



IAEA 2015 INTERNATIONAL CONFERENCE ON COMPUTER SECURITY IN A NUCLEAR WORLD

A NEW IEC STANDARD FOR CYBERSECURITY FOR NUCLEAR POWER PLANTS: IEC 62645 - REQUIREMENTS FOR SECURITY PROGRAMS FOR COMPUTER-BASED SYSTEMS

**Ted Quinn- Technology Resources
Ludovic Pietre-Cambacedes – EDF
Leroy Hardin - NRC
February 26, 2015**

Fuqing Plant Site in China (eight units delivered total)



Need for international cooperation

- 6 The threat is common**
- 6 Information sharing is important**
- 6 Law enforcement/cyber systems specialist cooperation**
- 6 The attack may not originate at the target country**
- 6 Cooperation is needed in common areas of guidance and also standards**

International Electrotechnical Commission (IEC)

- Leading global organization that prepares and publishes standards for:
 - Electrical and electronic products
 - Related technologies
 - Electricity, electronics, magnetics, electro-magnetics, electro-acoustics, multimedia, telecommunication, energy production and distribution, electromagnetic compatibility, measurement and performance, dependability, safety, environmental aspects
- Membership is by National Committees

National Committees participating in nuclear segment

P Members

- Argentina
- Belgium
- Canada
- China
- Czech Republic
- Egypt
- Finland
- France
- Germany
- Italy
- Japan
- Korea (Rep. of)
- Netherlands
- Norway
- Romania
- Russian Fed.
- South Africa
- Sweden
- Switzerland
- U.S.A.
- Ukraine
- United Kingdom

Observers

- Belarus
- Greece
- Pakistan
- Portugal
- Spain

IEC Technical Committee 45

Nuclear Instrument Standards

- 6 Subcommittee 45A: Instrumentation and Control of Nuclear Facilities**
- 6 Working Group 2-Sensor and measurement techniques**
- 6 Working Group 3-Application of digital processors to safety in nuclear power plants**
- 6 Working Group 5-Special process measurements and radiation monitoring**
- 6 Working Group 7-Reliability of electrical equipment in reactor safety systems**
- 6 Working Group 8-Control rooms**
- 6 Working Group 9-Instrumentation systems**
- 6 Working Group 10-upgrading and modernization of I&C systems**
- 6 Working Group 11-Electrical systems**

IEC SC45A WG A9 Instrumentation Systems Oct 2014



IEC SC45A Standards

- IEC 61513 Ed 2.0 2011 -Nuclear Power Plants-I&C for Systems Important to Safety – General Requirements for Systems (Similar to IEEE-603-1998)
- IEC 60880 Ed 2.0 (2006) Nuclear Power Plants – I&C Systems Important to Safety Software Aspects for Computer-Based systems performing Category A Functions (Similar to IEEE 7-4.3.2-2003)

New IEC Standard on Cyber Security Series and Standard – IEC 62645

- Commenced in 2008
- Title; “Nuclear Power Plants – Instrumentation and Control – Requirements for Security Programmes for I&C Systems,”
- Many countries are participating including France, U.S., U.K., Germany, Japan, Sweden, etc.
- Issued in August 2014 Ed 1.0

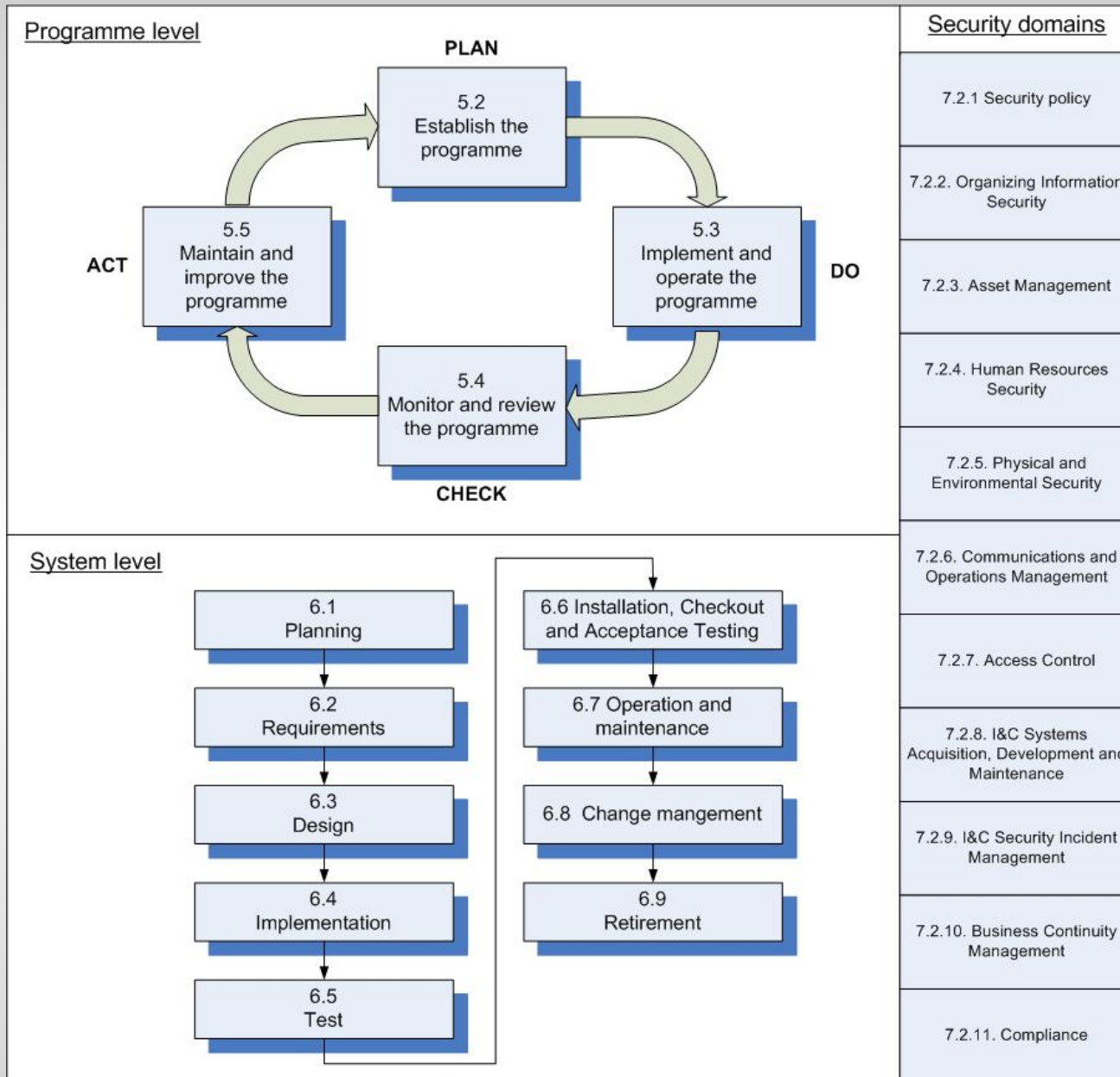
Nuclear Power Plants – Instrumentation and control systems – Requirements for security programmes for computer-based systems

6 Scope

6 This International Standard establishes requirements and provides guidance for the development and management of effective computer-based (CB) I&C systems, possibly integrating HPD (HDL (Hardware Description Language) programmed devices, hereinafter named I&C CB&HPD systems. Inherent to these requirements and guidance is the criterion that the power plant's security programme complies with the applicable country's CB I&C CB&HPD security requirements.

IAEA AND OTHER REFERENCES

- 6 IAEA Nuclear Security Series No. 17: *Reference Manual, Computer Security At Nuclear Facilities*, 2011
- 6 ISO/IEC 27000 Series – Information Technology- Security Techniques – Information Security Management Systems
- 6 NRC Reg Guide 5.71, Cyber Security Programs for Nuclear Facilities
- 6 NEI 08-09 R6, Cyber Security Plan for Nuclear Power Reactors
- 6 ISA TR99.02.01 2009, Security for Industrial Automation and Control Systems



IEC 62645 Ed. 1 Requirements for Security Programmes for Computer-Based Systems

IEC 62859 Ed. 1 Requirements for Coordinating Safety and Cybersecurity

IEC NWIP Risk Management – Technical Report - Review of Available Methods

IEC NWIP Supply Chain Cybersecurity

IEC NWIP Cybersecurity Monitoring

IEC NWIP Modeling – RECOMMENDED AS TECHNICAL REPORT

IEC NWIP on Security Controls

IEC NWIP Design Basis Threat (DBT) (Leave time for IAEA Guideline to complete) – **NOT RECOMMENDED**

IEC NWIP Demonstration of Effectiveness of security degrees/zones) including TESTING AND AUDITING -- ACCREDITATION

Schedule – IEC 62645 Ed 2.0 Draft Commencing now

- 6 The revision of IEC 62645 shall take into account the 2013 editions structure and high-level principles of the ISO/IEC 27001 and ISO/IEC 27002.**
- 6 A better consistency with the IEC 62443 series (on industrial control systems) should also be sought when relevant.**
- 6 A better consistency and articulation with IEC 61513 shall be reached**
- 6 A similar coordination work as the one mentioned in c) with IEC 61513 should be done with IEC 62138, IEC 60880, and all SC45A standards mentioning computer security.**
- 6 The content and structure of IEC 62645 ed. 2 could be rearranged to better take into account the future second level documents with respect to IEC 62645 (IEC 62859**

14 and potential future document

IEC 62645 Ed 2.0 Technical and Topical Modifications

6 The concept of security degrees and their associated attribution criteria consideration for revision:

? The possibility -fourth security degree (consistent with NSS17 graded approach).

6 Confidentiality issues should be addressed

6 Consideration of electrical sys and smart electrical

6 Specific guidance, on legacy systems (e.g. first generation/outdated digital systems).

6 Additional guidance, recommendations or requirements should be considered about cybersecurity audits and risk assessment.

6 High-level security requirements and/or recommendations to specifically address wireless technologies.

Cyber Security Summary

- Cyber security is major and growing threat that needs to be addressed by each country in both safety system and balance of plant design and design updates
- IAEA, IEC, IEEE and country specific Standards Organizations and Regulators are addressing this but a lot more work needs to be done
- The threat changes every day!!