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National Electric Power Regulatory Authority
Islamic Republic of Pakistan

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Registrar

No. NEPRA/DG(M&E)/LAD-01/ 13986

September 05, 2024

Chief Executive Officer,
K-Electric Limited (KEL),
KE House, Punjab Chowrangi,
39-B, Sunset Boulevard, Phase-II,
Defence Housing Authority,
Karachi

Subject: **ORDER OF THE AUTHORITY IN THE MATTER OF EXPLANATION ISSUED TO K-ELECTRIC LIMITED UNDER REGULATION 4(1) AND 4(2) OF NEPRA (FINE) REGULATIONS, 2021**

Enclosed please find herewith the Order of the Authority (total 10 Pages) in the subject matter for information and compliance.

Enclosures: As Above

Wasim Anwar Bhinder

(Wasim Anwar Bhinder)

National Electric Power Regulatory Authority

In the matter of Explanation issued to K-Electric Limited under Regulation 4(1) & 4(2) of the NEPRA (Fine) Regulations, 2021

Order

1. Pursuant to Section 15 of the NEPRA Act (now section 14B after promulgation of Regulation of Generation, Transmission and Distribution of Electric Power Amendment Act 2018), the Authority has granted a Generation License **(No. GL/04/2002, dated 18/11/2002)** to KE (hereinafter referred to as the "Licensee") to engage in the generation business as stipulated in its Generation License.

2. Pursuant to Section 14B(4) of the NEPRA Act, in the case of a generation facility connecting directly or indirectly to the transmission facilities of the national grid company, the licensee shall make the generation facility available to the national grid company for the safe, reliable, non- discriminatory, economic dispatch and operation of the national transmission grid and connected facilities, subject to the compensation fixed by the Authority for voltage support and uneconomic dispatch directed by the national grid company.

3. According to Rule 10(6) of the NEPRA Licensing (Generation) Rules, 2000, the licensee shall at all times comply with the provisions of the grid code, including, without limitation, in respect of the availability of the net capacity or in respect of the outages, maintenance and operation of its generation facilities, and shall provide the national grid company with all information reasonably required by the latter to enable it to dispatch the generation facilities of the licensee.

4. Clause OC 8.1.1 of Grid Code deals with the procedures for the restoration of power supplies following a Total Shutdown or a Partial Shutdown of the System and the re-synchronization of specific parts of the System that have been Islanded.

5. Clause OC 8.1.4 of Grid Code states that OC 8 applies to the System Operator, NTDC, distribution companies, Operators of the power plants, and Users of the System. Contingency arrangement are required to be established by the System Operator with each Externally-connected Party/Consumers.

6. Clause OC 8.2.1 of Grid Code states that a total shutdown of the System is a situation when there is no internal generation online and operation and there is no power supply available from external-connections. The restoration of power supply from such a situation is a Black start recovery. A partial shutdown is when there is no online operating generation

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY NEPRA AUTHORITY

or External Connection to a part of the System Operator to instruct Black Start Recovery procedures to restore supplies to that part of the system.

7. Clause OC 8.2.2 of Grid Code states that during restoration of power supplies following a Total Shutdown or Partial Shut Down of the System, it may be necessary to operate the system outside normal frequency and voltage as stated in OC 4. It may also be necessary for the System Operator to issue instructions that are contrary to the balancing mechanism or code, and also to normal contractual obligations in order to ensure restoration of supplies.

8. Clause OC 8.2.3 of Grid Code states that following a total Shutdown of the System designated power plants that have the ability to Start Up without any External Connection to the system shall be instructed to commence Black Start recovery procedures. These procedures, which are to be agreed in advance, may include the restoration of blocks of focal load demand that can be restored in agreement with the local distribution company. Local procedures may include the restoration of power supplies via Embedded Generators. The System Operator has the responsibility for the re-energization of the interconnected transmission system, and the re-synchronization of the stem blocks of islanded blocks of locally restored supplies.

9. The power system breakdown occurred on 23.01.2023 at 07:34:43:800 Hrs which plunged the whole country into darkness and the system was completely restored on 24.01.2023 after 20 hours approximately. NEPRA, being a regulator of power sector, took serious notice of the above incident and constituted an Inquiry Committee (IC) to probe into the matter. The IC visited power houses, grid stations, sites and offices in the process of inquiry. During the course of inquiry, the matter was examined in detail by inquiring the concerned officials and in the process, relevant documents were also obtained to arrive at the right conclusion.

10. The IC noticed that prior to the event, the Licensee was running synchronized with NTDC. Major portion of its network, including all its generation, was connected with NKI and the other portion with 220 kV NTDC Jhimpir-II grid station. The Licensee's total load was 1246 MW, out of which 708 MW import from NTDC (NKI-521MW and Jhimpir II-187MW), and the remaining 538 MW from its own generation (BQPS III-498MW and SNPC-40MW). The IC further observed that upon isolation from NKI at 07:34:15:250 Hrs, the Licensee faced deficiency of 521 MW, however, the NKI-KE Cross Trip Scheme operated which rejected the load of 283 MW from the Licensee's network. Since the power deficit was still there, the under frequency scheme operated through which 341 MW was rejected. Thus a total of 624 MW was rejected against short fall of 521 MW so the Licensee's system should have sustained but Unit 10 (249 MW) of BQPS-III tripped on 'Combustion Chamber Acceleration' which does not seem to be justified. This caused the other Unit 20 (239 MW) of BQPS III and SNPC (40 MW) to trip on over loading.

11. The IC also noted that the Licensee started its restoration at 0832 Hrs on 23.01.2023 through Tapal Power Plant, BQPS-II and KCCPP simultaneously as the same are equipped with black start facility. At 1000 Hrs, restoration from Gul Ahmed Power Plant was also

started. However, all power plants with black start facility (except Gul Ahmed) could not sustain in island mode and tripped multiple times which severely hampered the restoration process. The details of the tripping are as follows:

Tapal:

S.No.	Synchronization Date & Time	Tripping Date & Time
1.	0832 Hrs on 23.01.2023	1251 Hrs on 23.01.2023
2.	1423 Hrs on 23.01.2023	1622 Hrs on 23.01.2023
3.	1643 Hrs on 23.01.2023	1734 Hrs on 23.01.2023
4.	Back feed via Baldia	1859 Hrs on 23.01.2023
5.	2107 Hrs on 23.01.2023	-

BQPS-II:

i. At 1000 Hrs on 23.01.2023: GT-3 attempted but failed
ii. At 1100 Hrs on 23.01.2023: GT-3 became unavailable due to technical issue
iii. At 2043 Hrs on 23.01.2023: GT-3 tripped

KCCPP:

i. At 0900 Hrs on 23.01.2023: GT-4 attempted but failed
ii. At 1100 Hrs on 23.01.2023: GT-4 attempted but failed
iii. At 1234 Hrs on 23.01.2023: Plant attempted but failed
iv. At 1859 Hrs on 23.01.2023: Plant tripped

Repeated failed attempts on the black start facilities of most of the power plants in the Licensee's fleet and their frequent tripping indicates the lack of mock testing of the black start facility by the Licensee. The mock testing is a crucial step for the preparation of the Licensee and all relevant stakeholders to handle a blackout scenario, as it ensures the healthiness of black start facility.

12. In view of the above, the Authority observed that the Licensee has, prima facie, failed to perform its operations and discharge its responsibilities in accordance with Section 14B(4) of the NEPRA Act, Rule 10(6) of the NEPRA Licensing (Generation) Rules, 2000 and Clauses OC 8.1.1, 8.1.4, 8.2.1 8.2.2 & 8.2.3 of the Grid Code. In view of the foregoing, the Authority decided to initiate legal proceedings against the Licensee under NEPRA (Fine) Regulations, 2021 (hereinafter referred to as the "Fine Regulations, 2021").

Explanation to the Licensee:

13. Accordingly, an Explanation dated 08.08.2023 was issued to the Licensee under Regulation 4(1) & 4(2) of the Fine Regulations, 2021. The salient features of the Explanation are as follows:

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

WHEREAS, the National Electric Power Regulatory Authority (herein after referred to as the "Authority" or the "NEPRA") established under Section 3 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (herein after referred to as the "NEPRA Act") is mandated to regulate the provisions of electric power services; and

2. *WHEREAS, pursuant to Section 15 of the NEPRA Act (now section 14B after promulgation of Regulation of Generation, Transmission and Distribution of Electric Power Amendment Act 2018), the Authority has granted a Generation License (No. GL/04/2002, dated 18/11/2002) to KE (hereinafter referred to as the "Licensee") to engage in the generation business as stipulated in its Generation License; and*

3. *WHEREAS, the power system breakdown occurred on 23.01.2023 at 07:34:43:800 Hrs which plunged the whole country into darkness and the system was completely restored on 24.01.2023 after 20 hours approximately. NEPRA, being a regulator of power sector, took serious notice of the above incident and constituted an Inquiry Committee (IC) to probe into the matter. The IC visited power houses, grid stations, sites and offices in the process of inquiry. During the course of inquiry, the matter was examined in detail by inquiring the concerned officials and in the process, relevant documents were also obtained to arrive at the right conclusion; and*

4. *WHEREAS, the IC noticed that prior to the event, the Licensee was running synchronized with NTDC. Major portion of its network, including all its generation, was connected with NKI and the other portion with 220 kV NTDC Jhimpir-II grid station. The Licensee's total load was 1246 MW, out of which 708 MW import from NTDC (NKI-521MW and Jhimpir II-187MW), and the remaining 538 MW from its own generation (BQPS III-498MW and SNPC-40MW); and*

5. *WHEREAS, the IC further observed that upon isolation from NKI at 07:34:15:250 Hrs, the Licensee faced deficiency of 521 MW, however, the NKI-KE Cross Trip Scheme operated which rejected the load of 283 MW from the Licensee's network. Since the power deficit was still there, the under frequency scheme operated through which 341 MW was rejected. Thus a total of 624 MW was rejected against short fall of 521 MW so the Licensee's system should have sustained but Unit 10 (249 MW) of BQPS-III tripped on 'Combustion Chamber Acceleration' which does not seem to be justified. This caused the other Unit 20 (239 MW) of BQPS III and SNPC (40 MW) to trip on over loading; and*

6. *WHEREAS, the IC also noted that the Licensee started its restoration at 0832 Hrs on 23.01.2023 through Tapal Power Plant, BQPS-II and KCCPP simultaneously as the same are equipped with black start facility. At 1000 Hrs, restoration from Gul Ahmed Power Plant was also started. However, all power plants with black start facility (except Gul Ahmed) could not sustain in island mode and tripped multiple times which severely hampered the restoration process. The details of the tripping are as follows:*

Tapal:

S.No.	*Synchronization Date & Time*	*Tripping Date & Time*
1.	*0832 Hrs on 23.01.2023*	*1251 Hrs on 23.01.2023*
2.	*1423 Hrs on 23.01.2023*	*1622 Hrs on 23.01.2023*
3.	*1643 Hrs on 23.01.2023*	*1734 Hrs on 23.01.2023*
4.	*Back feed via Baldia*	*1859 Hrs on 23.01.2023*
5.	*2107 Hrs on 23.01.2023*	-

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY NEPRA AUTHORITY

BOPS-II:

ii.	*At 1000 Hrs on 23.01.2023:*	*GT-3 attempted but failed*
ii.	*At 1100 Hrs on 23.01.2023:*	*GT-3 became unavailable due to technical issue*
iii.	*At 2043 Hrs on 23.01.2023:*	*GT-3 tripped*

KCCPP:

i.	*At 0900 Hrs on 23.01.2023:*	*GT-4 attempted but failed*
ii.	*At 1100 Hrs on 23.01.2023:*	*GT-4 attempted but failed*
iii.	*At 1234 Hrs on 23.01.2023:*	*Plant attempted but failed*
iv.	*At 1859 Hrs on 23.01.2023:*	*Plant tripped*

7. AND WHERAS, repeated failed attempts on the black start facilities of most of the power plants in the Licensee's fleet and their frequent tripping indicates the lack of mock testing of the black start facility by the Licensee. The mock testing is a crucial step for the preparation of the Licensee and all relevant stakeholders to handle a blackout scenario, as it ensures the healthiness of black start facility; and

8. WHERAS, pursuant to Section 14B (4) of the NEPRA Act, in the case of a generation facility connecting directly or indirectly to the transmission facilities of the national grid company, the licensee shall make the generation facility available to the national grid company for the safe, reliable, non- discriminatory, economic dispatch and operation of the national transmission grid and connected facilities, subject to the compensation fixed by the Authority for voltage support and uneconomic dispatch directed by the national grid company; and

9. WHERAS, according to Rule 10 (6) of the NEPRA Licensing (Generation) Rules, 2000, the licensee shall at all times comply with the provisions of the grid code, including, without limitation, in respect of the availability of the net capacity or in respect of the outages, maintenance and operation of its generation facilities, and shall provide the national grid company with all information reasonably required by the latter to enable it to dispatch the generation facilities of the licensee; and

10. WHERAS, Clause OC 8.1.1 of Grid Code deals with the procedures for the restoration of power supplies following a Total Shutdown or a Partial Shutdown of the System and the re-synchronization of specific parts of the System that have been Islanded; and

11. WHERAS, Clause OC 8.1.4 of Grid Code states that OC 8 applies to the System Operator, NTDC, distribution companies, Operators of the power plants, and Users of the System. Contingency arrangement are required to be established by the System Operator with each Externally-connected Party/Consumers; and

12. WHERAS, Clause OC 8.2.1 of Grid Code states that a total shutdown of the System is a situation when there is no internal generation online and operation and there is no power supply available from external-connections. The restoration of power supply from such a situation is a Black start recovery. A partial shutdown is when there is no online operating generation or External Connection to a part of the System Operator to instruct Black Start Recovery procedures to restore supplies to that part of the system; and

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

13. WHERAS, Clause OC 8.2.2 of Grid Code states that during restoration of power supplies following a Total Shutdown or Partial Shut Down of the System, it may be necessary to operate the system outside normal frequency and voltage as stated in OC 4. It may also be necessary for the System Operator to issue instructions that are contrary to the balancing mechanism or code, and also to normal contractual obligations in order to ensure restoration of supplies; and

14. WHERAS, Clause OC 8.2.3 of Grid Code states that following a total Shutdown of the System designated power plants that have the ability to Start Up without any External Connection to the system shall be instructed to commence Black Start recovery procedures. These procedures, which are to be agreed in advance, may include the restoration of blocks of focal load demand that can be restored in agreement with the local distribution company. Local procedures may include the restoration of power supplies via Embedded Generators. The System Operator has the responsibility for the re-energization of the interconnected transmission system, and the re-synchronization of the stem blocks of islanded blocks of locally restored supplies; and

15. WHEREAS, in view of the above, the Licensee has, prima facie, failed to perform its operations and discharge its responsibilities in accordance with Section 14B (4) of the NEPRA Act, Rule 10(6) of the NEPRA Licensing Generation Rules, 2000 and Clauses OC 8.1.1, 8.1.4, 8.2.1 8.2.2 & 8.2.3 of the Grid Code; and

16. WHEREAS, the Licensee is required to follow the provisions of NEPRA Act, Rules & Regulations made thereunder, generation license, tariff determinations and other applicable documents and any violation thereof attracts appropriate proceedings against the licensee including but not limited to the imposition of fines under NEPRA (Fine) Regulations, 2021; and

17. NOW THEREFORE, in view of the above, Licensee is hereby called upon under Regulation 4(1) and 4(2) of the NEPRA (Fine) Regulations, 2021 to either admit or deny the occurrence of the above-mentioned violations of the Section 14B (4) of the NEPRA Act, Rule 10(6) of the NEPRA Licensing Generation Rules, 2000 and Clauses OC 8.1.1, 8.1.4, 8.2.1 8.2.2 & 8.2.3 of the Grid Code; and in case of your failure to respond within fifteen (15) days of receipt thereof, the Authority shall proceed in accordance with law including but not limited to imposition of fine.

Submissions of the Licensee:

14. In response, the Licensee submitted its reply vide letter dated 25.08.2023 (received on 30.08.2023). The salient features of the response submitted by the Licensee are as follows:

i. Before the breakdown event, KE and NTDC were operating in synchronism. KE's network was connected at 500 kV NKI and 220 kV Jhimpir, forming two islands for load flow conditions. A disturbance in the 500 kV NTDC network during the breakdown event caused a tripping of circuits, resulting in a loss of around 500 MW from NKI/National grid, consequent to which Cross Trip Scheme operated in KE network. After few seconds, the supply from 220 kV Jhimpir interconnection also got affected which interrupted power supply to the remaining KE island connected with 220 kV Jhimpir. The sudden loss of some 700 MW (57% of the total supply) power from NTDC caused the frequency depression in KE network and the protection schemes in KE system operated. With the operation of Cross Trip Scheme and Under Voltage/Under Frequency protection, around 630 MW of load

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

got ejected but due to the oscillations in the system, the remaining connected load and available generation could not achieve the equilibrium as the only running plants in KE system (BQPS-III under testing & commissioning stage & SNPC), as per demand requirement, got tripped leading to a power breakdown in KE system.

iii. Most KE plants were in standby mode, and the running plants were operating as per EMO. The sudden disconnection from the National Grid resulted in load variations, tripping the running plants and causing the power breakdown.

iv. Unit-10 of BQPS-III was not declared for commercial operations during the event. Efforts were made to sustain the load, but severe oscillations and load rejection led to tripping, contributing to the power breakdown.

v. The KCCPP on cold standby state initiated black-start operations after about an hour, synchronizing GT 4 with a 220 kV dead bus using HSD fuel, facing tripping due to activation of under/over voltage trip elements, leading to a need for revising voltage settings and incorporating operational parameters into black start SOP, including successful test drills for system readiness.

vi. BQPS-II requires approximately 3 hours for electrical system normalization after receiving electrical supply. However, during a recent power breakdown event, issues such as the complex being out of bar as per EMO, two GTs in planned shutdown, and three tripping in the restoration process for the remaining BQPS-II GT (related to auxiliary power supply, cooling water system, and exciter control system faults) were addressed through on-site strategies. These strategies included shifting auxiliary loads, rectifying pump coupling, and replacing control cards. Additionally, a proactive measure for system reliability involves conducting an annual black start drill during the winter for system readiness and effectiveness.

vii. During the power breakdown event, Tapal was on standby mode and synchronized on a dead bus at 08:32 Hrs, eventually energizing 25 grids by 12:34 Hrs. Despite multiple tripping and system disturbances, stable synchronization was achieved at 21:07 Hrs, with 13 grids and SNPC connected. After national grid supply resumed at 03:22 Hrs, the island was resynchronized. Post-event, operational protocols were reviewed for the smooth implementation of the black start process through Tapal.

viii. NEPRA's notice is deemed time-barred, citing Regulation 4(1) of the NEPRA (Fine) Regulations, 2021.

Hearing:

15. The Authority considered the response submitted by the Licensee and decided to provide an opportunity of hearing to the Licensee under Regulation 4(5) of the Fine Regulations, 2021. Accordingly, hearing in the matter was held on 27.11.2023, wherein, the representatives of the Licensee participated and made their submissions.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Analysis/Findings of the Authority:

16. The Licensee has submitted that a disturbance in the 500 kV NTDC network during a breakdown event caused a tripping of circuits, resulting in a loss of around 500 MW from the NKI/National grid, triggering the Cross Trip Scheme in the Licensee's network; subsequent interruptions in the 220 kV Jhimpir interconnection and the sudden loss of 700 MW led to frequency depression and the operation of protection schemes, resulting in the ejection of around 630 MW of load, but system oscillations prevented the remaining connected load and available generation from achieving equilibrium, ultimately causing a power breakdown in the Licensee's system as the only running plants as per demand requirement, BQPS-III (under testing & commissioning stage) and SNPC, got tripped. In this regard, the Authority observes that if certain areas in the Licensee's service territory had experienced power interruptions due to NTDC's network disturbance, it would have been understandable given the Licensee's reliance on NTDC, its own power generation, and external IPPs. However, the contention arises as the entire Licensee's system suffered a power breakdown. Criticism is directed at the Licensee, being a vertically integrated utility with licenses for Generation, Transmission, and Distribution, as it is deemed unacceptable for the entire system to be compromised merely due to power imports from NTDC. Hence, it is asserted that the Licensee should have taken sufficient precautionary measures to prevent a power breakdown in its system.

17. Moreover, the Licensee has submitted that the KCCPP on cold standby state initiated black-start operations after about an hour, synchronizing GT-4 with a 220 kV dead bus using HSD fuel, facing tripping due to activation of under/over voltage trip elements, leading to a need for revising voltage settings and incorporating operational parameters into black start SOP, including successful test drills for system readiness. In this regard, the Authority observes that the need for revising voltage settings and reviewing & incorporating operational parameters in the black start SOP, prima facie, indicates potential deficiencies in the plant's initial setup or operational protocols. Furthermore, although a successful black start synchronization test drill was reportedly performed by the Licensee in April, 2023, however, the same should have been done prior to the incident in order to ensure the healthiness of black start facility commissioned at KCCPP.

18. The Licensee has further submitted that BQPS-II requires approximately 3 hours for electrical system normalization after receiving electrical supply. However, during a recent power breakdown event, issues such as the complex being out of bar as per EMO, two GTs in planned shutdown, and three tripping in the restoration process for the remaining BQPS-II GT (related to auxiliary power supply, cooling water system, and exciter control system faults) were addressed through on-site strategies. These strategies included shifting auxiliary loads, rectifying pump coupling, and replacing control cards. Additionally, a proactive measure for system reliability involves conducting an annual black start drill during the winter for system readiness and effectiveness. In this regard, the Authority observes that the response submitted by the Licensee clearly indicates that despite possessing a black start facility, BQPS-II was not prepared for swift system restoration. Moreover, the measures adopted by the Licensee post-incident should have been implemented beforehand. Furthermore, actions such as rectifying pump couplings and

replacing control cards cannot be categorized as strategies, as these measures were prompted by specific issues that arose during the restoration process at that particular moment in time. Similarly, annual black start drills should have been conducted before the incident to ensure system readiness and effectiveness.

19. In addition to this, the Licensee has submitted that during the power breakdown event, Tapal was on standby mode and synchronized on a dead bus at 08:32 Hrs, eventually energizing 25 grids by 12:34 Hrs. Despite multiple tripping and system disturbances, stable synchronization was achieved at 21:07 Hrs, with 13 grids and SNPC connected. After national grid supply resumed at 03:22 Hrs, the island was resynchronized. Post-event, operational protocols were reviewed for the smooth implementation of the black start process through Tapal. In this regard, the Authority observes that the need for reviewing operational protocols, prima facie, indicates potential deficiencies in the same. Furthermore, repeated failed attempts on the black start facility of Tapal and its frequent tripping indicates the lack of mock testing of the black start facility by the Licensee. The mock testing could have been a crucial step for the preparation of the Licensee and Tapal to handle a blackout scenario, as it ensures the healthiness of the black start facility.

20. The Licensee has also submitted that NEPRA's notice is deemed time-barred, citing Regulation 4(1) of the NEPRA (Fine) Regulations, 2021. In this regard, the Authority observes that the time lines given in the rules are directory in nature and not mandatory. As the Authority had initiated correspondence/regulatory action in the matter at the relevant time, and the above Explanation letter is in continuation to that, no question as to time barred action arises even otherwise.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

Decision of the Authority:

21. In view of the above, the Authority is of the considered opinion that the Licensee has failed to provide satisfactory reply to the Explanation issued to it, therefore, decides to issue a Show Cause Notice to the Licensee in terms of Regulation 4(8) & 4(9) of the Fine Regulations, 2021.

Authority

Rafique Ahmed Shaikh
Member (Technical)

Engr. Maqsood Anwar Khan
Member (Licensing)

Mathar Niaz Rana (nsc)
Member (Tariff)

Did not Attend

Amina Ahmed
Member (Law)

Waseem Mukhtar
Chairman

Announced on _____, 2024 at Islamabad.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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