

## **INTERNATIONAL TRANSPORT OF NUCLEAR MATERIAL IN BRAZIL – A MODEL OF SUCCESS**

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### **Abstract**

The purpose of this work is to demonstrate how International Transport of Nuclear Material in Brazil is organized, coordinated and executed according to the National Nuclear Security Regime. The country has created a Nuclear Security governance in the Presidency of the Republic Institutional Security Cabinet, which holds a central role in the System for the Protection of the Brazilian Nuclear Program (Sipron, as the acronym in Portuguese), which has recently established the Nuclear Security Coordination in its structure. This new organization enabled the coordination of all national assets involved in the security of nuclear material during transport. Brazil has extensive dimensions; it occupies roughly half of South America, bordering the Atlantic Ocean and all the subcontinent countries except Ecuador and Chile. This continental country presents huge challenges to the ground transportation of any kind in order to reach neighboring countries. Nevertheless, in 2018, a successful nuclear material transport operation to Argentina was coordinated by Sipron within a length of more than 2.000 Km. Nuclear material was delivered from Resende in the State of Rio de Janeiro to Uruguaiana in the State of Rio Grande do Sul in the border with Argentina. This represents an itinerary farther than the distance between Vienna and Moscow. Various security coordination arrangements were necessary before and during the operation. First of all these arrangements were concerned to the identification of all stakeholders roles and responsibilities with the purpose to achieve the necessary synergy in order to perform the operation jointly. The Design and Evaluation Process Outline (DEPO) methodology was applied and the following tasks were accomplished: transportation conveyance characterization; risk and threat assessment with the support of the national intelligence agency; physical protection design according to a defined threat; law enforcement coordination (Federal Police and State Polices); contingency planning; information security measures; personnel clearances; coordination with highway operators; regulatory compliance; activation of the National Command and Control Joint Center and the State Command and Control Joint Centers; synchronization matrix implementation. The operation proved the importance of liaison in all levels, information sharing and cooperation among the responders. However the principle of confidentiality application became crucial to restrict access to sensitive information to the minimum necessary. Deterrence was largely employed during the operation to minimize risks. The operation has turned into a successful interagency Case Study with many Best Practices and Lessons Learned.

### **1. SCOPE OF THE TOPIC**

This paper describes and analyses the nuclear material transport operation that was undertaken to support the export of nuclear material from Brazil to Argentina. The overcoming of security challenges has constrained the scope of this work with an approach that has demonstrated the perspective of the different agencies involved.

The Brazilian Nuclear Program stakeholders are sometimes unaware of the full capabilities available by the State in order to assure the National Nuclear Security Regime, which has the objective to protect persons, property, society and the environment from harmful consequences of a nuclear security event.

The content of this paper has been originated from open sources and has not included sensitive information that may compromise security plans or may disclose classified information. The scope of this study is focused on the operational methodology, lessons learned and best practices in the transport of nuclear material.

## 2. TRANSPORT OF NUCLEAR MATERIAL IN BRAZIL

The nuclear material transport in Brazil is an essential fuel cycle activity carried out by nuclear operators under the oversight of the nuclear, environmental and transportation regulatory agencies.

### 2.1. Transport requirements

The National Commission on Nuclear Energy (CNEN, as the acronym in Portuguese) is the nuclear competent authority who is in charge of establishing, maintaining and sustaining the nuclear safety, security and safeguards requirements. The Federal Law n° 6.189 of December 16<sup>th</sup> 1974 empowers CNEN to implement the entire nuclear regulatory framework<sup>1</sup>, composed of around 80 (eighty) regulations<sup>2</sup>.

The Transport Security Plan, drawn up by nuclear operators and assessed by CNEN, comprises the actions undertaken to comply with the requirements related to the transport of nuclear material in Brazil. The Brazilian nuclear regulatory agency also establishes physical protection requirements for nuclear and radioactive material in transport according to the Regulation CNEN-NE-2.01, which describes security obligations to nuclear operators.

The Renewable Natural Resources and Environment Brazilian Institute (IBAMA, as the acronym in Portuguese) is the competent authority to establish environmental requirements which are enshrined in the following legislation: Federal Law n° 6.938 from 1981 and Presidential Decree n° 99.274, from 1990. When the Transport Security Plan complies with these regulations, IBAMA grants the nuclear operator an Operating License. In order to optimize the licensing process, IBAMA and CNEN have been considering to issue a Radioactive Material Transport Control Joint Technical Note<sup>3</sup>, which allows the operator to comply with both regulatory requirements in a single licensing document.

The United Nations recommendations for the nuclear material transport (classified in the orange book<sup>4</sup> as number “7”) were introduced in the Brazilian legislation for road, railroad, maritime, river and air transportation by the following regulatory agencies: National Ground Transportation Agency (ANTT, as for the acronym in Portuguese); National River and Maritime Agency (ANTAQ, as for the acronym in Portuguese); and Civilian Aviation National Agency (ANAC, as for the acronym in Portuguese).

### 2.2. Overview of the usual nuclear transportation needs in Brazil

The Brazilian nuclear material transport needs are related to a fruitful Nuclear Program, composed of advanced Research & Development facilities, uranium mines, enrichment plant, fuel cycle facilities (pilot and industrial plants), two nuclear power reactors and a third nuclear power reactor under construction.

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<sup>1</sup> BRAZIL, Federal Law n° 6189/1974. Creation of the *National Commission for Nuclear Energy Law*. Available at [http://www.planalto.gov.br/ccivil\\_03/LEIS/L6189.htm](http://www.planalto.gov.br/ccivil_03/LEIS/L6189.htm) Access on October 15th, 2018.

<sup>2</sup> BRAZIL, Comissão Nacional de Energia Nuclear, *Normas*. Available at <http://www.cnen.gov.br/normas-tecnicas>. Access on October 15th 2018.

<sup>3</sup> BRAZIL, Ibama and CNEN Termo de Referência (2013) Retrieved from [http://appasp.cnen.gov.br/seguranca/transporte/documentos/Nota\\_Tec\\_CNEN\\_IBAMA.pdf](http://appasp.cnen.gov.br/seguranca/transporte/documentos/Nota_Tec_CNEN_IBAMA.pdf) Access on May 7th 2019

<sup>4</sup> UNITED NATIONS, Recommendations on the Transport of Dangerous Goods, 20<sup>th</sup> Revised Edition (2017), Retrieved from [https://www.unece.org/fileadmin/DAM/trans/danger/publi/ST\\_SG\\_AC10\\_1\\_Rev20\\_Vol\\_I\\_E\\_WEB.pdf](https://www.unece.org/fileadmin/DAM/trans/danger/publi/ST_SG_AC10_1_Rev20_Vol_I_E_WEB.pdf), on May 7th 2019

The two nuclear power reactors, Angra I (657 Megawatts) and Angra II (1350 MWe), provides about 2,5% of the country's electricity<sup>5</sup> annually.

### 3. EXPORT OF NUCLEAR MATERIAL TO ARGENTINA

#### 3.1. Brazilian Nuclear legislation

The Brazilian Federal Constitution of 1988<sup>6</sup> establishes that it is the exclusive competence of the State to exploit services and nuclear facilities of any kind and to control and execute the monopoly over research, mining, enrichment, reprocessing, manufacturing and the trade of nuclear materials and its derivatives.

The Federal Law nº 6.189 of December 16<sup>th</sup> 1974 establishes that the Nuclear Industries of Brazil (INB, as the acronym in Portuguese), the State company that controls the nuclear fuel cycle, may execute commercial activities with nuclear material under the oversight of CNEN. The same Law imposes that the export of nuclear material is allowed on the condition that strategic stocks for the Brazilian Nuclear Program are guaranteed.

#### 3.2. Nuclear material export contracts

In 2016, the INB signed the first contract with the Argentinean Nuclear Fuel (CONUAR, as the acronym in Spanish) company to export enriched uranium from Brazil<sup>7</sup>. The contract included various requirements such as quantity, enrichment level, quality control, delivery deadlines, shipment packages, nuclear material end use, prices, payment conditions, safeguards, confidentiality conditions and physical protection.

In 2017, it was signed the second nuclear material supply contract, reflecting the Argentine desire to enhance the nuclear trade with Brazil. The estimated value of both negotiations between INB and CONUAR reached more than US\$ 7 millions<sup>8</sup>.

### 4. TRANSPORT OPERATION PLANNING

#### 4.1. Modal shipment decision

When INB decided for the road transportation modal to provide the enrichment uranium shipment from Brazil to Argentina, it became clear to all security agencies involved that it would be a challenge to transport nuclear material in such a great distance. It was agreed between both countries that INB would be responsible for the transportation from the city of Resende, in the State of Rio de Janeiro, where the Fuel Cycle plant is located, to Uruguaiana, in the State of Rio Grande do Sul, the border line with Argentina. The transport operation to Argentina with a length of more than 2.000 Km represented an itinerary farther then the distance between Vienna and Moscow.

Based on the complexity of the international transport operation, INB sought for the support of the System for the Protection of the Brazilian Nuclear Program (Sipron, as the acronym in Portuguese) with the purpose to maximize the synergy among the various agencies involved.

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<sup>5</sup> Fundação Getúlio Vargas, Boletim de Conjuntura do Setor Energético, page 5, retrieved on September 10th, 2019 from [https://fgvenergia.fgv.br/sites/fgvenergia.fgv.br/files/fevereiro-2019\\_final.pdf](https://fgvenergia.fgv.br/sites/fgvenergia.fgv.br/files/fevereiro-2019_final.pdf)

<sup>6</sup> BRAZIL. Constitution (1988). *Constitution of the Republic Federation of Brazil*: promulgated on October 5<sup>th</sup> 1988. Available at [https://www2.senado.leg.br/bdsf/bitstream/handle/id/518231/CF88\\_Livro\\_EC91\\_2016.pdf](https://www2.senado.leg.br/bdsf/bitstream/handle/id/518231/CF88_Livro_EC91_2016.pdf) Access on September 10<sup>th</sup>, 2019.

<sup>7</sup> World Nuclear News. Brazil to export enriched uranium, June 21 2016, retrieved on June 18<sup>th</sup>, 2019 from <https://www.world-nuclear-news.org/Articles/Brazil-to-export-enriched-uranium>

<sup>8</sup> Governo do Brasil. Indústrias Nucleares do Brasil pretendem produzir urânio metálico para a Argentina, retrieved on June 18th, 2019 from <http://www.brasil.gov.br/noticias/educacao-e-ciencia/2017/04/industrias-nucleares-do-brasil-pretendem-produzir-uranio-metalico-para-a-argentina>

## 4.2. The role of Sipron

The Sipron is a System integrated by all governmental agencies at the federal, state and municipal levels involved in the security and safety of the Brazilian Nuclear Program. The Sipron is coordinated by the Institutional Security Cabinet of the Presidency of the Republic (GSI-PR, as the acronym in Portuguese), which has a central role in the System.

The GSI-PR is structured directly under the President of the Republic with a Cabinet Chief who is a Minister of State and a close advisor. Therefore, Sipron is empowered by the highest authority in the Brazilian Government, which is a great advantage, when it is necessary to coordinate different federal Ministries and various agencies in nuclear security and safety issues.

The Coordination of Nuclear Security, created in 2017 in the GSI-PR, was assigned with the task of making the proper arrangements of the nuclear material transport operation to Argentina. This Coordination is a Sipron structure dedicated to nuclear security matters to manage high level nuclear security provisions for nuclear facilities and for nuclear material transport.

## 4.3. Initial coordinating steps to plan the support for the nuclear material transport

### 4.3.1. Identification of the involved security agencies

The first step taken by the Nuclear Security Coordination was the identification of all the agencies that might have any involvement in the transport operation security.

While this operation demanded much more attention than the regular fuel cycle transportation that INB was used to do, the following aspects raised high concerns among the planners:

- The travel distance of approximately 2.000 km, which required about 4 (four) overnights along the route for the crew and the security escort sleep over;
- The conveyance physical protection during the overnights in public areas;
- 5 (five) different Law Enforcement and Civil Defense jurisdictions during the crossing of 5 (five) Brazilian states: Rio de Janeiro; São Paulo; Paraná; Santa Catarina and Rio Grande do Sul;
- The conveyance crossing of an extensive route in public domain with peculiar landscapes of urban and rural areas, with terrain variation, distinct weather conditions, diverse traffic and road conditions, not to mention distinct local threats, which entail the need for a very detailed reconnaissance, risk and threat assessments;
- The need to maintain a very low profile for the operation, considering possible negative public reaction that the disclosure of the operation might provoke in environmental activist organizations.
- The existence of critical points like the bascule bridge near the city of Porto Alegre and road maintenance along the route that could affect the traffic flow.
- The need of a Transport Command and Control Center to provide prompt coordination, dispatching of assets and permanent situational awareness.

### 4.3.2. First preparatory meeting

The Nuclear Security Coordination of Sipron scheduled the first preparatory technical meeting with agencies representatives, previously identified as having attributions and roles in the nuclear material transport operation. The following agencies were called:

- Nuclear Security Coordination of the Sipron Department from the Presidency of the Republic Institutional Security Cabinet;
- Federal Secretariat for Joint Operations of the Ministry of Justice and Public Security;
- Nuclear Industries of Brazil;
- National Commission on Nuclear Energy;
- Brazilian Intelligence Agency; Federal Highway Police; Federal Police; Brazilian Customs;

- Defense Ministry with the Brazilian Army; Brazilian Air Force; Brazilian Navy;
- Rio de Janeiro State Police;
- São Paulo State Police;
- Paraná State Police;
- Santa Catarina State Police;
- Rio Grande do Sul State Police; and
- Ground Infrastructure National Department.

This first meeting had the following objectives:

- To present an overview of the current planning and the nuclear material transport operation schedule;
- To characterize the peculiarities of the Transport Security Plan (TSP) arranged by the INB and approved by the CNEN;
- To identify improvements opportunities in the TSP;
- To identify the possible roles of each security agency in the transport operation; and
- To identify situations and critical points that might interfere with the traffic flow.

#### 4.3.3. *INB Transport Security Plan (TSP)*

The INB transport planning was presented in the first meeting. Basically the conveyance was structured in three echelons: Safety and Security Echelon; Law Enforcement Echelon; and Transport Echelon, all of them under the Transport General Coordinator from INB. The transport schedule included a main route and alternatives routes, with 4 (four) overnights. The INB would be permanently escorted by a detachment of the Highway Federal Police, which would also provide the perimeter security during the technical stops and during the overnight.

One aspect that is worth to point out is that the INB had already concluded its TSP which had already been approved by the regulatory body. However, the document is focused in activities and arrangements carried out by the licensee. This meant a great opportunity to introduce new improvements to the transport activity in order to employ all the State security assets that the different agencies could offer.

The fact was that, by the time the INB planners had made the TSP, they were not used to employ the full capabilities that the operation could receive with the integration of all State security agencies.

#### **4.4. Identification of opportunities of improvements on the Transport Security Plan (TSP)**

The INB and CNEN perspective on the transport operation planning reflected a routine fuel cycle transport they were used to do. The different approaches and perspectives of all Law Enforcement agencies, Intelligence and Defense, much more focused on risks and threats, raised some new ideas that contributed to many improvements. Just after the first coordinating meeting some new opportunities were identified in the planning of the operation:

- The perimeter security during technical stops and overnights was the responsibility of the Federal Highway Police detachment, which was escorting the conveyance. This was a huge burden for the detachment, considering the six days operation period that might reflect in the security agents performance decrease;
- The threat or risk assessment for the nuclear material transport operation was limited and didn't have the National Intelligence Agency participation;
- The civilian drivers who worked to a contractor were not submitted to a comprehensive vetting process. As a consequence the risk of insiders increased;
- The initial planning lacked a transport command and control center to support the decision process, to increase the situational awareness and to dispatch reinforcement assets when necessary without having to be requested.

- There were few arrangements to summon up additional responders in order to previously prepare them for possible contingencies.
- The Brazilian Customs personnel in the borderline with Argentina was not briefed about the peculiarities of the cargo. The packages could not be opened in view of the IAEA safeguards rules that didn't allow seals violation.

#### **4.5. Introducing new improvements**

##### *4.5.1. Command and Control*

Based on the diagnosis of the coordinating meetings for the nuclear material transport operation, the GSI-PR suggested some upgrades in the INB transport planning. Proper steps were taken in order to involve a new and crucial agency: the Federal Secretariat for Joint Operations of the Ministry of Justice and Public Security. The importance of this organization is directly related to the employment of the National Command and Control Joint Center (CICC-N, acronym in Portuguese) which belongs to this Secretariat. The CICC-N performed the role of a National Transport Control Center.

The Federal Secretariat for Joint Operations has the central role among the Brazilian states in the Law enforcement operation coordination with Regional Command and Control Joint Centers located in each State.

##### *4.5.2. National Command and Control Joint Center*

This command and control structure was incorporated in the Brazilian Public Security assets in view of the security preparation for the Olympic Games in 2016. The National Command and Control Joint Center is located in the Brazilian capital Brasília. It is comprised of hardware and software systems. The main space is a room of 438 m<sup>2</sup> with 56 integrated monitors with large video wall in front of them. There is a backup electric generator and a safe room to store all the data<sup>9</sup>.

The center has 300 Law Enforcement personnel working 24/7. They were assigned by their respective states and from others security national agencies and have a liaison agent role with the attribution to contact their State Public Security Secretariats in order to exchange information, coordinate actions and dispatch assets.

Consequently, the National Command and Control Joint Center became one of the main resources in the nuclear material transport operation and much of the operation success derives from the capability of this structure to form a command and control network with the Regional Command Joint Centers in each state that the nuclear material conveyance would cross.

##### *4.5.3. Intelligence assessment*

The Brazilian Intelligence Agency provided a comprehensive risk and threat assessment for the transport operation. The Agency employed the Central and the Regional Offices to collect, analyze and produce useful Intelligence to support of the operation planning. The Intelligence documents included, but were not limited to, recommendations about critical points, threats, communication signal quality along the route and statistics of criminal acts in specific areas.

Liaison intelligence officers were provided to work in shifts in the National and Regional Command and Control Joint Centers during the whole operation.

##### *4.5.4. Support of the five State Polices along the itinerary*

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<sup>9</sup> GOVERNO DO BRASIL. Segurança Integrada: Centro Integrado de Comando e Controle coordena segurança durante Copa. Retrieved on June 19th 2019, from <http://www.brasil.gov.br/noticias/seguranca-e-justica/2014/05/centro-integrado-de-comando-e-controle-coordena-seguranca-durante-a-copa>

The engagement of the State Polices in the transport operation was essential to assure an external response in case of a contingency situation. Moreover, the support of the State polices during the technical stops and overnights relieved the Federal Highway Police detachment to rest properly, which improved their performance during the daily escorting tasks.

The coordination with each State Police was facilitated by the support of the National Command and Control Joint Center who could communicate directly with the nuclear conveyance or through the Regional Command and Control Joint Centers with the use of the tracking devices and the State police liaison officers assigned to the National Center.

The states liaison officers role during each state crossing and during the jurisdiction change was a key aspect to coordination in different levels and for the foresight and mitigation of incidents that were identified well ahead of the conveyance.

#### *4.5.5. Federal Police Support*

The Federal Police became an important participant in the planning phase. The Antiterrorism Division made a thorough background check in all contracted civilian drivers. The produced information resulted in the reduction of risks of potential and real insiders.

The local Federal Police districts along the route were notified about the nuclear material transport operation and important intelligence were made available previously. During the whole operation a team of Federal Police agents worked in shifts in the Transport Command and Control National Center.

#### *4.5.6. Ground Infrastructure National Department (DNIT as the acronym in Portuguese)*

DNIT was briefed about conveyance route to identify the total highway stretches that were under repair. Thus DNIT came up with solutions to prioritize the nuclear material conveyance when there was lane reductions resulted from roadworks.

#### *4.4.7 Ground Transportation National Agency (ANTT as the acronym in Portuguese)*

ANTT is responsible to control the highway concession contracts with private companies and, as a result, they were able to request real time images from the concessionaires. In order to prioritize the nuclear material traffic, ANTT relieved the conveyance from truck weighing along the route.

#### *4.5.8 Ministry of Defense*

The Ministry of Defense provided CBRN troops on an “Alert” level status during the whole operation. Also it allowed the conveyance to spend the last overnight in an Army base in Uruguaiana, on the borderline before the transfer of responsibility from Brazil to Argentina.

## 5. CONDUCTING THE TRANSPORT OPERATION

### **5.1. Transport operation starting process**

The starting date and time settlement depended on the date and time the Argentinians would be able to receive the nuclear material in the customs post located in the borderline in the city of Uruguaiana. With that information, it was provided a proper schedule for the whole transport operation, so the conveyance would arrive timely for the transfer of responsibility between both countries.

The previous planning also included the input of all scheduled events in the “activities matrix” platform. This matrix was supported by software available at the Transport Operation Control National Center. This tool provided a control during the operation allowing the states coordinators to identify eventual delays immediately or if unplanned incidents occurred.

## **5.2. Tracking systems**

During the operation redundant tracking systems were employed:

- The main system was attached to the cargo and provided the tracking by GPS during the whole itinerary;
- The secondary system was uploaded in the federal highway patrol escort personal mobile and provided tracking capabilities and allowed videoconferences with the response forces;
- Highway CCTV cameras: the highway concessionaires companies along the route provided real time video to the Transport Control Centers, which were useful to increase the security agencies situational awareness.

## **5.4. Work routine in the Transport Control Centers**

The National Transport Control Center operated with State Police representatives who were in charge to liaise with the Regional Transport Control Centers while the nuclear material conveyance crossed each State. The National Control Center received inputs from the Regional Control Centers by videoconferences and through the computer platform.

During the whole operation in the National Control Center, there were representatives working in shifts of the following agencies: Presidency of the Republic Institutional Security Cabinet; Federal Secretariat for Joint Operations; Brazilian Intelligence Agency; Highway Federal Police; Federal Police; State Police agents from the states of Rio de Janeiro; São Paulo; Paraná; Santa Catarina and Rio Grande do Sul; INB operator representative.

Real time images were provided and if, for example, an accident occurred in the itinerary, the nuclear conveyance was notified before it reached the location and arrangements were made so the incident would not interfere with the operation.

The previous arrangements and protocols established among the Federal Secretariat for Integrated Operations and the five State Secretariats for Public Security were crucial for the operation success. This reflected in much more efficient command and control relation among the National Transport Control Centers and the Regional Transport Control Centers.

The daily operational cycle started at early morning with Command and Control Center activation at “full operational”. During the night, the National Transport Control Center reduced its readiness status and the security responsibility was transferred to the Regional Transport Control Centers, considering that the conveyance security was in charge of the State Police.

There were routine briefings in the morning and at the end of the day. The matrix events were analyzed with the identification of reasons for delays and occurrences of unplanned events.

## **5.5. Incidents during the operation**

*5.5.1 State of Rio de Janeiro:* no incidents reported.

*5.5.2 State of São Paulo*

a) Administrative incident: Main tracking system malfunctioning. Two of the three devices attached didn't perform accordingly. The defective devices were repaired in the first overnight.



b) Operational incidents:

- 1) Truck rollover in the highway: The truck didn't belong to the conveyance and the incident had not interfered with the convoy movement.
- 2) Truck blocking the highway due to accident: As it was identified well ahead of the conveyance passage, it was promptly removed by the highway emergency team.
- 3) Change of the first overnight location: There was an unpredicted change in the location for the first overnight due to administrative issues. The local police quickly adjusted to the new situation and provided the conveyance security during the night.
- 4) Flat tire in one of the truck tractor: It was necessary to substitute one of the truck tractors because of a flat tire. It should be pointed out that the conveyance had a truck tractor in reserve that allowed a quick tractor change and the conveyance was not delayed. One Federal Highway Patrol team escorted the tractor to repair the tire, while the conveyance advanced.

*5.5.3. State of Paraná*

a) Administrative incidents:

- 1) Secondary tracking system oscillation. The signal presented some oscillation but was reestablished to normal along the route.
- 2) Main tracking system malfunctioning returned. Again two of the three devices attached were not working. The problem was solved still in the morning.

b) Operational incidents: Two car accident in north lane. One of them with victims. As the reported accidents were at the opposite lane it didn't affect the convoy. The highway assistance teams made the proper arrangements to avoid possible interference.

*5.5.4. State of Santa Catarina*

a) Administrative incidents

Delay in the arrival at second overnight location: Due to traffic, the stop for the second overnight occurred a bit later than the schedule.

b) Operational incidents: no incidents reported.

*5.5.5. State of Rio Grande do Sul*

a) Administrative incident: change in a technical stop due to an unpredicted religious service in the stop location. The planning was readjusted and the stop occurred in another place.

b) Operational incidents: no incidents reported.

## **5.6. Incidents evaluation**

The minor incidents during the five days of transport operation in a distance of more than 2.000 Km reflected the joint efforts achievements of all the agencies involved. The detailed planning, the availability of representatives of all the security agencies, the coordination, the different agencies roles attribution, the deterrence provided by the security agencies, the command, control and communication assets, the State intelligence produced, and the spirit of cooperation among all the participants shall be considered the main factors that contributed to the mission success.

## **5. SUMMARY**

The nuclear material international transport operation between Brazil and Argentina has become a successful joint operation study case. The employment of the State full capabilities to assure a secure and a safe nuclear material transport has proved the competence and quality of all personnel, the processes and equipment effectiveness.

It is worth to point out that all the performed actions were legal attributions no less no more. All requests that were made to agencies were supported by law. The main difference was the commitment of all participants

and the perception of how important and relevant this operation represented in order to demonstrate the Brazilian potential when dealing with strategic issues like the Brazilian Nuclear Program.

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