IAEA Support to Cameroon for Nuclear Security Measures at the Africa Cup of Nations 2021

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IAEA SUPPORT TO CAMEROON FOR NUCLEAR SECURITY MEASURES AT THE AFRICA CUP OF NATIONS 2021

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IAEA SUPPORT TO CAMEROON FOR NUCLEAR SECURITY MEASURES AT THE AFRICA CUP OF NATIONS 2021

INTERNATIONAL ATOMIC ENERGY AGENCY
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FOREWORD

Gatherings of large numbers of people are potential targets for terrorists. Recognizing the threat posed by terrorism involving nuclear or other radioactive material at major public events, including major sporting events, States have endorsed the need to protect people, property and the environment from these types of attack. The International Federation of Association Football (FIFA), in the FIFA Stadium Safety and Security Regulations, has prescribed a guideline for all international matches on the development of contingency plans in the case of terrorist attacks, including chemical, biological, radiological or nuclear attacks. The Confederation of African Football has followed the lead of FIFA by subscribing to these regulations.

The responsibility for nuclear security rests with the State. The IAEA provides assistance, upon request, to Member States wishing to establish arrangements and implement nuclear security measures to host a major public event. In 2022, Niger, Rwanda and Tunisia made use of IAEA assistance in relation to the African Union Summit on Industrialization and Economic Diversification, the Commonwealth Heads of Government Meeting and the Francophone Summit, respectively. Also in 2022, Cameroon requested the assistance of the IAEA for nuclear security on the occasion of the 33rd Africa Cup of Nations, after having received IAEA support during the 2020 African Nations Championship, held in Cameroon in 2021.

States are increasingly turning to the IAEA to cooperate in the implementation of nuclear security arrangements as part of overall security for major public events. To satisfy this growing number of requests from States, the IAEA is relying on the shared experiences of States that have already implemented nuclear security measures at large public gatherings, whether they be sporting or other types of major public event.

This publication has been prepared with contributions from the following State entities in Cameroon: the General Delegation for National Security; the Secretary of State in the Ministry of Defence in charge of the National Gendarmerie; and the National Radiation Protection Agency. These organizations have shared helpful information on the nuclear security arrangements implemented by the Government of Cameroon before and during the Africa Cup of Nations. The IAEA officers responsible for this publication were N. Tottie and B. Kaboro of the Division of Nuclear Security.

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1. INTRODUCTION

From 9 January to 6 February 2022, five regions, five cities and six stadiums in Cameroon hosted the 33rd edition of the Africa Cup of Nations (AFCON 2021) football tournament. Approximately 1000 players and coaches, along with 1088 media personnel, were present at AFCON 2021, which had been postponed to 2022 because of the COVID-19 pandemic. Almost 3700 volunteers and stewards helped with the organization of the tournament. Despite an 80% reduction in the stadium occupancy rate imposed by the CAF as a result of COVID-19, around 1.2 million tickets were distributed during the competition.

For a gathering of this magnitude, security was a major concern, involving considerable effort on the part of Cameroon authorities. To ensure that the tournament took place in a safe, secure and amicable environment for the teams, delegations and football fans, a security system was implemented throughout the territory, and reinforced in the cities and venues that hosted a total of 52 matches, an increase from previous tournaments.

To deter criminal activity, this security system was implemented at national borders, stadiums, hotels, team training stadiums, fan zones, media centres and at other sensitive areas, including various transport routes leading to the main venues in a highly visible manner from the beginning of the competition. Approximately 15 000 agents from the national security forces, police and gendarmerie were deployed at sensitive locations, and a total of 3700 surveillance cameras provided video surveillance of cities, stadiums and strategic locations. Local security organizations were connected with international partners, such as the International Criminal Police Organization (INTERPOL) and the IAEA, and mobile security teams from the military and police were assembled to accompany dignitaries, officials from the CAF and teams during transfers to and from the venues, and to maintain public order.

As part of the development of the Security Master Plan for AFCON 2021, a major public event (MPE) threat assessment was undertaken before the start of the competition. This assessment identified potential threats, including those related to nuclear and other radioactive material. Relevant national authorities were assigned specific roles and responsibilities based on the threat assessment results. Multiple discussion-based and operations-based exercises were conducted to ensure preparedness and effective response to possible, credible, criminal, or terrorist acts, including those involving nuclear and other radioactive material. These exercises were organized collaboratively by security forces and national authorities, and held at all major public event sites.

1.1. BACKGROUND

An MPE is a high-profile event that a State has determined to be a potential target [1]. It can be a planned national or international gathering, classified by the State as ‘major’ because it is a potential target and involves the implementation of a security plan. The organization of an MPE, in which a large number of people congregate (e.g., sporting contests or high level political meetings that could include high ranking State authorities) presents complex security challenges for the host State. MPEs draw great public interest and receive intense media attention. This makes them attractive venues for demonstrations, protests, violence or any other action that can be used to draw attention to a cause. One particular area of concern for States is the potential for organizations to use these gatherings as stages for criminal acts and acts of terrorism, including those involving nuclear or other radioactive material.

In accordance with the FIFA [2] and the CAF [3] security regulations, response plans for criminal and terrorist acts during international matches include reference to acts that potentially involve chemical, biological, radioactive or nuclear material. Prevention, detection and response to criminal and terrorist acts are important elements in securing MPEs against all threats, including those in relation to chemical, biological, radioactive or nuclear material.

Security should involve many different authorities and agencies, each with its own responsibilities, as stated in Paragraph 2.3 of the IAEA Nuclear Security Series No. 18, Nuclear Security Systems and Measures for Major Public Events [4].

1.2. OBJECTIVE

The objective of this publication is to describe the nuclear security measures that were established and implemented to address nuclear security threats at AFCON 2021, held in Cameroon from 9 January to 6 February 2022. The publication details how these measures were implemented, with the support of the IAEA, by the various competent authorities and agencies with responsibility for nuclear security, including the national police, gendarmerie, customs authorities, security services and competent technical organizations, as well as the National Radiation Protection Agency (NRPA).

Information provided in this publication on the experience of Cameroon can be used by IAEA Member States that plan to host an MPE.

1.3. SCOPE

This publication considers technical and administrative measures for developing the necessary organizational structure, nuclear security plans, strategies and concepts of operation, as well as the arrangements for implementing these plans, strategies and concepts of operation, as described in Ref. [4], at a major public event such as AFCON 2021.

While this publication describes the types of radiation detection instruments used during the implementation of nuclear security measures at AFCON 2021, it does not provide detailed technical specifications for these instruments. The publication does not provide any information considered to be confidential.

1.4. STRUCTURE

Section 2 describes activities in relation to preliminary nuclear security considerations, which were taken into account by Cameroon authorities when planning and preparing to host AFCON 2021. It considers the overall security concept that was applied at AFCON 2021, and the threat assessment process. It also examines policy decision making and the organizational structure for AFCON 2021, reviewing coordination mechanisms and the development of the nuclear security plan for AFCON 2021, as well as cooperation with the IAEA.

Section 3 describes preventive measures implemented for AFCON 2021, including measures to secure radioactive material within the national borders of Cameroon before and during AFCON 2021, measures to ensure the trustworthiness of personnel, and considerations in relation to information security and the prioritization of venues.

Section 4 describes nuclear security preparedness and response measures that Cameroon considered when preparing for AFCON 2021. These measures include the development of a concept of operations, designation of organizational roles and responsibilities, development of plans and procedures for implementing nuclear security measures at AFCON 2021, elaboration of operational coordination and management measures, deployment of radiation detection instruments and considerations in relation to logistical aspects.

Section 5 provides an overview of the results achieved by Cameroon in implementing nuclear security measures at AFCON 2021, and Section 6 describes lessons that were identified during this overall process.

2. PRELIMINARY NUCLEAR SECURITY ARRANGEMENTS

2.1. OVERALL SECURITY CONCEPT FOR AFCON 2021

The overall security concept applied at AFCON 2021 was developed on the basis of two fundamental principles, namely:

(1) Implementation of the highest level of security;
(2) Coordination of the authorities and agencies under a unified command and control system.

To accomplish the first of these two principles, all the authorities and agencies responsible for maintaining security at AFCON 2021 ensured, as far as possible, that security measures were implemented at the main venues and other strategic locations, including transport routes to and from the venues and locations. These security measures were applied in a balanced manner, respecting the conditions of the football tournament, while at the same time respecting the individual and collective rights of players, delegations and members of the public.

The second principle in regard to the coordination of all authorities and agencies, was accomplished through presidential decree no. 2019/295, dated 4 June 2019 [5], which stipulates details for the creation, organization and functioning of the Local Organizing Committee of the African Nations Championship (CHAN 2020) and AFCON 2021. This organizing committee (hereafter referred to as COCAN) was chaired by the Minister for Sports and Physical Education. COCAN was supported by fifteen technical subcommittees, including a security subcommittee, which was chaired by a representative of the Ministry of Territorial Administration.

The decision to host AFCON 2021 was taken by the Government of Cameroon, through the Minister for Sports and Physical Education and the Cameroon Football Federation, in the context of the CAF Action Plan. The agreement was formalized through a contract signed by the confederation, the Government of Cameroon and the Cameroon Football Federation. This contract describes the organization of all aspects of the tournament, including the implementation of security measures.

2.2. THREAT ASSESSMENT

After confirmation that Cameroon would host AFCON 2021, a virtual expert mission was organized by the IAEA to discuss, with the NRPA, issues in relation to the nuclear security threat assessment (on the basis of IAEA Nuclear Security Series No. 24-G, Risk Informed Approach for Nuclear Security Measures for Nuclear and Other Radioactive Material out of Regulatory Control [6]), the development of a concept of operations and the implementation of nuclear security measures for the MPE.

Following this expert mission, Cameroon conducted a nuclear security threat assessment. In accordance with the Law no. 2019/012 of 19 July 2019 [7], this threat assessment was carried out by national security entities and competent agencies, including the General Delegation for National Security (DGSN), the National Gendarmerie, the General Directorate of External Research (DGRE), Military Security (SEMIL), the NRPA and the General Directorate of Customs.

The threat assessment was based on the current national security situation and the regional specificities of the different venues hosting the AFCON 2021 games, and included consideration of the current inventory of nuclear and other radioactive material in Cameroon, and the provision by the IAEA of an up to date analysis report from the IAEA Incident and Trafficking Database (ITDB).

The threat assessment led to the prioritization of the following locations:

Main venues:

— Six football stadiums.

Other strategic locations:

— Fan zones, markets, crowded public places, accreditation centres and hotels used by dignitaries, officials and teams;
— Land borders (points of exit and entry);
— Douala seaport;
— Yaoundé, Douala and Garoua airports;
— Transport routes connecting the main venues and other strategic locations.

2.3. ORGANIZATIONAL STRUCTURE

The organizational structure for AFCON 2021, headed at the national level by the Inter-Ministerial Committee, saw the creation of several site specific security committees, which in turn reported to the AFCON Security Committee. This structure is set out in detail in Fig. 1, which depicts Regional Security Committees, along with the individual Site Committee Presidents for each region, as well as Stadium Security Committees and the Stadium Security Coordinators for the stadiums. These latter coordinators had overall responsibility for seaports, airports and land transport in their regions, as well as for the security of teams and officials (in coordination with liaison officers) and for nuclear security. The CAF had the administrative role during the event.

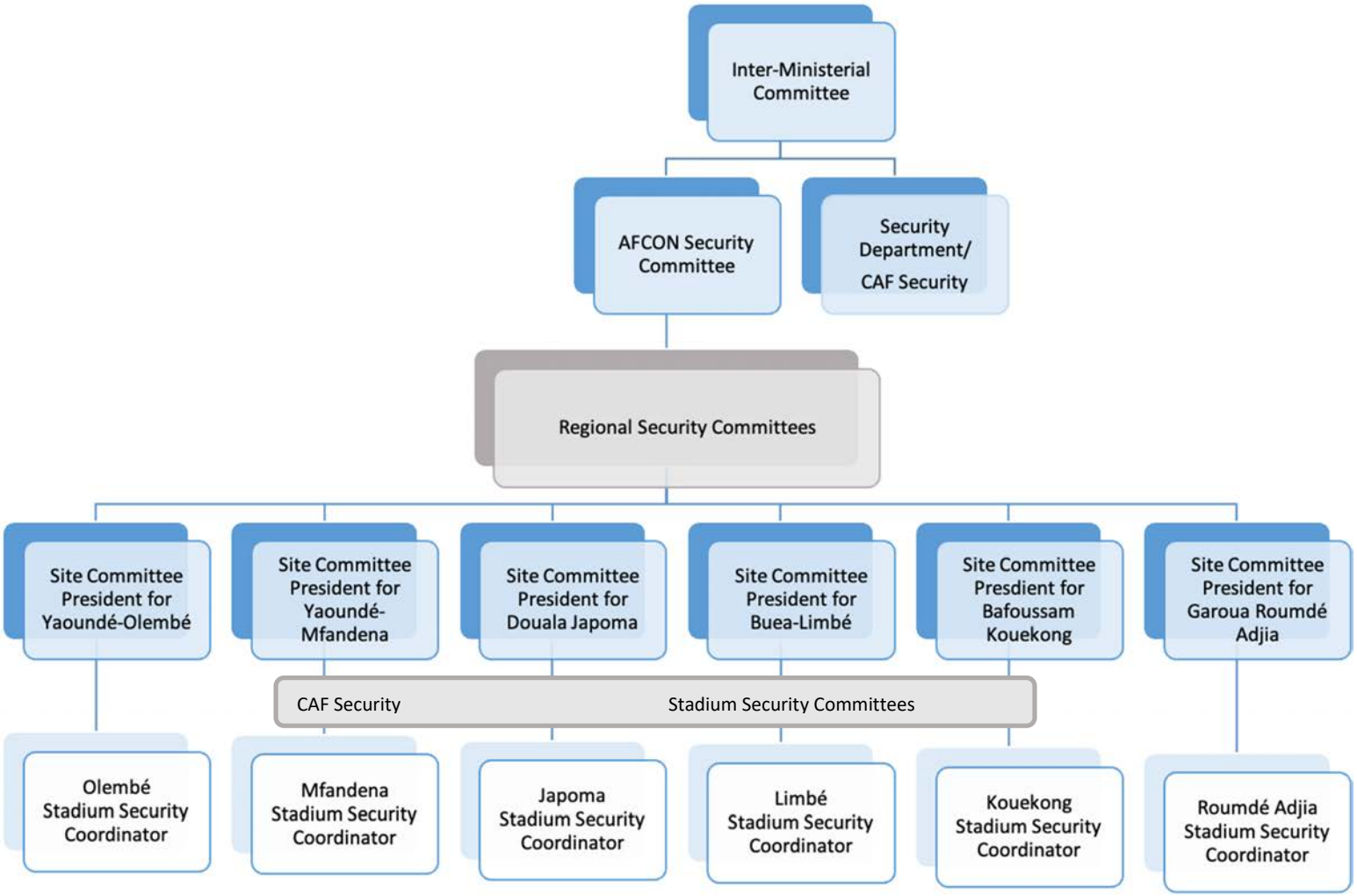

FIG. 1. Organizational structure for AFCON 2021 security. (CAF: Confederation of African Football)

2.3.1. Coordination at the inter-ministerial level

The Inter-Ministerial Committee was set up at the General Delegation for National Security in Yaoundé, the political capital of Cameroon. The committee was responsible for the coordination of all security activities. It also ensured the planning and implementation of all measures to prevent, detect and respond to any criminal or terrorist act intended to cause harm to persons, property or the environment, in particular at the main venues of AFCON 2021 and at other strategic locations prioritized as a result of the threat assessment.

The Inter-Ministerial Committee was also responsible for the coordination of the activities of the various security authorities and agencies, which is the second fundamental principle of the overall security concept for AFCON 2021.

A Regional Security Committee, headed by the governor of each region, was in charge of MPE security in each region.

The General Delegation for National Security invited the various interested parties to meetings, as necessary. These meetings followed a predetermined agenda. The following administrations were involved at this level (see also Fig. 2):

- General Delegation for National Security (DGSN);
- General Directorate of External Research (DGRE);
- Directorate of Customs (DGD);
- The Local Organizing Committee of the African Cup of Nations and Championship (COCAN);
- Ministry of Tourism (MINTOUR);
- Ministry of Sports and Physical Education (MINSEP);
- Ministry of Defence (MINDEF);
- Ministry of Telecommunications (MINPT);
- Ministry of Territorial Administration (MINAT);
- Ministry of Transport (MINT);
- Ministry of Health (MINSANTE);
- Cameroon Civil Aviation Authority (CCAA);
- National Radiation Protection Agency (NRPA);
- Cameroon Football Federation (FECAFOOT).

2.3.2. COCAN Security Subcommittee

To balance the need to implement the highest level of security for AFCON 2021 with the relevant prerequisites of the tournament, as well as individual and collective rights, a Security Master Plan was developed by a subcommittee of COCAN, the COCAN Security Subcommittee, which specified the roles and responsibilities of the various authorities and agencies. In the context of this master plan, the NRPA had the responsibility of developing and supporting the implementation of the nuclear safety and nuclear security components, in consultation with the Inter-Ministerial Committee.

The COCAN Security Subcommittee worked extensively with the CAF Security Department to ensure that all of the confederation’s security conditions were met during the development and implementation of the security plans and procedures at AFCON 2021.

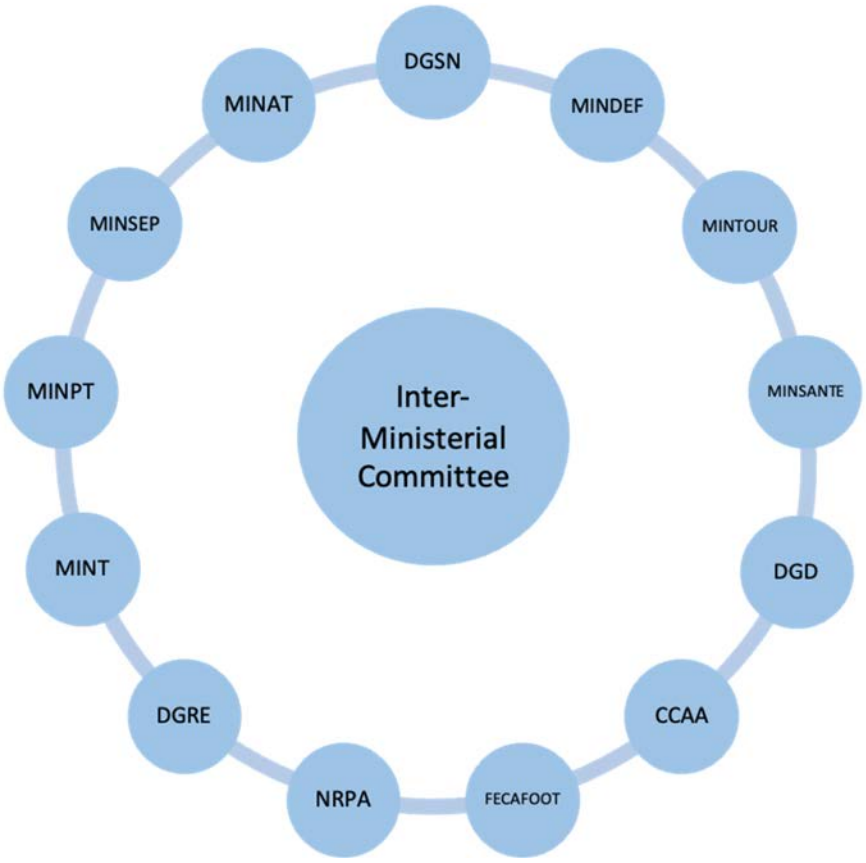

FIG. 2. Organizations represented at the Inter-Ministerial Committee.

In accordance with the decision of the President of COCAN, the COCAN Security Subcommittee was responsible for:

- Reviewing and updating detailed security plans for all airports, train and bus stations, and crowded public areas, as well as for all event venues;
- Developing the draft contract between the competent administrative authorities and the Cameroon Football Federation;
- Ensuring that the highest level of security was implemented throughout the entire football tournament;
- Ensuring that nuclear security measures were implemented by the relevant authorities and agencies for the transport routes used by the delegations, CAF officials, referees and teams for the duration of the competition;
- Arranging coordination between the authorities and agencies in charge of national security and the companies providing private security services;
- Developing recruitment and training plans for stewards;
- Assisting the accreditation management service.

The organizational structure of the COCAN Security Subcommittee was developed on the basis of a political decision made to ensure proper coordination between all of the relevant authorities and to achieve the highest level of security for AFCON 2021.

2.3.3. Coordination mechanism for AFCON 2021

Coordination between all organizations responsible for security at AFCON 2021 was ensured by the relevant committee at each level of responsibility (see Fig. 3) as follows:

- National level: The COCAN Security Subcommittee, with its headquarters at MINAT in Yaoundé, under the supervision of the Inter-Ministerial Committee and coordinated by the General Delegation for National Security;
- Regional level: The Regional Security Committees, located in the regions hosting the different pools (groups) of the competition, led by the governors of the individual regions;
- Site level: The Stadium Security Committees, in charge of Stadium Operational Security Teams, which included the CAF Security Officer, representatives of the various specialized teams and representatives from the NRPA.

FIG. 3. Coordination mechanism for AFCON 2021.

2.3.4. Stadium Security Committees and Stadium Operational Security Teams

Stadium Security Committees were established at the stadium level with responsibility over the Stadium Operational Security Teams. A Stadium Security Coordinator, either a senior police officer or gendarmerie official, was placed in charge of each Stadium Security Committee and reported directly to the Regional Security Committee (see Fig. 1). Regular meetings of the COCAN Security Subcommittee and Regional Security Committees were held before and after each match, with input from the Stadium Security Coordinator. The personnel in charge of implementing nuclear security measures for the stadiums reported both to the Stadium Security Committees and to the Director General of the NRPA.

To ensure that each site could fulfil the full range of security operations, including the implementation of nuclear security measures, the Stadium Security Committees included representatives from the following organizations:

- Border police: Responsible for the security of maritime areas and ports, including immigration control, and for keeping records of unlawful acts under its jurisdiction;
- Aviation police: Responsible for providing support to security forces involved in intelligence operations, escorting dignitaries, officials, teams and other national delegations, and conducting search and rescue operations;
- Police canine teams: Responsible for providing support to security forces involved in the search and rescue of people, and the search for explosives;
- Bomb squad: Responsible for planning, developing and implementing integrated measures for prevention, detection and response to all criminal or terrorist acts involving the use of explosive or incendiary devices, including those in which chemical, biological, radioactive or nuclear substances are implicated, for example in mass transport systems, public buildings and at sites, ports and airports, or at other strategic locations.

2.3.5. Command and control

Decisions taken at the national level were transmitted to the regional governors, who were responsible for security at the stadiums in their regions. Under the supervision of the individual governors, each Stadium Operational Security Team met two days before each game to assess the implementation of the security system for the venue, identify any gaps in that system and agree on how the identified gaps could be addressed.

Immediately before each game, all the entities that constituted the Stadium Operational Security Team met with their Stadium Security Coordinator to discuss security issues, including nuclear security measures and procedures. All the involved national authorities and agencies maintained a representative at each stadium, based in the stadium's CCTV Control Centre, to command their teams on the ground leading up to the MPE, during the MPE and 2–3 hours after each game.

2.4. COOPERATION WITH THE IAEA

In January 2021, the Government of Cameroon, through the NRPA, formally requested IAEA support for the implementation of nuclear security measures at AFCON 2021. After this request, the IAEA organized a coordination meeting in collaboration with the NRPA. The meeting took place virtually on 3–4 March 2021, providing an opportunity for the IAEA to assess the nuclear security needs of Cameroon, and for Cameroon to evaluate the support that would be offered by the IAEA. After this meeting, a joint action plan was agreed between the Government of Cameroon and the IAEA for AFCON 2021, in which the provision of technical assistance by the IAEA was outlined.

As part of the joint action plan, a virtual IAEA Mission on Cameroon's Threat Assessment and Risk Informed Approach for Nuclear and Other Radioactive Material out of Regulatory Control was conducted in July 2021. In addition, five national workshops, including two operations based exercises, were organized and facilitated by experts from the IAEA and from the NRPA. The workshops were attended by officials from the national authorities and agencies responsible for nuclear security at the AFCON 2021 main venues and strategic locations. The operations based exercises were conducted jointly by the NRPA and Cameroon security personnel (e.g. front line law enforcement officers, bomb squad personnel) with a focus on the detection of radiation, alarm assessment and alarm adjudication.

In addition to the radiation detection equipment already available to the NRPA from Cameroon's equipment inventory that included three radionuclide identification devices, nine personal radiation detectors and one portable radiation scanner backpack, the IAEA provided on loan, free of charge, the following radiation detection equipment for use during AFCON 2021:

- 150 personal radiation detectors for detection at access control points;
- 10 radionuclide identification devices for the identification of radionuclides at access control points by the second detection line;
- 10 portable radiation scanner backpacks for radiological mapping of sites before the event by the mobile expert support team.

To ensure that the nuclear security threat assessment for Cameroon was up to date, the NRPA asked the IAEA to provide an ITDB report on recent incidents concerning the illicit trafficking of radioactive sources, or the loss and theft of such sources, in the African region for the period leading up to the competition. During the competition, this information was provided online, in real time, to enable dynamic threat assessments to be conducted as needed.

2.5. TRAINING AND EXERCISES

Given the specificities of the nuclear security measures for the MPE, a special training programme was established for the NRPA, with a total of 22 staff members selected on the basis of their knowledge and experience to attend 'train the trainer' courses conducted jointly with the IAEA. This group then provided training to the following individuals:

- High level security officials (40);
- Front line officers of national security forces (600);
- Stewards (2150).

The training activities focused on the principles of radiation protection, detection by instrumentation (e.g. personal radiation detectors, radionuclide identification devices, portable radiation scanner backpacks), the nuclear security concept of operations and standard operating procedures. Practical exercises were used to reinforce this training. The courses took place in Yaoundé and at the various AFCON 2021 venues.

3. NUCLEAR SECURITY PREVENTIVE MEASURES

3.1. SECURITY OF NUCLEAR AND OTHER RADIOACTIVE MATERIAL

The Littoral Region, where Douala, the most populous city in Cameroon, is located, has more than 3 million inhabitants and contains the largest quantity of sealed radioactive sources used in the country. Other sources are located in regions that were involved in the football tournament but in smaller quantities. Such sources could be targeted by criminals or terrorists wishing to acquire nuclear or other radioactive material.

The NRPA inspected all the facilities containing radioactive material in the regions hosting the tournament to verify the security conditions of the radioactive sources and identify areas in which physical protection measures might need to be enhanced in order to minimize the risk of these sources being stolen or of associated facilities being sabotaged. Special arrangements were also made for the transport of radioactive material leading up to and during AFCON 2021.

3.2. INFORMATION MANAGEMENT

The management of all sensitive information, including information concerning nuclear security for AFCON 2021, was undertaken in accordance with Cameroon's information security needs, established by the Directorate General for External Research.

3.3. TRUSTWORTHINESS OF PERSONNEL

The security personnel who were involved in AFCON 2021 consisted of security forces (e.g. gendarmerie, police, army), stewards and volunteers. In order to ensure the trustworthiness of security personnel, the stewards and volunteers were recruited from the youth platform of the Ministry of Youth and Physical Education and the Ministry of Sports. To be a member of the platform, the stewards and volunteers had to undergo background security checks that included a verification of criminal convictions. In addition, stewards and volunteers were chosen on the basis of physical criteria (e.g. good physical condition, good health, aged 18–42). After their recruitment, personnel were trained in five modules on the subject of nuclear safety and security, fire safety and rescue, ethics and professional conduct, health, and technical aspects in relation to each stadium and the security demands of the CAF.

3.4. ACCREDITATION OF NUCLEAR SECURITY PERSONNEL

A process for the accreditation of nuclear security personnel was undertaken for each site, with accreditation centres established for the individual sites under the jurisdiction of the CAF. Official photographs and other details concerning the nuclear security personnel were provided to the accreditation centre, through the secretariat of the COCAN Security Subcommittee. After receiving written authorization from the CAF, by email and text message, the nuclear security personnel were able to visit the appropriate accreditation centre to obtain their access credentials.

To ensure the appropriate use of access credentials by nuclear security personnel, training was provided by security experts from the CAF, both before the personnel received the access credentials and at distribution. The training ensured that nuclear security personnel did not misuse these credentials or use them incorrectly, and is an excellent example of good practice in this area.

3.5. VENUE PRIORITIZATION

On the basis of the results of the threat assessment, the AFCON 2021 Inter-Ministerial Committee and the NRPA agreed to protect all the main venues and several strategic locations against nuclear security threats.

The competition venues approved by the African Football Confederation were located in five regions of Cameroon. These were the Centre, Littoral, North, West and South West regions.

The main venues, along with the stadium capacity, for the competition were as follows:

- Olembé (60 000) and Mfandena (42 000) in Yaoundé, in the Centre region;
- Japoma (50 000) in Douala, in the Littoral region;
- Roumdé Adjia (20 000) in Garoua, in the North region;
- Kouekong (20 000) in Bafoussam, in the West region;
- Limbé (20 000) in the South West region.

4. NUCLEAR SECURITY PREPAREDNESS

4.1. DEVELOPING A NUCLEAR SECURITY CONCEPT OF OPERATIONS FOR AFCON 2021

In March 2020, two working groups were created by the Director General of the NRPA to develop the nuclear security concept of operations and coordinate necessary actions, both before and during the football tournament. The first was the strategic group and the country's institutional point of contact for nuclear security, which was composed of the Director General of the NRPA, the Agency's Director of Regulation and Control and the Director of Technical Services. This group was responsible for radiological monitoring, the overall management of nuclear security activities for the MPE, and cooperation with the IAEA and the Inter-Ministerial Committee.

The second working group, which was under the responsibility of the strategic working group, was the tactical group, headed by a radiological adviser, who was appointed by the Director General of the NRPA, and composed of scientific personnel from the General Directorate and regional branches of the NRPA. This group was responsible for supervising the implementation of nuclear security actions on the ground. The tactical group was divided into subgroups, with one subgroup for each stadium. Each subgroup included a radiological adviser appointed by the NRPA.

In total, the strategic group held four meetings to develop the contingency plan in which the concept of operations and the structure of the NRPA operational teams were defined. The tactical group held a total of 16 meetings, consisting of two meetings per venue before the start of the competition, where one was for coordination with the Stadium Security Committees and the other for training in relation to the radiation detection instruments.

A post-match debriefing per subgroup was held after each game, which enabled the operational teams of the NRPA to discuss and assess the results of pre-event radiation surveys and nuclear security activities for each game, and share any lessons that were identified. The Director General of the NRPA was responsible for the overall supervision of the two working groups.

4.2. ORGANIZATIONAL ROLES AND RESPONSIBILITIES

This section considers the roles and responsibilities of the various agencies responsible for nuclear security during AFCON 2021. The coordinating body for these agencies, in relation to nuclear security measures, was the NRPA. Figure 4 describes group interactions in relation to the NRPA.

4.2.1. Role of the National Radiation Protection Agency

Senior officers from the NRPA played a key role in raising awareness on nuclear security issues at the senior level through their participation in meetings at the ministerial level.

The Director General of the NRPA directly supported activities to raise public awareness on nuclear security issues, through participation in press conferences and interviews that were broadcast throughout Cameroon.

At the operational level, NRPA personnel were involved in delivering training on nuclear security to law enforcement personnel, stewards, volunteers and private security operators.

During the football matches, the operational teams of the NRPA supported security officers equipped with personal radiation detectors at all the main venues. After each match, the subgroup

leader produced a report on the implementation of nuclear security measures and sent the report to the Director General of the NRPA, who was responsible for coordination and communication with the Inter-Ministerial Committee. The General Directorate of the NRPA, based in Yaoundé, was also the national point of contact for the IAEA Incident and Emergency Centre (IEC). A direct telephone line for emergency calls concerning nuclear security issues was made available to the NRPA for 24 hours a day, 7 days a week. Three officials of the NRPA ensured that the line was permanently staffed.

The tactical group, headed by a radiological adviser appointed by the Director General of the NRPA, was responsible for alarm and alert assessment and for supervision of the activities of the operational teams. The radiological adviser appointed to each subgroup led each stadium's mobile expert support team.

Each operational team was responsible for the maintenance and distribution of personal radiation detectors to the police and national gendarmerie officers who performed the role of front line officers at each point of control. The operational team provided scientific support to these front line officers, through the use of radionuclide identification devices in the case of a radiation alarm being generated by a personal radiation detector. The operational team also supported the implementation of the nuclear security action plan at each stadium.

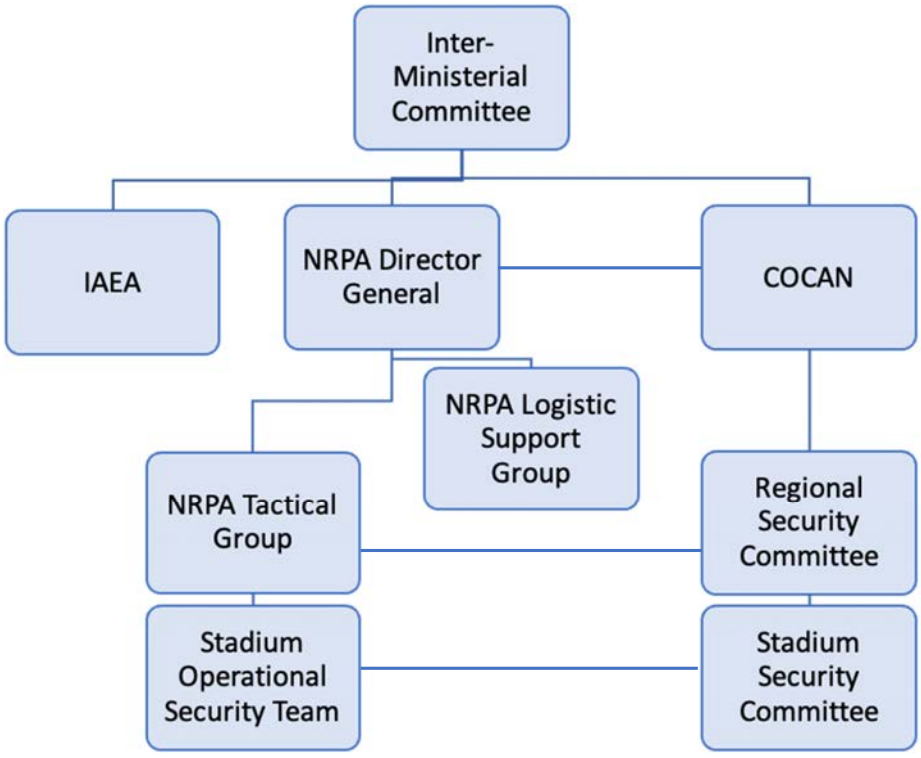

FIG. 4. Diagram of group interactions in relation to the NRPA.

4.2.2. Role of law enforcement

Senior law enforcement officers played a key role in ensuring that nuclear security measures were integrated into Cameroon's overall security planning process.

Law enforcement officers were responsible for carrying out the nuclear security threat assessment for AFCON 2021, after receiving the relevant training from IAEA experts. This threat assessment included the identification of key strategic locations that were not necessarily involved in the event, but were nonetheless subject to nuclear security measures.

Officers from the national police and gendarmerie were trained and equipped to form part of the nuclear security teams responsible for pre-event surveys and for the screening of spectators entering the venues.

4.2.3. Role of private security organizations

To ensure that nuclear security measures were implemented as effectively as possible across the venues, private security operators at airports and at hotels used by dignitaries, officials and teams were trained and equipped to use personal radiation detectors and to act as front line officers.

4.3. THE NUCLEAR SECURITY PLAN

The NRPA supported national authorities and other agencies to develop a nuclear security plan for AFCON 2021, which was then approved by the Inter-Ministerial Committee.

The nuclear security plan for AFCON 2021 aimed to prevent, detect, and if necessary, respond to criminal or intentional unauthorized acts involving nuclear and other radioactive material.

To develop this plan, Cameroon authorities relied on experience gained from the implementation of nuclear security measures at the Women's AFCON 2016 and the African Nations Championship (CHAN) 2020. While both of these latter competitions were much smaller than AFCON 2021, in terms of both the number of venues and the number of games planned, they provided a good basis for the development of the AFCON 2021 nuclear security plan.

The specific objectives of the AFCON 2021 nuclear security plan were as follows:

- To contribute to the nuclear security threat assessment for AFCON 2021;
- To ensure the prevention of, detection of, and response to criminal or intentional unauthorized acts involving nuclear or other radioactive material;
- To select, acquire and deploy appropriate radiation detection instruments in order to implement nuclear security measures at AFCON 2021;
- To perform pre-event surveys and record the results to inform decision making in relation to nuclear security before and during AFCON 2021;
- To train security and law enforcement personnel mobilized for AFCON 2021 in the use of radiation detection instruments;
- To provide radiation alarm assessment in order to implement an effective nuclear security strategy for AFCON 2021;
- To establish an operational radiological monitoring cell at the General Directorate of the NRPA, with connections to the ITDB and the IAEA Unified System for Information Sharing (USIE) so as to ensure timely information sharing in the case of a criminal or other intentional unauthorized act involving nuclear or other radioactive material at AFCON 2021.

The AFCON 2021 nuclear security plan was designed to address the different phases leading up to and during the main event. In the pre-event phase, the plan addressed the need to perform pre-event surveys and ensure that physical protection measures were established to secure nuclear and other

radioactive material in use in Cameroon, along with the associated facilities. Information provided in a report by the ITDB was also exploited for this purpose.

In the main event phase, the plan addressed the need to prevent, detect, and if necessary, respond to criminal or intentional unauthorized acts involving nuclear and other radioactive material during the competition.

4.4. PRE-EVENT CONCEPT OF OPERATIONS

One week before the competition, the operational subgroup of the NRPA undertook background radiation surveys of the main venues and other strategic locations. Equipment used by the subgroup included personal radiation detectors, radionuclide identification devices and portable radiation scanner backpacks.

After these surveys were completed, each venue was locked down by security forces and handed over to the CAF. This process was important, not only to provide reassurance that the venues were free of radiation sources that could have been present for possible malicious purposes, but also to provide essential data on the basic variations in natural background levels at the venues, in the case that any subsequent radiation measurements be taken by the mobile expert support team during the competition, for example in the case of a criminal act involving nuclear or other radioactive material.

A final, operational survey was performed three hours before the opening of the stadiums on the day of each match.

For large areas, such as the seating areas in the stadiums, a considerable number of people were involved in performing radiation surveys, each using a personal radiation detector. The same strategy was adopted for the field of play, with two additional people equipped with portable radiation scanner backpacks, as shown in Fig. 5.

For open areas, such as car parks and fan zones, venue surroundings and main access roads, portable radiation scanner backpacks were used as the primary survey instrument.

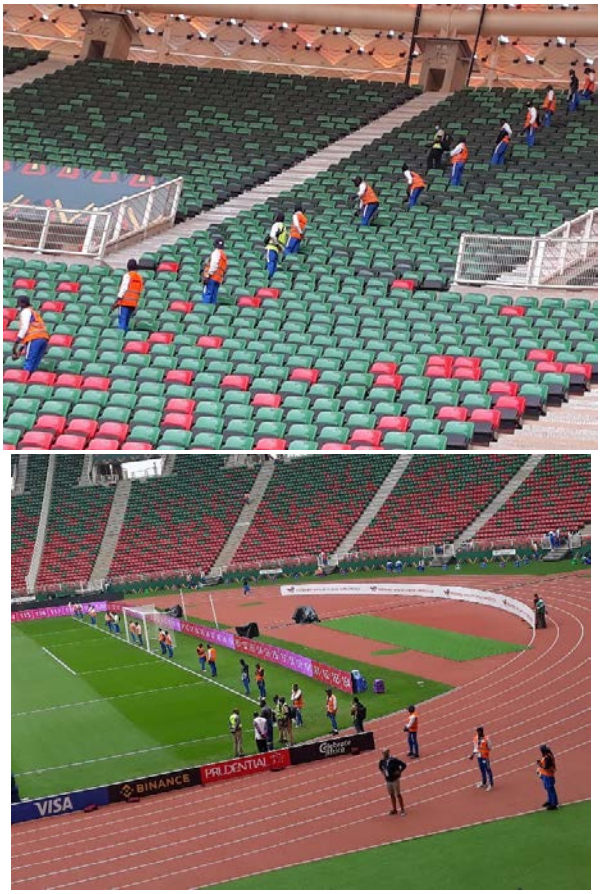

FIG. 5. Mapping of a seating area and field of play at the Olembé Stadium, Yaoundé (photo courtesy of the NRPA).

4.5. CONCEPT OF OPERATIONS DURING THE MAJOR PUBLIC EVENT

Approximately three to four hours before opening each main venue (i.e. stadium) to the public, a pre-match background radiation survey took place to ensure that there were no changes from previous readings, which would necessitate response actions.

Using a three-tier graded approach, nuclear security teams from the relevant national authorities and agencies, supported by NRPA specialists, were deployed at the venue after the pre-match survey was completed. This approach, designed to secure all the main venues and other strategic locations from nuclear security threats, ensured that any attempts to enter a main venue or other strategic location with nuclear or other radioactive material after the pre-match survey would be detected at an early stage. Such an approach also ensured that a proportionate response could be implemented very quickly. The three tiers of the graded approach are described in the subsections below.

4.5.1. Tier 1: Front line officers

The first tier in Cameroon's graded approach was the deployment of front line officers from national security forces, all of whom wore personal radiation detectors to control access to each venue and other locations. These officers were integrated into overall security measures

implemented at venue entry points, and they formed a key part of the venue security teams, who were also responsible for the physical screening of vehicles and pedestrians using search procedures, metal detection equipment and X ray scanning equipment.

The decision was taken at an early stage to use portable radiation detection equipment rather than fixed portal monitors given the limited time available for the acquisition and installation of fixed systems, as well as their expense (see Fig. 6).

FIG. 6. Belt-worn personal radiation detector used by security officers (photo courtesy of the NRPA).

4.5.2. Tier 2: Triage teams

The second tier in Cameroon's graded approach was the deployment of triage teams, supported by officers from national security forces. These teams were stationed at all access checkpoints to the main venues and other locations so as to support front line officers who were monitoring access using personal radiation detectors.

If a vehicle or pedestrian triggered an alarm on the personal radiation detector of a front line officer, the vehicle and its occupants, or the pedestrian, would be escorted by officers of the national security forces to a secure location for a secondary assessment of the alarm by the triage team (see Figs 7, 8 and 9).

Each triage team consisted of two radiation protection specialists from the NRPA. Both specialists were equipped with radionuclide identification devices and were supported by officers from the national security forces. The triage teams were responsible for the following tasks:

- Assessing radiation alarms generated by the personal radiation detectors of front line officers to determine whether the alarm was false, innocent or non-innocent;
- In the case of false alarms, determining the reason for the false alarm, if possible;
- In the case of innocent alarms, determining the nature of the nuclear or other radioactive material that triggered the alarm and the reason for its presence;
- In the case of non-innocent alarms, or alarms for which the cause could not be determined, locating and performing an initial identification of the nuclear or other radioactive material that triggered the alarm and requesting that the mobile expert support team perform further investigation, as necessary;
- Recording and reporting all alarms that were assessed;

— Notifying the AFCON 2021 Regional Security Committee of any alarms, as well as the outcome of the investigations performed by the triage teams.

FIG. 7. Pedestrian control using personal radiation devices worn by security officers (photo courtesy of the NRPA).

FIG. 8. Vehicle control using personal radiation devices worn by security officers (photo courtesy of the NRPA).

FIG. 9. Investigation into the origin of an alarm caused by a package (photo courtesy of the NRPA).

4.5.3. Tier 3: Mobile expert support team

The third tier in Cameroon's graded approach was the mobile expert support team. This team, which included three radiation protection specialists from the NRPA, was located at the General Directorate of the NRPA in Yaoundé. If the mobile expert support team needed to be activated and deployed to a radiation alarm during the MPE, they were able to rely on existing activation and deployment arrangements, developed in conjunction with the Ministry of Territorial Administration.

The mobile expert support team was responsible for conducting further investigations into radiation alarms that the triage team was unable to satisfactorily resolve, or in the case that the detection of radiation had potential or actual radiological consequences. In the context of AFCON 2021, the mobile expert support team had the specific responsibility of undertaking more in-depth inspections at the request of the triage team, for example in the following cases if:

- A radionuclide was detected that was not being used for medical purposes;
- Neutron radiation was detected, potentially indicating the presence of nuclear material;
- The radiation dose rate was greater than 100 μSv/h;
- Possible surface contamination was found;
- Radionuclides were detected that needed identification;
- The results of the triage team investigation were inconclusive for any reason;
- The results of the triage team investigation were deemed to be suspicious, or the triage team requested further analysis by experts.

Additional responsibilities of the mobile expert support team could include the following:

— Classifying radioactive material in accordance with the hazard presented (i.e. using the categorization provided in IAEA Safety Standards Series RS-G-1.9, Categorization of Radioactive Sources [8]);
— Conducting searches to locate lost or stolen radioactive material;
— Ensuring the safe and secure recovery, transport and storage of any nuclear or other radioactive material that might have been detected during AFCON 2021;
— Performing controlled operations that could involve exposure to radiation;
— Proposing countermeasures (e.g. isolation of areas, shelter and evacuation).

The members of the mobile expert support team were equipped with various radiation detection instruments and other specialized equipment to enable them to perform their responsibilities. These instruments and equipment included the following:

— Two personal radiation scanner backpacks, with gamma and neutron detection capabilities and GPS;
— Two radionuclide identification devices;
— Personal dosimeters;
— Personal protective equipment (e.g. lead apron);
— Recovery clamps and other handling equipment;
— One container suitable for the recovery of radioactive material.

4.6. LOGISTICS SUPPORT

The Logistics Support Group worked closely with the Coordination Group at the NRPA and was chaired by the Director of Administrative and Financial Affairs of the Agency, under the supervision of the Director General. The Logistics Support Group was responsible for providing the necessary logistics support to the operational teams of the NRPA.

4.7. DEPLOYMENT, TESTING AND MAINTENANCE OF DETECTION EQUIPMENT

Detection equipment was checked and tested by NRPA personnel at their various locations where the events took place, before distribution and use of the equipment. During the football matches, the set of equipment assigned to each venue was kept at the regional office of the NRPA that was responsible for nuclear security at the venue.

The operational teams of the NRPA ensured the proper functioning of detection equipment before distributing it to front line officers. If necessary, the team also oversaw the maintenance and repair of any devices that might have malfunctioned.

5. CONCLUSION

The establishment and implementation of nuclear security measures for AFCON 2021 involved considerable efforts by all the organizations involved. NRPA personnel spent a significant amount of time before the competition on planning nuclear security measures and on training personnel before the MPE, and a total of 40 staff members from the NRPA were mobilized during the games to provide nuclear security support to the larger security operation. During the period of competition, nuclear science specialist from the NRPA contributed to a total of 2400 working hours.

The assessment of ten alarms were triggered by personal radiation detectors during AFCON 2021. A total of seven of these alarms were found to be innocent alarms triggered by the presence of

naturally occurring radioactive material, such as potassium-40. Three other alarms were false since they were caused by the way in which the personal radiation detectors were being used at the time of the assessment.

6. POST-EVENT ANALYSIS

6.1. CHALLENGES IN THE IMPLEMENTATION OF NUCLEAR SECURITY MEASURES AT AFCON 2021

Given the scale of the operation to implement nuclear security measures at AFCON 2021, provision of both human and technical resources, proved to be a challenge for the responsible authorities in Cameroon.

Implementation of the transport restrictions associated with AFCON 2021 made the movement of nuclear security personnel between venues more difficult and resulted in much more time being allocated to personnel for them to reach their destinations.

As Cameroon does not currently have any nuclear facilities on its territory, the first step was to ensure support from the national authorities for the importance of including nuclear security into overall security arrangements for AFCON 2021. The Director General of the NRPA and the NRPA team were instrumental in ensuring that nuclear security considerations were integrated into the overall security planning process.

6.2. GOOD PRACTICES IN THE IMPLEMENTATION OF NUCLEAR SECURITY MEASURES AT AFCON 2021

Cameroon began the process for implementing nuclear security planning 14 months before AFCON 2021, ensuring that nuclear security measures were incorporated into the AFCON 2021 security planning process and that sufficient time was dedicated to training and equipping front line officers who would implement nuclear security measures during the event. In this way, national authorities reinforced the message that early planning for the implementation of nuclear security measures at an MPE is essential, if such measures are to be properly integrated into the overall security planning.

Cameroon requested assistance for nuclear security from the IAEA at an early stage in the security planning process for AFCON 2021, enabling the full package of IAEA assistance to be provided to Cameroon. Early requests from States wishing to implement nuclear security measures for MPEs help to enable IAEA assistance to be provided in good time.

The participation of senior officers from the NRPA in ministerial meetings ensured that government ministers were aware of the importance of nuclear security issues at an early stage. The Director General of the NRPA was also present at press conferences and interviews, directly supporting activities to raise public awareness concerning nuclear security issues.

Thanks to the participation of the NRPA in the nuclear security threat assessment process, national authorities were provided with the information necessary to make an accurate, well informed assessment of nuclear security threats and risks.

Cameroon implemented a comprehensive training package on nuclear security issues for all the personnel and interested parties involved in AFCON 2021, ensuring that those involved in the

implementation of nuclear security measures at the MPE were able to perform their roles in an effective manner.

Cameroon also had a sufficient number of well-trained nuclear security specialists able to support nuclear security activities during AFCON 2021. For example, specialists from the NRPA, as part of the triage team, were responsible for investigating radiation alarms detected by law enforcement officers. The expertise of the triage teams allowed the front line officers to fulfil the role of the mobile expert support team for circumstances in which the team was unavailable. For example, if the mobile expert support team was not able to travel to the location of the alarm. Such cross-cutting capabilities are particularly relevant for countries with a limited number of professionals that have expertise in nuclear security.

To ensure that access credentials were used appropriately by nuclear security personnel, they received training from security experts of the CAF in advance of receiving the credentials, and again when these access credentials were distributed. The training ensured that nuclear security personnel did not misuse their credentials or use them incorrectly, and this was considered an excellent example of good practice in this area.

Cameroon requested the IAEA to deliver a workshop on nuclear security culture to raise the awareness of interested parties early in the planning stage of this MPE. Participation in the workshop helped to ensure that interested parties fully understood the benefits of integrating nuclear security into the event planning process.

6.3. LESSONS IDENTIFIED FROM AFCON 2021

The following lessons were identified from the development and implementation of nuclear security measures at AFCON 2021:

- Once the decision is made to implement nuclear security measures at an MPE, it is important that the State ensure that nuclear security is fully integrated into the overall security planning for the event, ideally at an early stage of the security planning process.
- The development of plans and procedures to implement nuclear security measures at an MPE can be an opportunity for the State to develop its overall nuclear security plans and procedures in the case that the State wishes to do so.
- The roles and responsibilities of each of the national authorities involved in the implementation of nuclear security measures at an MPE need to be clearly defined, as is the manner in which they interact and cooperate.
- Early awareness of nuclear security culture among interested parties is important if nuclear security is to be properly integrated into the overall security arrangements for an MPE.
- The logistics involved in supporting nuclear security teams deployed at an MPE, across diverse geographic sites, entails the provision of significant numbers of communications devices, of accommodations and refreshments for teams and of fuel for the vehicles, as well as significant financial support. The amount of radiation detection equipment in use at an MPE also necessitates specific arrangements for battery checks and replacements, for electrical plugs and chargers, and for the storage of equipment at facilities.
- A sufficient amount of time is needed for States to train front line officers in the use of radiation detection instruments, and the assessment of radiation alarms and information alerts. Time is also needed for security forces to form specialized groups who can manage the responsibilities of front line officers and triage teams so as to reduce the reliance on specialists from technical or scientific agencies (e.g. the relevant radiation authority) with limited human resources.

— An analysis of training needs can be undertaken in the early stages of the planning process of the MPE to ensure that training needs in relation to the implementation of nuclear security measures are met.
— It is important to implement a programme focusing on nuclear security exercises so as to ensure that all the organizations responsible for nuclear security are familiar with the relevant nuclear security practices and procedures that are necessary when hosting an MPE. Exercises to test the assessment of, and response to, instrument alarms and information alerts are particularly important for law enforcement organizations that might not be familiar with these events.
— Cooperation with the IAEA to train those who provide training for the implementation of nuclear security measures at an MPE is essential.
— When determining the quantities and types of radiation detection equipment needed by a State to implement nuclear security measures at an MPE, the State will first need to assess the operational conditions of its existing equipment and make arrangements to repair or replace existing equipment if it is found to be defective.
— Cooperation with the IAEA to train experts in verifying the performance of the radiation detection instruments used for MPEs is needed to ensure that any loaned detection instruments are in correct working order at all times during the MPE. This training can be used as a foundation to develop a national programme for the maintenance of radiation detection equipment.
— An assessment of the quantities and types of radiation detection instruments needed to support the implementation of nuclear security measures at an MPE needs to be performed at an early stage in the planning process for the MPE. This assessment enables the State to identify radiation detection equipment that can be provided by national authorities, as well as the equipment that can be requested from other international organizations, such as the IAEA, on loan. This request needs to be made as early as possible to ensure the availability of the equipment.

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LIST OF ABBREVIATIONS

AFCON	Africa Cup of Nations
CAF	Confederation of African Football
COCAN	Local Organizing Committee of the African Cup of Nations and Championship
CCAA	Cameroon Civil Aviation Authority
CCTV	Closed circuit television
DGD	Directorate of Customs (Cameroon)
DGRE	General Directorate of External Research (Cameroon)
DGSN	General Delegation for National Security (Cameroon)
FECAFOOT	Cameroon Football Federation
FIFA	International Federation of Association Football
IAEA	International Atomic Energy Agency
IEC	Incident and Emergency Centre (IAEA)
INTERPOL	International Criminal Police Organization
ITDB	Incident and Trafficking Database (IAEA)
MINAT	Ministry of Territorial Administration (Cameroon)
MINPT	Ministry of Telecommunications (Cameroon)
MINSANTE	Ministry of Health (Cameroon)
MINSEP	Ministry of Sports and Physical Education (Cameroon)
MINT	Ministry of Transport (Cameroon)
MINTOUR	Ministry of Tourism (Cameroon)
MPE	Major public event
NRPA	National Radiation Protection Agency (Cameroon)
USIE	Unified System for Information Sharing (IAEA)

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