribal areas. Cross-border terrorist activities and drug smuggling have caused serious problems for Pakistan. Moreover, the international community is also expected to cooperate and recognize Pakistan's efforts of counter-terrorism. Pakistan's contribution in the war on terror is higher than any other state in the world. More than 70,000 deaths of civilian and military personnel and $120 billion economic loss are in the account of Pakistan. The United States and other global powers should acknowledge Pakistan's efforts in Global War on Terror. They should also understand its security needs and the threats it faces. Inspite of all these challenges, Pakistan has clearly defined priorities regarding its nuclear arsenal and facilities. The study will try to find and assert that Pakistan is an advanced and responsible nuclear weapon state and it believes that nuclear weapons are an assurance for the survival for the country. Pakistan needs to live with these weapons. The global community should also understand the regional security dynamics and should stand with Pakistan at this crucial time. The world has become a global village and all states are interdependent. Pakistan should not be

left alone as happened after the Cold War era. International cooperation in this regard would be beneficial for all.

An effort has been made to elaborate those serious issues which are also the cause of concern for the global community. A few of them have been discussed below to understand Pakistan's situation.

6.2.1. Terrorism

Terrorism has become a nightmare for the entire global community. During the last three decades, almost every state has experienced terrorist insurgencies. In contemporary world politics, global terrorism has become a serious challenge. Terrorism is one of the most serious challenges that Pakistan is confronting. However, as a result of the operations launched against terrorists in various parts of the country by the armed forces and law-enforcement agencies, the menace has been restricted to a great extent but not eliminated. After September 11, 2001, terrorist attacks in the USA, Pakistan became a major non-NATO ally of the United States and faced many terrorist attacks on its territory. Religious extremists appeared as one of the most serious threats to Pakistan's internal security. The wave of this terrorism has caused many security problems for Pakistan. Suicide bombing, target killings, religious intolerance and attacks on minorities have increased in the last fifteen years. According to South Asia Terrorism Portal (SATP) report, fatalities in terrorist violence in Pakistan 2003 to 2016 are 60,611.105

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Table: 6.2. Fatalities in Terrorist Violence in Pakistan 2003-2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Civilians</th>
<th>Security Force Personnel</th>
<th>Terrorists/Insurgents</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>140</td>
<td>24</td>
<td>25</td>
<td>189</td>
</tr>
<tr>
<td>2004</td>
<td>435</td>
<td>184</td>
<td>244</td>
<td>863</td>
</tr>
<tr>
<td>2005</td>
<td>430</td>
<td>81</td>
<td>137</td>
<td>648</td>
</tr>
<tr>
<td>2006</td>
<td>608</td>
<td>325</td>
<td>538</td>
<td>1471</td>
</tr>
<tr>
<td>2007</td>
<td>1522</td>
<td>597</td>
<td>1479</td>
<td>3598</td>
</tr>
<tr>
<td>2008</td>
<td>2155</td>
<td>654</td>
<td>3906</td>
<td>6715</td>
</tr>
<tr>
<td>2009</td>
<td>2324</td>
<td>991</td>
<td>8389</td>
<td>11704</td>
</tr>
<tr>
<td>2010</td>
<td>1796</td>
<td>469</td>
<td>5170</td>
<td>7435</td>
</tr>
<tr>
<td>2011</td>
<td>2738</td>
<td>765</td>
<td>2800</td>
<td>6303</td>
</tr>
<tr>
<td>2012</td>
<td>3007</td>
<td>732</td>
<td>2472</td>
<td>6211</td>
</tr>
<tr>
<td>2013</td>
<td>3001</td>
<td>676</td>
<td>1702</td>
<td>5379</td>
</tr>
<tr>
<td>2014</td>
<td>1781</td>
<td>533</td>
<td>3182</td>
<td>5496</td>
</tr>
<tr>
<td>2015</td>
<td>940</td>
<td>339</td>
<td>2403</td>
<td>3682</td>
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<tr>
<td>2016</td>
<td>253</td>
<td>118</td>
<td>546</td>
<td>917</td>
</tr>
<tr>
<td>Total*</td>
<td>21130</td>
<td>6488</td>
<td>32993</td>
<td>60611</td>
</tr>
</tbody>
</table>

This figure shows how terrorism has affected Pakistan after the 9/11 attack.

6.2.2. War in Afghanistan

September 11, 2001 terrorist attacks in the United States have comprehensively affected global peace and development. To eliminate this terrorism and its facilitators, the USA with its allies started a Global War on Terror (GWoT). Pakistan, as a non-NATO ally, supported the global community in this action. War in Afghanistan began on October 7, 2001, and continues to the present day.106 Sharing its North Western porous border, Pakistan had to bear the influx of millions of refugees, small weapons and drug smuggling, kidnapping, and other security issues. "Pakistan shares a 1500 miles long border with Afghanistan and some 300 passes link Afghanistan with KP and Baluchistan."107 The War on terror has become partially counter-

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productive. It has created many security challenges for the neighbouring states, particularly for Pakistan. Several local militant groups emerged in the region after this war started. Overall, Pakistan has paid a very heavy price on account of this war on terror.

Historically, Afghanistan has always been a critical issue for Pakistan's national security. The Afghan-Soviet war was the start of militancy in the country. "It is generally believed that the root cause for the growth of terrorism in Pakistan was the involvement of the U.S. in Afghanistan in 1980s." Though, American CIA with the help of Pakistan, successfully invalidated the Soviet Occupation of Afghanistan, however, the post-war era (1989) had created a power vacuum in Afghanistan. This automatically became a source of concern for Pakistan. Destabilization in Afghanistan’s society had direct implications on Pakistan. Pakistan did face many domestic challenges prior to the Afghan-Soviet war, but those were kept under control. There was no militant group or campaign at that time. The war in Afghanistan provided all those ingredients which led the society towards violence and mass killings. The flow of weapons, drugs, human trafficking and militant sections in the society provoked the sensitive matters into a bloody-campaign. According to Safiya Aftab, “although terrorists in Pakistan are supposed to have committed approximately all kinds of the violence, various domestic terrorist groups have also forged associations with international terrorist groups who had arrived in this region during the Afghan Jihad against Soviet occupation of Afghanistan and then during the civil war in that country.” Currently, it has been reported that Tehreek-e-Taliban Pakistan’s (TTP) mainstream members are located in Afghanistan and

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are carrying out their terrorist activities into Pakistan. “TTP leader Mullah Fazlullah operates from Afghanistan, mainly in Kunar and Nuri-stan provinces.”

The September 11, 2001, incidents provided another chance for the global community to interfere in Afghanistan’s territory. But, this time, the USA with its NATO allies invaded Afghanistan. A new wave of terrorism emerged in response to USA’s action. A new chapter of challenges opened up for Pakistan. The consequences of war in Afghanistan had greatly damaged the fabric of Pakistan’s society and almost all the institutions were dented. Thereby victimizing the people of Pakistan. According to South Asia Terrorism Portal (SATP) report, fatalities in terrorist violence in Pakistan from 2003-2016 are 60,611. The economy of Pakistan has also suffered very badly. According to Finance Minister Ishaq Dar, “Pakistan’s economy suffered over $100 billion losses in the last 12 years after becoming a U.S. ally in its war on terror since 9/11.”

It is thus evident that instability in Afghanistan has direct implications on Pakistan. Pakistan will suffer more until there is peace in Afghanistan. Stability in Afghanistan is not only in favour of itself but also for Pakistan and the South Asian region.

6.2.3. Socio-Political Dimensions of Vulnerabilities

Pakistan has a diverse society with various, ethnic religious and sectarian groups. A weak political system, corruption in civil institutions and inefficient governance have created many socio-political challenges in Pakistan. Health issues, illiteracy, poor infrastructure, injustice, unemployment, corruption and poverty are the core issues in Pakistani society.

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“Pakistan was ranked 134th out of 183 countries in its annual ranking of world corruption levels for 2011.”113 However, according to Transparency International Berlin annual global report 2015 Pakistan has improved its ranking from the 50th most corrupt country in 2014 to 53rd in 2015.114 Corruption has also been a very serious challenge in the civil sector. Although the current democratically elected government has shown some improvements to cope with this challenge that has deep roots in the governance system. Economic growth is also not satisfactory. Economic indicators show that the economic situation will remain the same for a few more years. According to World Health Organization’s report 2015 “the Gender Inequality Index for Pakistani is 0.559 and ranked 144 out of 145.115 Other domestic conflicts like unrest in Balochistan, violence in Karachi city, religious intolerance, and ethnic and sectarian violence are maligning Pakistan’s image.

It is a harsh reality that Pakistan’s civil law-enforcement organizations have failed to deliver effectively. It is the duty of civil organizations to maintain domestic peace and stability. There are nineteen major organizations that work under the Federal Government. The leading civil law-enforcement organizations like police, the Intelligence Bureau (IB) and the Federal Investigation Agency (FIA) have not been able to control crimes and other illegal activities successfully. Their incompetency and inability to deliver have created a bad impression of these organization among common people. Additionally, corruption and political influence have also given a bad name to these institutions. The public perception of these institutions is going down day by day. While elaborating the role of civil law-enforcement organizations in the country, Hassan Abbas has highlighted that “corruption, nepotism, and political

manipulation are rampant; they damage police integrity, credibility, and public image. An additional impediment to criminal law-enforcement is the ineptitude of Pakistan's judicial sector."116 The bad image of these organizations has encouraged criminal elements/extremists to carry out activities fearlessly. The poor functioning of these organizations also have many other reasons. "The changing tactics and targets of the various terrorist groups operating in the country pose a formidable challenge to a police force with limited resources, poor training, and inadequate equipment."117 Furthermore, many political elites and bureaucrats have always misused their authority and promoted their cronies in civil organizations. The capacity and strength of these organizations has always remained insufficient. The total strength of all law-enforcement and intelligence services' officials at the disposal of the federal government (with cross-provincial jurisdiction) is approximately 210,000.118

Political leadership has not considered policy reforms and enhancing the capabilities of these organizations. Pakistani population is growing rapidly, and there is a need to introduce new policies. Most importantly, the rapidly growing population requires reforms in law-enforcement organizations. But, unfortunately, very less attention is being paid to this matter. If the situation continues, more severe situations will be created. In addition to civil law-enforcement agencies, the Inter-Services Intelligence (ISI) plays a very significant role in state's domestic and global intelligence. The role of the ISI is vital in national security policy making:

The ISI is tasked with the collection of foreign and domestic intelligence; co-ordination of intelligence functions of the three military services; surveillance over its cadre, foreigners, the media, politically active segments of Pakistani society, diplomats of other countries accredited to Pakistan and Pakistani diplomats serving outside the country; the interception and monitoring of

117 Ibid.
118 Ibid., p.4.
Despite having joint roles and responsibilities in national security, the FIA and the IB have failed to achieve results. Lack of policy-making skills and attitudes have made their positions vulnerable. The weakness of civil law-enforcement organizations has exposed the inefficiency of their policy makers. Ineffective counter-terrorism strategies have exposed the civil law-enforcement agencies.

After the brutal activities of terrorist groups in Pakistan, The National Counter Terrorism Authority (NACTA) was established in March 2013. Unfortunately, it could not perform according to the prescribed policy due to lack of financial resources at its disposal. At the same time, the National Action Plan (NAP) was launched by the government of Pakistan in January 2015 to counter extremism and terrorism in the country. However, its implementation still remains tardy. Although, all these organizations are responsible for maintaining peace and stability in the country, due to lack of an effective counter-terrorism policy, the state is confronting many socio-political and internal security issues.

6.2.4. Nuclear Security Culture

Nuclear security culture essentially helps understand the states’ behaviour and attitude in certain situations while dealing with their nuclear security and policy matters. Nuclear security has attained serious attention during the last two decades. After nuclear non-proliferation and disarmament debates, nuclear security has emerged as a core issue in global nuclear politics. To ensure a strong nuclear security mechanism, an efficient nuclear security culture is very important. According to Matthew Bunn, nuclear security culture has significant


implications in maintaining effective nuclear security. A strong nuclear security culture further helps in developing and maintaining strong nuclear policies. In the case of Pakistan, Western nuclear security experts have described its nuclear security culture as weak and that it has negative implications in long-term nuclear security management.

There can be several ways to estimate the current status of nuclear security culture in Pakistan. For general understanding, the IAEA has prescribed various characteristics of nuclear security culture. On the basis of those standards, Pakistan is still in the initial stages of progress and development. Equal contribution from every segment of the community such as social, political and technical scientists is very important. Most of them are unaware of their roles and responsibilities. According to Mark Fitzpatrick, nuclear security culture in Pakistan is very weak and common citizens have no interest in nuclear safety-security matters of the country.

According to Feroz Khan, the nuclear security culture in Pakistan is not much old. It evolved mainly after the September 11, 2001 incidents in the USA. Has Pakistan achieved a satisfactory level in nuclear security culture? What has Pakistan done so far in enhancing nuclear security culture in the country? There is no precise information available in this regard. There is very little information available on Pakistan’s nuclear security arrangements. There are several other questions which need to be addressed. In addition, a visible gap between civil and military leadership in dealing with nuclear affairs in the country raises various questions in the mind of the global community. Academicians, researchers and civil society play a little role in the nuclear affairs of the country. Despite all fool-proof nuclear security arrangements, nuclear security culture still needs to get improved.

122 In an Interview with Mark Fitzpatrick, Director, Non-Proliferation and Disarmament Programme, the International Institute for Strategic Studies (IISS) London on March 04, 015.
6.2.5. Ineffective Global Representation

Effective global representation plays a very valuable role in developing foreign relations, building positive perceptions, exchange of knowledge and state-to-state cooperation. In terms of nuclear diplomacy, a solid and effective representation is a very important component for a nuclear-weapon state. Unfortunately, Pakistan has been very weak in terms of presenting its point of view at the global level. Ineffective global representation has made its position vulnerable and raised several questions on its capabilities. Has Pakistan failed to establish a good nuclear diplomacy mechanism? There are three fundamental tools of effective global representation:

i. Foreign Office/ Nuclear Diplomacy.

ii. Academicians/ Researchers/ Civil Society.

iii. Media.

The role of these three components is very significant in any state. Pakistan’s Foreign Office has maintained a satisfactory position in dealing with nuclear affairs. Because of its efficient work, efforts of Pakistani diplomatic community have always been acknowledged by international community. Unfortunately, Pakistan has been very weak in other two domains. Many international nuclear policy experts believe that Pakistan’s representation has remained insignificant on the international level. Official statements have always been made in response to any global concern/comment on its nuclear programme. Although, Pakistani diplomats have made a solid representation at international platforms, in reality, there is not even a single nuclear expert in Pakistan’s diplomatic community. There are a few nuclear experts in Pakistani academic community. The lack of academic and research contributions have made its position weak. Due to insufficient research data/resources, it is very difficult to project Pakistan’s perspective at the global level. Global nuclear policy-makers believe that without having good nuclear diplomacy and research contribution, it is very difficult to understand Pakistan’s
perspective. The global research community would refer to other sources to collect research data on Pakistan's nuclear security matters which unfortunately has created various misperceptions about Pakistan's nuclear security management. Pakistani mass media lacks the professional expertise in nuclear politics and cannot even project Pakistan's perspective in a cogent manner. Furthermore, it is unable to play any effective role in promoting nuclear security culture within Pakistan.

In conclusion, all nuclear-weapon states are facing various kinds of socio-political and security challenges. After the incident of 9/11, the entire global community has suffered many problems. Terrorism, unemployment, socio-political vulnerabilities, economic recession and insecurity have increased all over the world. No nuclear-weapon state can claim "a perfect system". Nuclear-weapon states are spending huge budgets to maintain domestic law and order situation. These expenditures show that threats exist in all these states and nuclear security is a common challenge for all nuclear-weapon states. After analyzing Pakistan's situation, it has been clarified that Pakistan has numerous internal security challenges. Socio-political vulnerabilities are further worsening the domestic conditions. Since the Afghan-Russia war started in 1979, Pakistan has been confronting serious security challenges. Are these challenges a real threat to nuclear weapons' security system? How are these challenges interlinked with nuclear weapons’ security? These questions further raise several ambiguities about Pakistan’s nuclear weapons’ security system. Like other nuclear-weapon states, Pakistan has reformed and advanced its security measures and strategies to face all these security challenges. However, things are still not in favour of Pakistan. On the basis of these challenges, Pakistan's nuclear weapons’ safety and security efforts have been widely questioned. Pakistan has to resolve all these challenges, and it has to prepare a good nuclear diplomacy. Bad governance has always remained a serious problem in the country. Challenges can be controlled through good governance and good social policies as well. Despite all odds, Pakistan's nuclear weapons
programme is technically sound. Its technology is as sophisticated as that of a developed country however does share the socio-political hiccups as any other NWS does.
CHAPTER SEVEN

RESEARCH FINDINGS AND POLICY OPTIONS

7.1. Research Findings:

After evaluating the various theoretical paradigms, in-depth analysis of nuclear weapons safety and security guiding principles, technical tools, comparative analysis of Western and Pakistani nuclear experts, it has been found that misperceptions have been created about Pakistan's nuclear weapons' safety and security. In addition, propaganda has been generated against Pakistan's nuclear weapon's programme. After evaluating the whole debate, this research provides following outcomes:

- After complete evaluation of international concerns and examining Pakistan’s nuclear safety and security mechanism, command and control system, the study has found that Pakistan's nuclear safety and security system is based on the best international practices that are globally available.
- Pakistan’s nuclear weapons are safe and secure, and they are under strict security arrangements.
- Pakistan’s nuclear weapons' safety and security system is as much advanced and robust as the nuclear safety and security infrastructures of any of the other nuclear weapon states.
- International concerns regarding Pakistan's nuclear weapon programme are based on hypothetical scenarios that have little chances of getting materialized.
- Global community has challenged and mispercieved Pakistan’s nuclear weapons’ security parameters.
There are no credible threats to Pakistan’s nuclear weapons.

7.2. Policy Options

The evolution in nuclear weapons’ security system came with the help of nuclear scientists alongside military, civil, and security experts. Every nuclear-weapon state have developed their nuclear security infrastructures after passing through various experiences and assessments. Although very little information is available about nuclear safety and security parameters adopted by all nuclear-weapon states, every such state has undertaken immense efforts to ensure that its nuclear weapons are secure and under tight command and control. From non-proliferation regimes to nuclear safety and then nuclear security, all these concepts emerged after some experiences.1 Some of the nuclear-weapon states have shared their experience of nuclear security with each other, such as, the UK and France, who have subsequently acquired help from the USA. Now, the USA, UK and France have almost the same nuclear safety and security parameters.2 The majority of nuclear-weapon states have adopted indigenously developed nuclear safety and security systems. In addition to a comprehensive nuclear command and control system, there are various socio-political elements which have multiple effects. To establish a strong national nuclear security policy; technically tested, politically encouraged and systematically processed reforms are very important. Western nuclear-weapon states have adopted best nuclear policies to maintain their nuclear strategies and these policies have evolved with the passage of time.

Pakistan’s nuclear weapons’ history starts from early 1970s. At the initial stages, Pakistan’s nuclear strategy was only to deter India, and this strategy still exists. After a careful analysis of the information about Pakistan’s nuclear policy, the study observed that only a few

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1 Scott D. Sagan’s book *Limits of Safety*, has elaborated nuclear safety issues during cold war era.
2 This statement was quoted by many nuclear experts in USA during interviews.
departments are involved in nuclear policy and decision-making in Pakistan. The study suggests that there is an ardent need to take all the stakeholders on board at some point. Their contribution can play constructive roles in long-term scenario. This exercise would further help in developing national nuclear security culture. The growing threats of non-traditional security challenges have made it obvious that the measures for nuclear security and the related culture are required to prolong beyond the traditional arrangement of guarding nuclear weapons and fissile material.

Pakistan has made every effort to secure its nuclear weapons. Under the control of the National Command Authority, it has ensured a sophisticated command and control system. Every nuclear safety and security aspect has been utilized in the administration of its nuclear weapons. According to Samar Mubarakmand, Pakistan has applied the best nuclear safety and security parameters in its nuclear weapons.3 Pakistan has a technically advanced and sturdy nuclear mechanism. Its nuclear facilities, installations, nuclear laboratories, research and training centres are greatly advanced and under highly educated and professionally groomed personnel. Unfortunately, Pakistan has not been able to build a positive image for itself in the nuclear field at the global level. In nuclear politics, it has failed to achieve a credible position. Thus, global perceptions and media campaigns have created a negative opinion about Pakistan’s nuclear weapon programme. Both internal and external factors have deteriorated Pakistan’s image in nuclear technology. However, in the world of uncertainty, everything is possible. Pakistan can get a positive image at a global stage. After analyzing various scenarios, perceptions and facts, this study suggests that Pakistan has to improve its nuclear image and develop strong and proactive nuclear diplomacy. The country does have a robust nuclear safety and security mechanism, but it has to change global perception through productive and proactive nuclear diplomacy. Furthermore, countering socio-political vulnerabilities would

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3 In an interview with Dr, Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
further enhance Pakistan's credibility. The following policy options would be very effective for Pakistan’s image in nuclear security and would be useful for developing nuclear diplomacy for the country:

7.2.1. Enhancing Nuclear Security Culture

An approach to create a culture of safeguarding nuclear weapons involves various socio-political factors. These factors help determine the required attitudes and beliefs in an organization. Nuclear security culture has become a very strong component of nuclear management. A strong nuclear security culture provides maximum guarantee for a safe and secure nuclear programme. Nuclear security culture comprises various features of organizational, operational and technical aspects. The IAEA model of nuclear security culture (briefly discussed in chapter three) clearly defines various aspects of nuclear security culture to achieve effective nuclear security. Nuclear-weapon states have developed indigenous nuclear security culture models for their nuclear weapons’ security.

Nuclear security culture of every nuclear-weapon state could be different. Culture is known to be a product of subjective social learning. Every nuclear-weapon state has a different socio-political culture and that influences the national-level policies and decision-making. Internationally defined practices are very effective in enhancing and strengthening the culture of nuclear security.

International nuclear security experts believe that Pakistan's nuclear security culture is in its initial phases and that is not satisfactory. Nuclear security culture is not only confined to technical upgrades or security hardware. It is achievable with the support of all stakeholders. Pakistan has to improve its nuclear security culture by utilizing all of its socio-political factors such as civil society, academicians, politicians and scholars. It can obtain a good level of

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4 This point has been raised by various nuclear security experts.
nuclear security culture by mobilizing all stakeholders. A sturdy nuclear security culture will strengthen Pakistan’s nuclear policies to achieve its desired objectives. There are four major components to enhance nuclear security culture in the country.\(^5\)

**Figure: 7.1. Components for Nuclear Security Culture**

A strong nuclear security culture is not achievable without the concerted efforts of the above stated components. The government has a very important role in defining the rules and regulations, distribution of responsibilities and finally, protection of sensitive information. The leadership evaluates the national needs and demands, and then formulates good strategies to achieve positive results. The respective organization manages policy statements, takes care of resources and maintains records. Civil society individuals are the key elements in any state or system. Effective participation of civil society leads to outstanding achievements.

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\(^5\) IAEA has highlighted these components in its nuclear security culture. These components have been discussed in details. Most importantly, these components have been considered useful for all nuclear power states and they are applicable in any system. For details see, International Atomic Energy Agency (IAEA), "Nuclear Security Culture," IAEA, Nuclear Security Series No.7, 2008
In Pakistan, there is a perception that only strategic organizations are responsible for an effective nuclear security culture, but, in reality, it is achievable only through mutual coordination of all factors; the government, strategic organizations, leadership and civil society (individuals’). There are various roles and responsibilities of these components which they perform during different times and situations. A strong nuclear security culture will provide a better chance to all stakeholders to participate with their constructive roles in national nuclear security policy and decision-making according to the global security environment.

7.2.2. Proper Response to International Concerns

There is strong criticism against Pakistan’s nuclear weapons security. Global anxieties are based on self-assessed concerns. Furthermore, a continuous global media campaign has created a negative approach towards Pakistan’s nuclear weapons. How can Pakistan change the global perceptions about its nuclear weapons’ security? How can Pakistan improve its nuclear diplomacy? After analyzing the previous record, it is logical that Pakistan could not present its perspective very effectively at the global level.6 In the age of global media when the world has become a global village, Pakistan has to participate with its productive approaches and policies. According to Samar Mubarakmand, Pakistan still needs to enhance its nuclear diplomacy and its diplomats should be trained to represent the country’s policies in a very convincing and logical manner.7 Pakistan should counter all the concerns accordingly at global forums. Diplomats should have a proper academic background to evaluate the international perspectives, and then formulate the strategies and suggest valuable proposals to the government.

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6 Most of the nuclear security experts and analysts’ community believe that there is a serious deficiency of academic research and policies of Pakistan. It is very difficult for them to understand Pakistan’s perspective.
7 In an interview with Dr, Samar Mubarakmand on August 06, 2014, Islamabad, Pakistan.
There is a need to shift the approach from “talking points” and official statements to real and logical strategies. A strong representation with an efficient nuclear diplomacy at the international level would create further opportunities for Pakistan. This approach would definitely help Pakistan highlight its real perspective. It would also be helpful to counter the malignant propaganda against Pakistan. In addition, young scholars should be provided opportunities to learn under senior strategic and scientific community of the country. Proper orientation and counselling of young scholars would be helpful for them to understand national security interests and it would further enhance nationalism. That would be highly beneficial in the long term.

Figure: 7.2. Nuclear Diplomacy

In the figure above, 7.2, a few steps have been recommended to enhance nuclear diplomacy at the global level. In the first place, there is a need to prepare Pakistani scholars in their respective fields. Scholars’ motivation, nationalism and loyalty to their motherland is very important. Secondly, scholars should be trained, educated and groomed in nuclear politics. Then, they should be facilitated and encouraged to make their contribution at the global level.
This strategy would be instrumental in developing an effective nuclear diplomacy at the international level.

7.2.3. Enhancing and Strengthening Research Potential in Nuclear Politics

In the contemporary world's political environment, nuclear politics has become a focal point. Academic research, analytical study and logical opinion development have contributed a very valuable role in nuclear politics. Currently, there is a very small number of nuclear experts and analysts in Pakistan. Due to this deficiency, it is very difficult for Pakistan to convey its correct perspective. On the other hand, international community is unable to understand Pakistan's position. Therefore, that becomes a mutual responsibility of all stakeholders; such as, academicians, researchers, analysts and civil society. Other nuclear-weapon states such as the USA, UK, France, Israel and India practice very strong nuclear diplomacy at the global level. Their experts, opinion-makers and think tanks are in large numbers. They are not only providing funds and fellowships to their young scholars, but also involving them at international-level training and capacity-building.

Western perspectives and literature have a great influence in opinion-making on a global scale. Pakistan should also share its academic research contributions to promote its perspective. In addition, research fellowship positions should be created for young Pakistani scholars in various global think tanks. They will not only learn and refine their research skills, but also establish networking with international research community. Furthermore, a liaison should be created between the educational institutions and strategic organizations like SPD which should help higher education commission (HEC) in developing curriculum for nuclear politics. Practical knowledge of the subject would be an advantage for scholar to conduct in-depth analysis. As a result, they will project Pakistan’s perspective at the global level in a very effective way.
7.2.4. Effective Counter Terrorism Policies

The domestic situation presents the real face of any state. Unfortunately, Pakistan is suffering from terrorism since the last four decades.\textsuperscript{8} However, there are several socio-political factors which are promoting terrorism in Pakistan; weak civil law-enforcement agencies too are equally responsible in this regard. Ineffectiveness and poor performance of civil law-enforcement institutions have been criticized by many. There is a dire need to review the performance and capabilities of all such institution. There is a need to improve the selection/recruitment criteria of the personnel working in these institutions. All political influence and meddling in the affairs of the civil law-enforcement agencies must be ended. Most importantly, there is a need to develop effective counter-terrorism strategies and intelligence-sharing to meet all types of challenges and threats. At the same time, the law-enforcement personnel should be equipped with modern weapons and given better training. Although, these civil institutions have an important role to play in national nuclear security issues, their effective performance will bring domestic peace and development. In addition, an effective counter-terrorism policy will be constructive for good governance. National Counter Terrorism Authority (NACTA) should be provided with funds without any further delay to enable it to perform its responsibilities.

Furthermore, it is also time to review the Afghan policy. Afghanistan has always been a crucial factor in Pakistan’s regional policy. Weak policies during the last three decades have put Pakistan in a very difficult situation. Instability and terrorism in Afghanistan has a direct impact on Pakistan. In addition, three million Afghan refugees are a big challenge for Pakistan.\textsuperscript{9}

\textsuperscript{8} As discussed earlier that because of serious terrorists’ incidents in the country, Western analysts have raised their concerns about nuclear weapon states.

\textsuperscript{9} Some numbers of Afghan refugees have been found in terrorism activities, violence, kidnapping, drug trafficking, spying and providing logistics support to terrorists.
Pakistan should adopt a long-term strategy to avoid further challenges and issues emanating from Afghanistan.

7.2.5. International Cooperation

International cooperation and scholar-exchange programmes can have multi-dimensional effects. Pakistan has already taken various nuclear safety and security cooperative measures. Most of these measures are in the scientific, technical and legal areas. There is a need to expand the horizon of international cooperation with the help of actions like the exchange of policy-makers, nuclear experts, security analysts, sharing of research knowledge, institutional and academic cooperation and creating research opportunities for young scholars at the international level. International cooperation will bring productive results for Pakistan.

There are a few major areas highlighted in figure below which should be enhanced:

**Figure: 7.3. Strategy for International Cooperation**

![Diagram of International Cooperation]

It is the responsibility of the Higher Education Commission of Pakistan, Foreign Ministry and non-governmental organizations/ think tanks, particularly working in education and consultancy areas, to provide such opportunities to young researchers. International
coordination will enhance confidence and will be useful in promoting mutual cooperation and understanding. Western research institutions and think tanks in nuclear studies are highly advanced and equipped with rich resources and senior experts. Cooperation with these institutions and experts will be in Pakistan’s favour. This will be useful in removing the negative perceptions associated with Pakistan.

7.2.6. Controlled Transparency

Transparency in nuclear affairs has been a very critical issue. There is a perception that Pakistan is not transparent and, covertly, it is rapidly increasing its nuclear inventory, including nuclear fissile material and weapons. These concerns further lead to various other questions. What are the locations of nuclear facilities in Pakistan? What is the total quantity of nuclear fissile material? What are the total numbers of nuclear weapons? What are the safety and security measures Pakistan has applied in its nuclear weapon system? Pakistan has already explained its position. There should be a demarcation between transparency and secrecy. According to Khalid Ahmed Kidwai, no country maintains transparency in its nuclear weapons programme but only the civilian nuclear programmes which are under the safeguards of the IAEA are transparent.\textsuperscript{10} Pakistan has placed ambiguity in its nuclear weapons’ programme. This is also a part of its deterrence strategy. But, Pakistan has an option to be more open in nuclear policies and exchange of information at academic research level. According to Igor Khripunov, this would be helpful to understand Pakistan’s perspective.\textsuperscript{11} There are certain ways to limit and delimit\textsuperscript{12} nuclear transparency, and Pakistan can also learn from other nuclear-weapon states.


\textsuperscript{11} Igor Khripunov, Distinguished Fellow, Center for International Trade and Security (CITS), University of Georgia, USA on April 17, 2014. Dr Annette Schaper has shared the same views during interview. She is a Senior Research Fellow, PRIF, Germany, Interview on May 14, 2013.

\textsuperscript{12}With the help of scientists and strategic organizations, these limits and delimits can be defined.
7.2.7. Educating the Mass Media

The mass media has become one of the most powerful tools in Pakistan, as elsewhere. No one can ignore its importance and implications in national security policy-making. Unfortunately, Pakistani mass media, particularly electronic media, is not mature yet. It is still in its preliminary phase. Pakistani leadership and responsible institutions should formulate a strategy to educate the media in nuclear security issues as well. A well-informed and mature media could be useful for national interest. Additionally, it would be constructive in enhancing and strengthening the nuclear security culture in the country. For that matter, journalists, TV analysts and programmers should be trained and educated in respective departments. This will help them understand the essence of nuclear politics and its importance in national security policy. Later on, they can contribute in a productive way.
Conclusion

After an exhaustive research into the threats to Pakistan’s nuclear assets and how these threats have been showcased by the international media, the scholar has reached some conclusions. In social sciences the conclusions are never taken as an end in themselves but as a way to move towards further research and contemplations. A careful and tiring investigation about Pakistan’s nuclear weapons and the organizational structure involved in the management of these weapons, the scholar has made certain objective observations. Pakistan’s safety and security architecture is carefully enunciated, highly efficient and very well equipped with the properly protected and most sophisticated technology. It is intensely monitored by a competitive intelligence system. There are regular threat appraisals conducted to ensure the depth of its safety and security. The Nuclear Emergency Management System and regulatory regime has the ability to prevent any illicit trafficking, border controls and deal with any unforeseen radiological emergencies. This has so far kept the programme accident free unlike other nuclear weapon states.

The comparative analysis of Pakistani and Western perspective regarding security of Pakistan’s nuclear weapons provides the logical framework to this dissertation. Few theories of international relations have been put to test by the author in order to conduct a properly structured research. If realism has to prevail, the contradictions caused due to reality and perceptions must be realized. The triumph of highly politically biased and twisted opinions is achieved through effective propaganda resources. Most of the previous research studies conducted by Western experts and analysts are based on hypothetical arguments. On the other hand, Pakistan’s nuclear scientists, policy and decision-making elites have confidence in their nuclear weapons’ safety and security systems. Nuclear safety and security systems have evolved with the passage of time and like all other nuclear weapon states, Pakistan has modernized and modified its nuclear industry both for civil and military purposes.
Nuclear security has become a constant challenge and threat of nuclear terrorism has increased during the last two decades. Currently, there are eight declared and one non-declared nuclear weapon states, but hypothetical statements and concerns raised by western and Indian analysts are a deliberate effort to malign Pakistan and its nuclear weapons programme. The politicization of nuclear weapons security is more damaging. Indian and Western analysts highlight the social vulnerabilities of Pakistan and link them with its nuclear weapons’ security. It is therefore essential for Pakistan to constantly correct their misperceptions.

Up to now, worries about Pakistan’s nuclear warheads and delivery vehicles have been blown out of proportion to generate anxiety against Pakistan. There is no doubt that Pakistan will continue to sustain the credibility of its nuclear deterrence. For that purpose, because of a series of escalatory measures taken by India since 1998, Pakistan has declared that it would pursue a full spectrum deterrence strategy to counter Indian aggression at any level. In response to Cold Start Doctrine (CSD) of India, Pakistan produced small-low yield or tactical nuclear weapons to ensure that India’s threats of aggression under CSD does not thrive. However, Pakistan has made a conscious decision that it would not pursue an arm race in South Asia. Pakistan does not seek to topple the strategic balance with India but aims to create and maintain symmetry, credibility and effectiveness of its deterrence. In fact, Pakistan would like to revive dialogue with India on nuclear CBMs. In this context, Pakistan would also like an enhanced focus on its long-standing proposal for a Strategic Restraint Regime (SRR), comprising nuclear and missile restraint, conventional balance and conflict resolution.

As discussed earlier in the introductory debate of this research study, it analyses various dimensions of nuclear security and its importance for Pakistan. It further explores the significance of this research study. The statement of the problem and hypothesis have provided a base to assess the ground realities. Nuclear weapons are an integral part of Pakistan’s national security policy. They are not only the weapons of deterrence against Indian aggression, but
also a source of survival and prestige for Pakistan. Global concerns about Pakistan’s nuclear weapons’ security are mostly based on perceptions rather than facts. Their studies about Pakistan’s nuclear weapons’ security are based on deductive arguments. Even before its nuclear tests, Pakistan had faced various global sanctions and criticism against its nuclear weapons programme. Yet, national security and sovereignty has always remained a priority for civil and military leadership. Security concerns were raised against Pakistan’s nuclear weapons following the September 11, 2001, incidents in the USA. Over the last fifteen years, the same security apprehensions have been propagated against Pakistan’s nuclear weapons.

Various theoretical foundations lead to a logical conclusion of this research study. Different theoretical aspects are conjugated to support the argument. From nuclear deterrence strategy to nuclear weapons’ security, all dimensions have been explained in case of Pakistan. High reliability theory (HRT) examines the effectiveness of the organization. Pakistan’s military has proved through its professionalism, discipline, historical evidence, reliability culture, training and capability to perform in any situation. In contrast to the normal accident theory (NAT), Pakistan’s strategic organization has maintained an errorless record. The most significant aspect of Pakistan’s military is its professionalism and capabilities to perform in any dangerous situation. The following figure explains the role of the strategic organization in Pakistan:

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13 While visiting the various well-known nuclear security experts and academicians, it was revealed that their source of information was “secondary source” or media. Most of them do not have exact knowledge about Pakistan’s nuclear programme, its efforts for nuclear security and role of nuclear weapons in its national security. Surprisingly, there was a big difference of opinion between social scientists and nuclear physicists. Social scientists’ opinions are based on perception and arguments rather than actual knowledge and understanding of the subject. They have completely underestimated the nuclear weapon technology and nuclear safety and security parameters.

14 In 1990, United States, under the Pressler amendment, imposed sanctions on Pakistan. The major reason behind the sanction was that Pakistan was involved in nuclear weapon development and it was using its funds in nuclear proliferation activities. After nuclear tests in May 1998, President Clinton imposed Glenn amendment sanctions against Pakistan (which also included India).

15 Even Western experts have shown more confidence on military over nuclear weapon security control in Pakistan.
Pakistan has established a robust command and control system, and all of its nuclear developments, both civil and military, are under the National Command Authority. All nuclear-related institutions, organizations, research centers and laboratories are under the National Command Authority. The SPD, the secretariat of NCA, is highly reliable organization in Pakistan. Even before the establishment of SPD and the NCA, there was no case of unauthorized or accidental use of nuclear weapons. Furthermore, there is no report of missing fissile material or weapons from Pakistan’s nuclear complex. To avoid any kind of mishap, misuse or accidental use of nuclear weapons, Pakistan has established advanced safety and security protocols. The ultimate objective is to maintain effective nuclear deterrence in the region.
The NCA understands that if it has to maintain nuclear deterrence against Indian aggression, it has to sustain all these components, that is, nuclear safety, security, reliability and effectively controlled nuclear weapons. Furthermore, Pakistan believes in a self-defence policy. It has learned from its previous experience that no country will rescue Pakistan in a time of war. Nuclear weapons provide an absolute defence system to Pakistan against Indian aggression. Pakistan will maintain its nuclear weapons safe and secure in any condition. The development of tactical nuclear weapons and short-range ballistic missile was the result of Indian Cold Start Doctrine. Pakistan believes in maintaining full-spectrum deterrence in the region. To maintain this deterrence strategy, Pakistan has to keep its nuclear weapon system, credible, safe, secure, and under a reliable command and control system.

The study has also discussed the global legal instruments to keep nuclear technology safe and secure. There are no fully agreed upon global parameters and regulations for nuclear weapons’ security. Every nuclear-weapon state has its individual responsibility to guard its nuclear weapons. For that purpose, every state has indigenously developed nuclear weapons’ safety and security protocols. Although, USA, being the most advanced nuclear-weapon state with highly strong nuclear security culture, has shared nuclear safety and security measures with other nuclear-weapon states such as the PALs system, etc. Nuclear weapons’ safety and security is not enough in itself. There are various guiding principles linked with nuclear
weapons’ safety and security, such as, safety and security measures, organizational measures and operational measures under the umbrella of an effective nuclear safety and security culture.\textsuperscript{16} Pakistan has implemented all required safety and security protocols. Nuclear safety culture in Pakistan has evolved since the inception of its nuclear programme and it has developed a good nuclear safety culture with the passage of time. It does not mean that there is no scope of improvement left for nuclear safety and security culture in the country.

The study suggests that there is also a communication gap between Western and Pakistan’s security analysts. After evaluating the Western apprehensions about Pakistan’s nuclear weapons’ security, the following causes have been deduced:

**Figure: C.3- Additional Causes of Negative Impression**

Pakistan is passing through a very challenging era of its history where bad governance, terrorism, socio-political issues, violence and social vulnerabilities are major concerns. These

\textsuperscript{16} These aspects have been discussed in chapter three.
factors are spoiling Pakistan’s image at the global level. Because of a serious, internal security condition, Pakistan has always been criticized over its nuclear weapons’ security. Unfortunately, the global community has been misguided about facts. Nuclear weapons’ security has always been a prime objective of Pakistan’s security policy and decision-making elites. An effective nuclear deterrence is possible only through a reliable, safe and secure nuclear weapons’ system. Negative perceptions and baseless assumptions about Pakistan’s nuclear weapons have been created to denuclearize it. Global media has transformed threat perceptions into real threats. While analyzing Western concerns over Pakistan’s nuclear weapons’ security, it has been revealed that most of these concerns are based on secondary sources or information from the media.

The study also analyses the real challenges to all nuclear-weapon states as well. It has been observed that all nuclear-weapon states are facing many socio-political and non-traditional challenges. Terrorism is one of the most serious challenge to all nuclear-weapon states in general. Pakistan is also facing such challenges at the same pattern. In order to assess the validity of western perceptsions, the study elaborates Pakistan’s arrangements to secure its nuclear weapons. Safety and security of nuclear weapons is and will remain the most important issue for Pakistan. Nuclear physicists and those experts who have basic knowledge of nuclear weapons’ safety and security system believe that it is impossible for terrorists or non-state actors to operate nuclear weapons single handedly. There are various complicated procedures involved in triggering a single nuclear weapon. Even if it is triggered accidently or is used without authority, the DALs system provides the last stage security system.

The study inferred that Pakistan’s nuclear weapons’ safety and security system is as much advanced and robust as any other nuclear weapon state’s nuclear infrastructure is. Pakistan has maintained an error-free nuclear safety and security system. However, Pakistan has to address non-technical issues which are tarnishing its image at the global level.
Recommendations:

The following recommendations can serve in the best interest of Pakistan:

1. There is a need to promote the nuclear security culture in the country.
2. There is a dire need to improve the nuclear diplomacy structure.
3. Counter-terrorism strategies in the country need upgradation.
4. Nuclear politics has become a very important subject. There is a need to provide government scholarships, fellowships and research facilities to the young professionals.
5. Controlled transparency and demonstration of nuclear safety and security efforts.
6. Relevant government officials, diplomats and politicians should have basic concepts of nuclear politics. More importantly, diplomats should get special academic training and education in nuclear studies.
7. Academic and research collaboration with international research centres and academic institutions.
8. Culture of exchange of scholars, academicians and officials should be promoted.
9. There is a need to provide research facilities and opportunities to foreign scholars and policy-makers in the country. It will help them understand Pakistan’s perspective.
10. There is a need to strengthen the nuclear security culture at the regional forum. For that purpose, the South Asian Association for Regional Cooperation, would be the appropriate forum.
11. Global cooperation on nuclear security, particularly with the United States, Russia and China at certain levels.
12. There is a need to enhance the requirements for a national-level Design Basis Threat.
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• Global Insecurity Center, University of Bristol, United Kingdom.
• The International Institute for Strategic Studies (IISS) London.
• Chatham House, the Royal Institute of International Affairs, London.
• Royal United Services Institute (RUSI) London.
Annexures

Annex-A
Pakistan’s National Statement
Nuclear Security Summit 2016
Washington, 31 March - 1 April 2016

Pakistan is strongly committed to the objective of nuclear security and has been proactively engaged with the international community to promote nuclear safety and security. It has ensured that nuclear and radioactive materials and all related facilities are secured in all places. The Nuclear Security Summit (NSS) process has contributed to improve nuclear security by raising greater awareness about it. The process has reinforced nuclear security culture as an area of special focus. Valuable ground has been covered in strengthening nuclear security architecture worldwide through national efforts.

Nuclear security is a national responsibility. Effective measures taken at the national level contribute to nuclear security internationally.

As a responsible nuclear state, Pakistan takes nuclear security very seriously and accords it the highest priority in its security construct. Our nuclear security paradigm, evolved over the years, is effective and responsive against the entire range of possible threats. Nuclear security regime in Pakistan is dynamic and regularly reviewed and updated.

In line with the commitment made during the 2014 NSS, Pakistan has ratified the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM). This is a reaffirmation of Pakistan’s confidence in its national nuclear security regime, which is consistent with the contemporary international standards.

Focus on nuclear security should further enhance international cooperation in peaceful applications of nuclear technology. Confidence in safety and security of nuclear and radiological materials and associated facilities should facilitate collaboration in health, industry, agriculture and other sectors.

Post-NSS 2016, focus should be on broadening participation in efforts towards promoting nuclear security through the platform of IAEA which has primacy and the competence in such matters.

National Nuclear Security Regime
Pakistan's nuclear security regime is based on national legislative, regulatory and administrative framework. The elements of nuclear security in Pakistan include robust command and control system led by the National Command Authority (NCA), rigorous regulatory regime, comprehensive export controls and international cooperation. We follow the principle of multi-layered defence to prevent and effectively respond to the entire spectrum of threats.

Pakistan has established a specially trained, highly skilled and well equipped force that is designed for nuclear security. Dedicated intelligence provides depth to our security architecture. Continuous threat appraisal and institutional reviews are conducted to upgrade response mechanism.

The regulatory regime encompasses all matters related to nuclear safety and security, including physical protection of materials and facilities, material control and accounting, transport
security, prevention of illicit trafficking, border controls, and plans to deal with possible radiological emergencies through an elaborate Nuclear Emergency Management System (NEMS).

Pakistan’s export control regime is at par with the standards followed by Nuclear Suppliers’ Group (NSG), Missile Technology Control Regime (MTCR) and Australia Group. International cooperation, consistent with our national policies and international obligations, helps in voluntary sharing of best practices and experiences in the security domain.

Centre of Excellence: As part of nuclear security regime, Pakistan’s Centre of Excellence on Nuclear Security (PCENS) has been established. Working together, PCENS, the National Institute of Safety and Security (NISAS) and Pakistan Institute of Engineering and Applied Sciences (PIEAS) provide exhaustive education and training in areas including physical protection, material control and accounting, transport security, cyber security and personnel reliability. These training facilities continue to grow into a regional and international hub, with support of the IAEA.

In collaboration with IAEA, PCENS has conducted several regional and national training courses. Pakistan hosted the annual meeting of the ‘International Network of Nuclear Security Support Centres’ in March 2016, which was the first meeting of the Network held outside IAEA Headquarters, Vienna.

Technical and Scientific support: PNRA and PAEC maintain dedicated units to provide technical and scientific support services at the national level to ensure equipment lifecycle management and to provide assistance in case of any nuclear security event. These units are equipped with necessary laboratory tools, equipment, software and expert support.

Nuclear Safety: Pakistan attaches great importance to nuclear safety at all levels. Safety parameters, emergency preparedness and response, and operators’ training protocols and procedures are continuously reviewed and enforced. The approach to ensure safety of nuclear power plants is in accordance with national regulatory system.

IAEA-Pakistan Nuclear Security Cooperation Program: Pakistan has successfully implemented IAEA-Pakistan nuclear security cooperation program. Several projects have been successfully implemented for capacity enhancement in nuclear security.

Nuclear Medical Centres: Security measures at all Nuclear Medical Centres with category-l radioactive sources are being upgraded, through IAEA-Pakistan cooperation. Physical protection at a number of Centers using Category-l sources has been upgraded consistent with the IAEA Code of Conduct on Safety and Security of Radioactive Sources.

In addition, collaboration with IAEA is an ongoing process for enhancing nuclear security systems and measures at civilian Nuclear Power Plants and Research Reactors consistent with global good practices, such as nuclear security recommendations contained in INFCIRC 225/Rev.5 and other nuclear security documents of IAEA.

Nuclear Emergency Management System: A Nuclear Emergency Management System (NEMS) has been established at the national level to handle nuclear and radiological emergencies. A Nuclear and Radiological Emergency Support Centre (NURESC) and Nuclear and Radiological Emergency Coordination Center (NRECC) provide technical guidance to licensees and users of nuclear and radiation facilities in case of an emergency and coordinate the response. Several training courses for the first responders and emergency response personnel have been conducted for emergency preparedness.
Revision of Pakistan's National Export Control List: The Strategic Export Control Division (SECDIV) in the Ministry of Foreign Affairs notified second revision of the ‘National Export Control List’ in 2015. The List, classified on the basis of the European Union's integrated system, covers the scope of export controls maintained by NSG, Australia Group and MTCR.

Combating Illicit Trafficking: As part of its national detection architecture, Pakistan has deployed radiation detection equipment at several entry and exit points to deter, detect and prevent illicit trafficking of nuclear and radioactive materials.

International Cooperation: Pakistan has submitted four reports to the UNSCR 1540 Committee. The reports elaborate measures taken by Pakistan for nuclear and radiological security as well as on controls over transfer of sensitive materials and technologies.

Pakistan is a party to the Convention on Physical Protection of Nuclear Material including its 2005 Amendment, Nuclear Safety Convention, Convention on Early Notification of a Nuclear Accident, and the Convention on Assistance in case of a Nuclear Accident or Radiological Emergency. Within this framework, Pakistan will continue to contribute to the strengthening of nuclear safety and security.

Pakistan has been working with the Global Initiative to Combat Nuclear Terrorism (GICNT) in different areas, including the development of GICNT guidelines. Pakistan is also a member of UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).

Future Aspirations: Pakistan has an elaborate programme for harnessing peaceful uses of nuclear energy. We operate power plants, research reactors, agriculture and biotechnology research centers, medical centers, and also employ industrial applications of nuclear technology. Pakistan is proud to have more than 42 years’ experience in safe and secure operations of nuclear power plants under IAEA safeguards.

Pakistan believes that safe and sustainable civil nuclear energy is essential to advance its economic development plans. Our Energy Security Plan includes a Nuclear Power Programme 2050, to meet current energy shortfalls and future requirements of a growing population and economy. Towards this end, we envisage generation of nuclear energy of 40,000 MW. To realize this plan, Pakistan seeks international civil nuclear cooperation.

Pakistan is ready to assist interested states with experience and expertise gained in the areas of nuclear power generation, and other applications of nuclear technology, under the auspices of the IAEA.

As a country with advanced nuclear fuel cycle capability, Pakistan is in a position to provide nuclear fuel cycle services under IAEA safeguards, and to participate in any non-discriminatory nuclear fuel cycle assurance mechanisms.

Over the years, Pakistan has streamlined and strengthened its export control regime and enhanced its engagement with multilateral export control regimes. Pakistan has strong credentials to become a member of the Nuclear Suppliers Group and other multilateral export control regimes, on non-discriminatory basis.

Pakistan’s participation in the entire NSS process reflects its seriousness and strong sense of responsibility. We remain alive to the need for sustained national efforts in the domain of nuclear security.

Pakistan is committed to the objective of enhancing nuclear security. It has fully been engaged with the international community to promote nuclear safety and security.

The Nuclear Security Summit process in the past four years has generated high level commitments to foster nuclear security culture. The 2014 Summit gives each participating state an opportunity to consolidate and implement the decisions it has taken in the process.

Nuclear security within a state is a national responsibility. Within that framework, the international community should pursue cooperation on nuclear security through voluntary national actions and in accordance with each state’s international obligations.

The existing international nuclear security framework covers the measures taken by the International Atomic Energy Agency (IAEA) and the United Nations as well as various conventions and initiatives. Therefore, there is no need to create new, parallel institutions or mechanisms.

The Summit process enables us to coordinate and synergize the work of the international community. In this context, we reaffirm the essential responsibility and central role of the IAEA.

NATIONAL NUCLEAR SECURITY REGIME

Pakistan’s nuclear security regimen has five pillars:

One, a well defined, robust command and control system. The National Command Authority (NCA), the apex decision making body, works under the chairmanship of the Prime Minister. It is supported by its secretariat, the Strategic Plans Division (SPD), and the Strategic Forces Commands. The NCA exercises control over all aspects including policy, procurement, employment, and nuclear security. The SPD develops technical solutions, Personnel Reliability Programme (PRP), and intelligence capabilities to deal with issues related to nuclear security, non-proliferation, accidents and WMD terrorism.

Two, Pakistan’s nuclear security regime is anchored in the principle of multi-layered defense for the entire spectrum of any nuclear threat - insider, outsider or cyber threat - and is guided by the concept of five Ds - deter, detect, delay, defend, and destroy. A specially trained Special Response Force ensures the security of our nuclear assets. Besides, an integrated intelligence system exercises constant vigil to provide depth in defense. Force validation exercises are carried out regularly to revisit and upgrade our safety and security regime.

Three, a rigorous regulatory regime encompasses all matters related to nuclear safety and security, including physical protection of materials and facilities, material control and accounting, transport security, prevention of illicit trafficking, border controls, and plans to deal with possible radiological emergencies. The Pakistan Nuclear Regulatory Authority (PNRA), an autonomous oversight body, has developed a sustainable nuclear security regulatory system with established response and recovery capabilities. It works closely with the IAEA.

Four, a comprehensive export control regime. The legislative, regulatory, administrative and enforcement measures of our export control regime are at par with the standards followed by the Nuclear Suppliers Group (NSG), the Missile Technology Control Regime (MTCR) and the Australia Group.

Five, international cooperation, consistent with our national policies and interests as well as international obligations.
Centre of Excellence:
As part of its nuclear security programme, Pakistan has undertaken several steps to establish a Centre of Excellence, update regulations and adopt best practices. The Center of Excellence conducts specialized courses in nuclear security, physical protection, material control and accounting, transport security and personnel reliability.
A National Institute of Safety and Security (NISAS) has been established at PNRA for facilitating national and regional training courses on nuclear security. The Institute, a key part of the Centre of Excellence, is equipped with the state of the art laboratories for training in the nuclear and radiation safety, nuclear security and physical protection.
In 2014, the Centre of Excellence, in collaboration with the IAEA, is planning to host regional training courses including course on "Security of Radioactive Sources". Physical protection and nuclear security courses are planned as well with IAEA’s assistance. These training facilities, associated with Pakistan’s Centre of Excellence on Nuclear Security, have the potential to grow into a regional and international hub, with the support of the IAEA.
NUCLEAR SAFETY:
In the past few years, Pakistan has invested heavily in nuclear safety at the plant, corporate and regulatory levels.
After the Fukushima accident, Pakistan carried out detailed assessment of its own nuclear power plants. We revisited safety parameters, emergency preparedness and response, and operators’ training protocols and procedures. The approach to ensure safety of nuclear power plants is in accordance with our national legislative system. All new authorizations now require from the licensees to implement lessons learnt from the Fukushima accident.
Pakistan has accepted IAEA’s proposal to join the Agency’s Collaborating Centers, which are designed to standardize technology, disseminate information, and facilitate research and training.
NUCLEAR SECURITY ACTION PLAN (NSAP):
A robust Nuclear Security Action Plan (NSAP) is being implemented in collaboration with the IAEA to manage radioactive sources, secure orphan sources, detect radiation and prepare for emergencies. Collaboration with IAEA is ongoing for upgrading physical protection of a nuclear power plant at Karachi.
NUCLEAR MEDICAL CENTRES:
Under IAEA-Pakistan Nuclear Security Cooperation Programme, security measures at 15 Nuclear Medical Centres in public and private sector, having category-1 radioactive sources, have already been upgraded. Upgrade measures at 8 more centres are underway.
NUCLEAR EMERGENCY MANAGEMENT SYSTEM:
A Nuclear Emergency Management System has been established at the national level to handle nuclear and radiological emergencies. A Nuclear and Radiological Emergency Support Centre (NURESC) and a National Radiation Emergency Coordination Center (NRECC) are available round the clock as part of emergency response mechanism. The mechanism covers the entire range of activities and is endowed with state-of-the-art equipment, mobile labs and technical guidance. Several training courses and exercises for the first responders, emergency response personnel and front line officers have been conducted for emergency preparedness.
REVISION OF PAKISTAN’S NATIONAL EXPORT LIST:
The Strategic Export Control Division (SECDIV) in the Ministry of Foreign Affairs, in consultation with the relevant ministries and entities, revised the “National Export Control Lists” in 2011. The lists, classified on the basis of the European Union’s integrated system, cover the scope of export controls maintained by the NSG, Australia Group and MTCR.
PREVENTING ILLICIT TRAFFICKING:
The National Detection Architecture includes use of detection devices at several entry and exit points as well as other random check points to deter, detect and prevent illicit trafficking of nuclear and radioactive materials.

INTERNATIONAL COOPERATION:
Pakistan has been working with the UN Security Council Resolution 1540 Committee. So far, we have submitted four reports to the Committee that elaborate the measures we have taken for nuclear and radiological security as well as on controls over all forms of transfer of sensitive materials and technologies. We are now working on the fifth report. As a party to the Convention on Physical Protection of Nuclear Material (CPPNM), the Nuclear Safety Convention, the Convention on Early Notification of a Nuclear Accident, and the Convention on Assistance in the case of a Nuclear Accident or Radiological Emergency, Pakistan has been contributing to the nuclear security framework. Our consistent observance of the IAEA Code of Conduct and participation in the IAEA in the Incident and Trafficking Database (ITDB) have been highly useful.

Pakistan has been working with the Global Initiative to Combat Nuclear Terrorism (GICNT) in different areas, including the development of the GICNT guidelines on a nuclear detection architecture, nuclear forensics and response and mitigation. Pakistan held the position of Chairman IAEA Board of Governors for 2010-11 and became a member of the UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) in December 2011.

FUTURE COMMITMENTS AND ASPIRATIONS:
Pakistan has more than 40 years of experience in safe and secure operation of nuclear power plants under IAEA safeguards. Pakistan Atomic Energy Commission (PAEC), a premier national institution, is leading the effort. Safe and sustainable civil nuclear energy is essential to advancing our economic development agenda. Our Energy Security Plan includes a futuristic, self-sustaining Nuclear Power Programme 2050, to meet the existing energy shortfalls and to respond to the future requirements of a growing population and economy. In that context, we envisage generation of nuclear energy of 8,800 MWe by 2030 and 40,000 MWe by 2050. In this regard, Pakistan looks forward to the removal of barriers to equitable access to international civil nuclear cooperation. With the experience and expertise it has gained in the areas of nuclear power generation, non-power application of nuclear technology, nuclear security and nuclear safety, under the auspices of the IAEA, Pakistan is well placed to assist interested states.
As a country with advanced nuclear fuel cycle capability, Pakistan is in a position to provide nuclear fuel cycle services under IAEA safeguards, and to participate in any non-discriminatory nuclear fuel cycle assurance mechanism.
Over the years, Pakistan has streamlined and strengthened its export control regime and enhanced its engagement with multilateral export regimes. Pakistan qualifies to become a member of the Nuclear Suppliers Group and other export control regimes, on a non-discriminatory basis.

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Annex-C

Pakistan National Statement

Nuclear Security Summit

Seoul, 26-27 March 2012

Pakistan welcomes the Nuclear Security Summit process as a catalyst for fostering nuclear security culture. We reiterate our commitment to the objective of enhancing nuclear security. Nuclear security within a state is a national responsibility. Within this framework, the international community should explore space for cooperation on nuclear security through voluntary national actions and in pursuance of international obligations. The existing international nuclear security framework is quite extensive which covers the measures taken by the International Atomic Energy Agency (IAEA) and the United Nations as well as various conventions and initiatives. Therefore, Summit participants agree that there is no need to create new, parallel institutions or mechanisms for nuclear security. The Summit process enables us to look at the bigger picture to synergize the work of the international community to strengthen nuclear security. In this context, we reaffirm the essential responsibility and central role of the IAEA. Pakistan’s nuclear security regimen has four pillars:

One, a well defined, robust command and control system - comprising the National Command Authority, the Strategic Plans Division (SPD), and the Strategic Forces Commands – exercises control over all aspects of policy, procurement, operations, and, most importantly, nuclear security. The SPD develops technical solutions, Personnel Reliability Programme (PRP), and intelligence capabilities to deal with nuclear security, non-proliferation, accidents and WMD terrorism.

Two, a rigorous regulatory regime covering all matters related to nuclear safety and security, including physical protection of materials and facilities, material control and accounting, transport security, prevention of illicit trafficking and border controls, as well as plans to deal with possible radiological emergencies. The Pakistan Nuclear Regulatory Authority (PNRA), an autonomous oversight body, regulates the safety and security of civilian nuclear materials and facilities. It works closely with the IAEA and benefits from its recommendations and guidance.

Three, a comprehensive export control regime. Our export control laws are at par with the standards followed by the Nuclear Suppliers’ Group, the Missile Technology Control Regime, and the Australia Group.

Four, international cooperation, consistent with our national policies and interests as well as international obligations. Since the Washington Summit, Pakistan has taken the following nuclear security related activities:

Centers of Excellence for Training The Strategic Plans Division has established a Training Academy near Islamabad which conducts specialist courses, among others, in physical
protection and personnel reliability. Pakistan Institute of Engineering and Applied Sciences (PIEAS) runs a Master’s programme in nuclear engineering with a specialization in nuclear security.

PNRA has established a School for Nuclear and Radiation Safety; and is now in the process of setting up a Nuclear Security Training Center (NSTC). We are ready to open these training facilities, which can act as a regional and international hub, to participants from other countries in the region and beyond. This programme can be developed further in consultation with the IAEA.

Post Fukushima: Focus on Nuclear Safety.

• An international seminar on Nuclear Safety and Security was held in Islamabad in April 2011, which especially focused on the lessons learnt from the Fukushima accident.

• Pakistan carried out detailed assessment of its nuclear power plants. We revisited safety parameters, emergency preparedness and response, and operators’ training.

• PNRA now stipulates that all new authorizations require from the licensees to implement lessons learnt from the Fukushima accidents.

• Pakistan has accepted IAEA’s proposal to join IAEA’s Collaborating Centers, which are designed to standardize technology, disseminate information, and facilitate research and training.

• Pakistan actively participated in the development of the IAEA Nuclear Safety Action Plan and joined the endorsement of its final version by the IAEA Board of Governors and General Conference.

Nuclear Security Action Plan (NSAP): In January 2011, Pakistan renewed its Nuclear Security Action Plan (NSAP), which it has been implementing since 2006 in collaboration with the IAEA. The programme continually upgrades physical security of 11 Nuclear Medical Centers (NMCs) working under Pakistan Atomic Energy Commission (PAEC). In Phase 2, physical protection of the remaining three and four new NMCs will be upgraded. A programme for upgrading physical protection of civilian nuclear power plants is being considered with the IAEA. Radiation Emergency Response Mechanism: PNRA, with the assistance of IAEA, has developed a radiation emergency response mechanism which remains operative round the clock. It is also operating a Nuclear and Radiological Emergency Coordination Center (NRECC) for technical guidance to licensees and users of nuclear and radiation facilities in case of an emergency.

A Nuclear Security Emergency Coordination Center (NuSECC), with fully equipped mobile labs, is working for technical assistance in coordination with law enforcement agencies or the first responders. Revision of Pakistan’s National Export List: The Strategic Export Control Division (SECDIV) in the Ministry of Foreign Affairs, in consultation with the relevant ministries and entities, revised the “National Export Control Lists” in July 2011. Combating
Illicit Trafficking: Pakistan is in the process of deploying Special Nuclear Material (SNM) Portals on key exit/entry points to deter, detect and prevent illicit trafficking of nuclear and radioactive materials.

International cooperation and recognition: Pakistan has been working with, and reporting to, the UN Security Council Resolution 1540 Committee. So far, we have submitted four reports that elaborate measures we have taken for nuclear and radiological security as well as controls over all forms of transfer of sensitive materials and technologies.

As a party to the Convention on Physical Protection of Nuclear Material (CPPNM), the Nuclear Safety Convention, the Convention on Early Notification of a Nuclear Accident, and the Convention on Assistance in case of a Nuclear Accident of Radiological Emergency, Pakistan has been contributing to the nuclear security framework. Our consistent observance of the IAEA Code of Conduct and participation in the IAEA in the Illicit Trafficking Database (ITDB) have been highly productive. Pakistan has been actively working in the Global Initiative to Combat Nuclear Terrorism; and has been part of its Implementation and Assessment Group that is preparing guidelines on nuclear detection architecture and nuclear forensics. Pakistan held the position of Chairman IAEA Board of Governors for 2010-11 and became member of the UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) in December 2011.

Future Commitments and Aspirations: Pakistan has more than 37 years’ experience in safe reactor operations. We are ready to assist interested states with the experience and expertise we have gained in the areas of nuclear security and nuclear safety under the IAEA auspices. Pakistan’s nuclear security training facilities can become a regional/international hub. As a country with advanced nuclear fuel cycle capability, Pakistan is in a position to provide nuclear fuel cycle services under IAEA safeguards, and to participate in any nondiscriminatory nuclear fuel cycle assurance mechanism. Safe and sustainable civil nuclear energy is essential to advancing our economic development agenda. In 2011, the IAEA Board of Governors unanimously approved the C-3 and C-4 Safeguards Agreements thus reflecting international recognition of Pakistan’s expertise in the safe and secure operation of nuclear power plants. The National Command Authority in July 2011 reviewed and approved the “futuristic, self-sustaining Nuclear Power Programme 2050, to meet the existing energy shortfalls and to respond to the future requirements of a growing population and economy.”

Pakistan qualifies to become a member of the Nuclear Suppliers Group and export control regimes on a non-discriminatory basis.

http://www.state.gov/documents/organization/246278.pdf
Pakistan welcomes the initiative taken by President Barack Obama to convene a Nuclear Security Summit (NSS). The initiative is timely and raises awareness about nuclear security, which is a common global concern. It gives primacy to an issue that requires attention at the highest level.

Pakistan believes that this Summit will act as a catalyst for fostering a nuclear security culture. Pakistan has keenly promoted this culture.

Pakistan welcomes President Obama's call for security of nuclear material.

At this Summit, we reaffirm our commitment to the objective of strengthening nuclear security and to stop terrorists from gaining access to nuclear or radiological materials for terror.

Nuclear security within a state is a national responsibility. Within this framework, the international community must continue to explore space for cooperation in nuclear security which subsumes measures to combat the threat of nuclear terrorism.

Currently the international regime dealing with nuclear security is quite extensive ranging from the measures taken by the IAEA and the United Nations to several initiatives that have been taken in the recent past. We do not need new or parallel mechanisms for cooperation on nuclear security or to address the threat of terrorism. But we do need better coordination amongst different initiatives. Moreover, faithful application of the widely agreed standards and provision of matching assistance, where necessary and acceptable, can equip international community with more effective tools to strengthen nuclear security and prevent nuclear terrorism.

This Summit enables us to look at the bigger picture and synergize the work of international forums and partnerships to strengthen the security of nuclear materials and prevent possible acts of terrorism. Our main objective is to share, on a voluntary basis, expertise and experiences in nuclear security, to learn from best practices, to share information and intelligence, in a non-binding, non-prescriptive manner to enhance capabilities to fight nuclear terrorism, and to enhance capacities to respond to nuclear security incidents.

The Summit has kept a sharp focus on nuclear security and has avoided going into the areas of non-proliferation and disarmament, which are being discussed at other relevant forums. It also recognizes that nuclear security measures should not infringe on the nations’ rights to peaceful uses of nuclear energy, including the production, transfer, use and exchange of nuclear materials for peaceful purposes.

Pakistan's nuclear programme has been security conscious right from the beginning. Since its inception, we had imposed tight measures for nuclear security. After the nuclear tests of 1998,
these measures were further institutionalized into an elaborate and effective nuclear security regime.

Our nuclear security regime has four pillars:

One, a well-defined command and control system comprising the National Command Authority, the Strategic Plans Division, and the Strategic Forces Commands, exercises strict control over all aspects of policy, procurement, operations, and, most importantly, nuclear security.

Two, strict regulatory regime covering all matters related to nuclear safety and security, including physical protection of materials and facilities, material control and accounting, transport security, prevention of illicit trafficking and border controls, as well as plans to deal with possible radiological emergencies.

Three, an extensive export control regime.

Four, international cooperation, consistent with our national policies and interests as well as international obligations.

Today a robust command and control system is in place, which protects our strategic assets against theft, diversion, and accidental or unauthorized use. The NCA, the apex decision-making body, chaired by the Prime Minister of Pakistan, makes all major decisions regarding nuclear policy, planning, use and security. Within this overall framework, the SPD develops technical solutions, personnel and human reliability programmes, and intelligence capabilities to deal with nuclear security, non-proliferation, accidents and WMD terrorism.

The Pakistan Nuclear Regulatory Authority (PNRA), an autonomous oversight body, regulates the safety and security of civilian nuclear materials and facilities. It works closely with IAEA on safety and security issues and benefits from its recommendations and guidance.

The national Nuclear Security Action Plan (NSAP), being implemented by the PNRA in collaboration with the IAEA, encompasses several aspects of nuclear security including physical protection, prevention of illicit trafficking, management and security of radioactive sources and response to unauthorized acts involving nuclear and radioactive material. It has trained more than 1000 personnel from relevant national organizations in various aspects of nuclear security. It also collaborates with Pakistan Institute of Engineering and Applied Sciences to run a Master's programme in nuclear engineering with a specialization in nuclear security.

Under the Plan, Pakistan has established national nuclear security emergency coordinating center and a network of six emergency-response mobile labs. We have equipped strategic entry and exit points with radiation detection equipment for prevention and detection of illicit trafficking in nuclear and radioactive materials.

Our export control laws are at par with the standards followed by the Nuclear Suppliers Group (NSG), the Missile Technology Control Regime (MTCR), and the Australia Group (AG), as well as European Union Guidelines. The jurisdiction of the 2004 Export Control Act, which has a catch all clause, extends to the entire territory of Pakistan and all citizens whether at home or abroad. Severe punishments under the law include up to 14 years’ imprisonment, heavy fines and confiscation of assets. It also covers offenses falling in the category of illicit transfer of
intangible technology such as services, training, and advice. To ensure consistent implementation of the law, an interagency Strategic Export Control Division (SECDIV) and an Oversight Board have been established in the Ministry of Foreign Affairs.

Pakistan has maintained highest standards for non-proliferation. When problems surfaced we addressed them definitively and kept the international community informed.

Pakistan has been working with, and reporting to, the UNSCR 1540 Committee. Pakistan is a party to the Nuclear Safety Convention, Convention on Physical Protection of Nuclear Material (CPPNM), the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in case of a Nuclear Accident or Radiological Emergency. We subscribe to the IAEA Code of Conduct on Safety and Security of Radioactive Sources and participate in the IAEA Illicit Trafficking Database. This relationship has been highly productive for Pakistan and IAEA.

Pakistan joined the Container Security Initiative in 2006 and has been observing the exercises of Proliferation Security Initiative. Pakistan's participation in the Global Initiative to Combat Nuclear Terrorism (GICNT) underlines our commitment to become a partner in the international efforts against contemporary global challenges.

Pakistan believes that all nations, including those in South Asia, should work closely for security, development and prosperity. All nations should pursue this goal on the basis of sovereign equality, mutual trust, and mutual respect.

Pakistan's nuclear programme is security-driven. It was an existential choice we made to deter aggression, prevent war and defend ourselves. Our objective has been development of a minimum credible nuclear deterrent. We are against an open-ended arms race in South Asia. We have always tried to maintain peace and security in South Asia at the lowest levels of armaments.

Pakistan has proposed the establishment of a Strategic Restraint Regime in South Asia, which would promote nuclear and missile restraint, a balance in conventional forces, and conflict resolution. We have concluded with India risk reduction and confidence building measures which include a hot line, prior notification of ballistic missile tests, and an agreement on reducing the risk of accidents relating to nuclear weapons.

More than ever, India and Pakistan need a substantive, structured and sustained dialogue on all issues, including nuclear CBMs.

Pakistan has legitimate needs for power generation to meet the growing energy demand of our expanding economy. Civil nuclear power generation under IAEA safeguards is an essential part of our national energy security plan to support sustained economic growth and industrial development.

Pakistan has more than thirty five years of experience in running nuclear power plants. With trained professional manpower and a strong nuclear safety and security culture, Pakistan fully qualifies for participation in civil nuclear cooperation at the international level. We urge all relevant forums to give Pakistan access to nuclear technology for peaceful uses, in a non-discriminatory manner, to meet its growing demand for energy.

We welcome the renewed international interest in nuclear power generation to meet the challenge of climate change.
As a country with advanced fuel cycle capability, Pakistan is in a position to provide nuclear fuel cycle services under IAEA safeguards, and to participate in any non-discriminatory nuclear fuel cycle assurance mechanism.

Pakistan is strongly committed to nuclear security. It would continue to refine and modernize its technical and human resources and mechanisms on safety and security of nuclear weapons, nuclear materials, facilities, and assets. Pakistan would cooperate with the global community in accordance with its national policies and requirements as well as international obligations.

http://embassyofpakistanusa.org/news420A_a_04142010.php

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Annex-E

Press Release

No PR344/2015-ISPR Dated: November 13, 2015
Rawalpindi - November 13, 2015:
Chief of Army Staff (COAS) General Raheel Sharif visited Pakistan’s Centre of Excellence for Nuclear Security (PCENS) and witnessed its state of the art facilities and ongoing training activities.
While lauding the high standards of professionalism and commitment of the Strategic Plans Division (SPD) security forces, entrusted with safeguarding Pakistan’s Strategic assets, COAS expressed full confidence in Pakistan’s nuclear security regime. While interacting with officers and troops, he expressed that the nuclear security is a sacred responsibility and that, “I am glad to see that it has instilled as a culture and the progress made in the recent past was praiseworthy”.
As a responsible nuclear weapon state, Pakistan has taken several measures, including setting up of the PCENS, to strengthen its nuclear security regime, at par with international best practices. Pakistan has also offered this Centre of Excellence as a regional and international hub for imparting nuclear security education and training to the international community. Since its establishment PCENS has conducted several national and international training courses focusing on physical protection, personal reliability as well as safety and security of nuclear and radiological materials and facilities.
Earlier on arrival at PCENS, General Raheel Sharif was received by Lieutenant General Mazhar Jamil, Director General Strategic Plans Division.

Annex-F

Press Releases: NCA Meetings

No PR280/2015-ISPR Dated: September 9, 2015

Rawalpindi - September 9, 2015:

Meeting of the National Command Authority (NCA) was held on 9 September 2015, under the Chairmanship of Prime Minister Muhammad Nawaz Sharif. It was attended by Federal Ministers of Defence, Finance and Interior, the Advisor to the Prime Minister for National Security and Foreign Affairs, Special Assistant to the Prime Minister for Foreign Affairs, Chairman Joint Chiefs of Staff Committee, Services Chiefs and DG SPD.

The NCA reviewed the internal security situation and acknowledged the sacrifices and appreciated successes of the Armed Forces in the ongoing Operation Zarb-e-Azb.

The NCA reposed full confidence in Pakistan’s robust nuclear command and control structure and security arrangements related to country’s strategic assets.

The NCA also reviewed the regional security environment and was briefed on fast-paced strategic and conventional capabilities’ developments taking place in the neighbourhood. The NCA re-affirmed that the State remains fully cognizant of the evolving security dynamics of South Asia and will take all measures to safeguard its national security. In view of the growing conventional asymmetry, the NCA reiterated the national resolve to maintain ‘Full Spectrum Deterrence Capability’in line with the dictates of ‘Credible Minimum Deterrence’ to deter all forms of aggression, adhering to the policy of avoiding an arms race.

As responsible nuclear state, Pakistan will remain actively engaged with the international community on nuclear stability and security issues. In its appraisal of the non-proliferation debate since the last meeting, the NCA expressed satisfaction on Pakistan’s enhanced outreach with the multilateral export control regimes. Pakistan shares the goals of non-proliferation and is committed to play its due role as a mainstream partner in the global non-proliferation regimes.

The Meeting renewed Pakistan’s interest in joining the multilateral export control regimes on non-discriminatory basis; including the membership of NSG. Pakistan has the requisite credentials for full access to civil nuclear technology for peaceful purposes, particularly to meet its energy shortages.

Pakistan seeks peace and strategic stability in South Asia as corner stone of its policy and considers conflict resolution, as the mean to achieve this end.

Annex-G

Extracts from Recent Pakistan-US Joint Statements

The White House
Office of the Press Secretary
For Immediate Release
October 23, 2013

Joint Statement by President Obama and Prime Minister Nawaz Sharif

Nonproliferation, Nuclear Security and Strategic Stability

President Obama and Prime Minister Sharif emphasized that nuclear terrorism is one of the most challenging threats to international security. President Obama appreciated Pakistan’s constructive engagement with the Nuclear Security Summit process and its cooperation with the International Atomic Energy Agency and other international forums, while acknowledging Pakistan’s efforts to improve its strategic trade controls and enhance its engagement with multilateral export regimes. Looking ahead to the 2014 Nuclear Security Summit at the Hague, the two Leaders reaffirmed the commitments of the 2012 Nuclear Security Summit in Seoul, strengthening nuclear security; reducing the threat of nuclear terrorism; preventing terrorists, criminals, or other unauthorized actors from acquiring nuclear materials; and working closely for the objectives of the Summit. They acknowledged the importance of regional balance and stability in South Asia and pursuing increased transparency and uninterrupted dialogue in support of peaceful resolutions of all outstanding issues. Prime Minister Sharif affirmed Pakistan’s support for the universal objectives of non-proliferation and disarmament. The two Leaders underscored that all sides should continuously act with maximum restraint and work jointly toward strengthening strategic stability in South Asia. Prime Minister Sharif expressed Pakistan’s desire to join the multilateral export regimes. President Obama reiterated his confidence in Pakistan’s commitment and dedication to nuclear security and recognized that Pakistan is fully engaged with the international community on nuclear safety and security issues.


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Annex-H

2015 Joint Statement By President Barack Obama And Prime Minister Nawaz Sharif

The White House
Office of the Press Secretary
For Immediate Release
October 22, 2015

Strategic Stability, Nuclear Security, and Nonproliferation

President Obama and Prime Minister Sharif recognized the shared interest in strategic stability in South Asia. The two leaders underscored that all sides should continuously act with maximum restraint and work jointly toward strengthening strategic stability in South Asia. They acknowledged the importance of regional balance and stability in South Asia and pursuing increased transparency and uninterrupted dialogue in support of peaceful resolution of all outstanding disputes.

President Obama and Prime Minister Sharif discussed the continuing threat of nuclear terrorism. The United States and Pakistan committed to work together to make the Nuclear Security Summit hosted by President Obama next year a success. President Obama welcomed Pakistan’s constructive engagement with the Nuclear Security Summit process and its cooperation with the International Atomic Energy Agency and other international forums.

The leaders noted Pakistan’s efforts to improve its strategic trade controls and enhance its engagement with multilateral export control regimes. Recognizing the importance of bilateral engagement in the Security, Strategic Stability and Non-Proliferation Working Group, the two leaders noted that both sides will continue to stay engaged to further build on the ongoing discussions in the working group.

Annex I
Research Questions for PhD Thesis

1. Would disarmament be helpful for nuclear security?
2. Why P-5 states do not trust each other in terms of sharing information/data on nuclear security matters?
3. Are current global nuclear security regimes sufficient to keep nuclear materials and installations safe and secure?
4. Is nuclear terrorism threat real?
5. In your point of view, do all nuclear weapon states follow the same nuclear weapons security parameters? If we compare the nuclear weapon states (NWSs).
6. Why are there discrimination and ambiguities in global nuclear security matters?
7. What and how USA can help Pakistan in nuclear security matters? If there is any possibility. Model like CTR
8. Why one NW state (Pakistan) is facing criticism? Why not all NWSs?
9. What are the major challenges to Pakistan’s NWs? (In your opinion)
10. What Pakistan should do in nuclear security issues? Policy options for Pakistan?
11. What is the role of organization in nuclear security and policy management?
12. What is the role of social scientists (particularly nuclear experts) in nuclear policy making?
13. Are nuclear weapons more secure under civilian control or in military control?
14. Why P-5 states do not trust each other in terms of sharing information about nuclear safety and security?
15. Blame game policies of states may affect nuclear security.
16. PRP, HRP (PSP), DBT
17. Permissive Action Links (PALs)
18. Procedures in PALs system?
19. Who designs the code?
20. Testing of PALs system?
21. PALs system is for deployed nuclear weapons or dismantled?
22. CAT-1, CAT-2, CAT-3, CAT-4…?
23. Safety Mechanism…
24. Enhanced Electrical Isolation (EEI)
25. Insensitive High Explosive (IHE)
26. Fire-Resistant Pit (FRP)
27. Mechanical Safing (MS)
28. Separable Components (SC)
29. One-Point Safe Design (OPSD)
30. Environmental Detection Sensors (EDS)
31. The Enhanced Nuclear Detonation Safety (ENDS)
32. Current nuclear safety and security tools and mechanism?
33. What and how USA can help Pakistan in nuclear security matters? If there is any possibility. Model like CTR
34. What Pakistan should do in nuclear security issues? Policy options for Pakistan?
35. Why are there discrimination and ambiguities in global nuclear security matters?
36. What and how USA can help Pakistan in nuclear security matters? If there is any possibility. Model like CTR
37. Permissive Action Links (PALs)
   1. Procedures in PALs system?
   2. Who designs the code?
   3. Testing of PALs system?
   4. PALs system is for deployed nuclear weapons or disassembled?
38. What are the major nuclear security concerns in case of Pakistan?
39. Nuclear Command and control system in Pakistan: satisfactory or fragile?
40. Nuclear weapons under military control in Pakistan: secure or insecure?
41. Pakistan’s nuclear security arrangements: improved or not?
42. What are the areas Pakistan needs to improve?
43. Has nuclear security summit undermined non-proliferation efforts?