



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 26, 2015

Mr. Kevin K. Davison
Site Vice President
Prairie Island Nuclear Generating Plant
Northern States Power Company - Minnesota
1717 Wakonade Drive East
Welch, MN 55089

SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2 –
ISSUANCE OF LICENSE AMENDMENTS REGARDING REVISION TO
LICENSING BASIS ANALYSIS FOR A WASTE GAS DECAY TANK RUPTURE
(TAC NOS. MF4680 AND MF4681)

Dear Mr. Davison:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment Nos. 215 and 203 to Renewed Facility Operating License Nos. DPR-42 and DPR-60 for the Prairie Island Nuclear Generating Plant (Prairie Island), Units 1 and 2, respectively, in response to your application dated August 21, 2014, as supplemented by letters dated February 9, 2015, and July 31, 2015. The amendments revise the licensing basis analysis for the Prairie Island waste gas decay tank rupture as described in the Updated Safety Analysis Report.

A copy of our related safety evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

A handwritten signature in black ink, reading "Terry A. Beltz", is written over a horizontal line.

Terry A. Beltz, Senior Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-282 and 50-306

Enclosures:

1. Amendment No. 215 to DPR-42
2. Amendment No. 203 to DPR-60
3. Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NORTHERN STATES POWER COMPANY - MINNESOTA

DOCKET NO. 50-282

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 215
Renewed License No. DPR-42

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Northern States Power Company - Minnesota (NSPM, the licensee), dated August 21, 2014, as supplemented by letters dated February 9, 2015, and July 31, 2015, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Implementation Requirements
 - A. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.
 - B. Upon implementation of Amendment No. 215, NSPM shall incorporate in the Updated Safety Analysis Report (USAR) the following information (revised information associated with this license amendment is indicated in ***bold italics***)

Enclosure 1

as set forth in the NRC staff's safety evaluation attached to this amendment, and shall submit the revised description with the next USAR update:

1) Section 14.5.3.1, "Gas Decay Tank Rupture"

- The Kr 85 inventory given in Appendix D, Table D.7-1, represents the activity at the end of the 60 year plant life. **(Reference 112)**
- Gas decay tank rupture maximum doses are provided along those for volume control tank rupture, below. ***These gas decay tank maximum doses result from a postulated WGDT activity inventory of 140,000 Ci DEX. Note, however, that the maximum WGDT activity inventory of 78,800 Ci DEX allowed by TS 5.5.10b effectively imposes an upper limit of 0.5 rem whole body dose on the consequences of the hypothetical tank rupture described by the accident analysis.***

The WGDT rupture analysis results have been approved by the NRC in License Amendment 215 and 203, for Units 1 and 2, respectively. (Reference 113)

2) Section 14.5.3.2, "Volume Control Tank Rupture"

- Table on Page 14.5-12:

	<u>Thyroid Dose</u>		<u>Whole Body Dose</u>	
	EAB	LPZ	EAB	LPZ
Gas Decay Tank Rupture (Ref. 112)	N/A	N/A	4.32 rem	1.18 rem
Volume Control Tank Rupture	7.3E-03 rem	1.7E-03	0.18 rem	0.05 rem
10CFR100 Limits	300 rem	300 rem	25 rem	25 rem

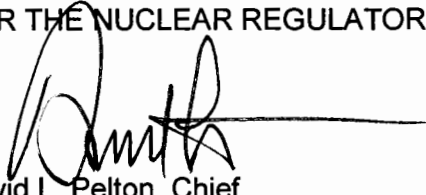
3) Section 14.11, "REFERENCES," two new references will be added:

- **112. Calculation # 12400604-UR(B)-001, Waste Gas Tank Rupture Dose Consequences, Revision 0A.**

- **113. NRC SER for License Amendment 215 / 203, dated August 26, 2015.**

C. The USAR changes shall be implemented in the next periodic update of the USAR in accordance with 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read 'D. Pelton', with a long horizontal line extending to the right.

David L. Pelton, Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Date of Issuance: August 26, 2015



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NORTHERN STATES POWER COMPANY - MINNESOTA

DOCKET NO. 50-306

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 203
Renewed License No. DPR-60

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Northern States Power Company - Minnesota (NSPM, the licensee), dated August 21, 2014, as supplemented by letters dated February 9, 2015, and July 31, 2015, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Implementation Requirements
 - A. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.
 - B. Upon implementation of Amendment No. 203, NSPM shall incorporate in the Updated Safety Analysis Report (USAR) the following information (revised information associated with this license amendment is indicated in ***bold italics***)

Enclosure 2

as set forth in the NRC staff's safety evaluation attached to this amendment, and shall submit the revised description with the next USAR update:

1) Section 14.5.3.1, "Gas Decay Tank Rupture"

- The Kr 85 inventory given in Appendix D, Table D.7-1, represents the activity at the end of the 60 year plant life. **(Reference 112)**
- Gas decay tank rupture maximum doses are provided along those for volume control tank rupture, below. ***These gas decay tank maximum doses result from a postulated WGDТ activity inventory of 140,000 Ci DEX. Note, however, that the maximum WGDТ activity inventory of 78,800 Ci DEX allowed by TS 5.5.10b effectively imposes an upper limit of 0.5 rem whole body dose on the consequences of the hypothetical tank rupture described by the accident analysis.***

The WGDТ rupture analysis results have been approved by the NRC in License Amendment 215 and 203, for Units 1 and 2, respectively. (Reference 113)

2) Section 14.5.3.2, "Volume Control Tank Rupture"

Table on Page 14.5-12:

	<u>Thyroid Dose</u>		<u>Whole Body Dose</u>	
	EAB	LPZ	EAB	LPZ
Gas Decay Tank Rupture (Ref. 112)	N/A	N/A	4.32 rem	1.18 rem
Volume Control Tank Rupture	7.3E-03 rem	1.7E-03	0.18 rem	0.05 rem
10CFR100 Limits	300 rem	300 rem	25 rem	25 rem

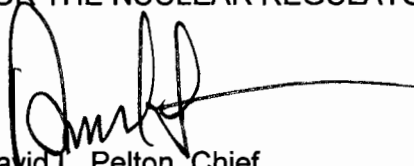
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- **112. Calculation # 12400604-UR(B)-001, Waste Gas Tank Rupture Dose Consequences, Revision 0A.**

- **113. NRC SER for License Amendment 215 / 203, dated August 26, 2015.**

C. The USAR changes shall be implemented in the next periodic update of the USAR in accordance with 10 CFR 50.71(e).

FOR THE NUCLEAR REGULATORY COMMISSION

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David L. Pelton, Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Date of Issuance: August 26, 2015



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 215

TO RENEWED FACILITY OPERATING LICENSE NO. DPR-42

AND AMENDMENT NO. 203

TO RENEWED FACILITY OPERATING LICENSE NO. DPR-60

NORTHERN STATES POWER COMPANY – MINNESOTA

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2

DOCKET NOS. 50-282 AND 50-306

1.0 INTRODUCTION

By application dated August 21, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14233A431), as supplemented by letters dated February 9, 2015, and July 31, 2015 (ADAMS Accession Nos. ML15040A510 and ML15215A659, respectively), Northern States Power Company - Minnesota (NSPM, the licensee), doing business as Xcel Energy, Inc., requested a revision to the licensing basis analysis for a waste gas decay tank (WGDT) rupture at the Prairie Island Nuclear Generating Plant (Prairie Island), Units 1 and 2. The proposed changes would revise the Prairie Island licensing basis to include the maximum amount of activity in a WGDT that could accumulate over the plant lifetime (60 years) from operation with one percent of the rated core thermal power being generated by rods with clad defects.

Prairie Island was originally licensed with the activity in a gas decay tank to be the maximum amount that could accumulate over a 40-year plant lifetime from operation with one percent of the rated core thermal power being generated by rods with clad defects. For all isotopes except krypton-85 (Kr-85), the postulated amount of activity was taken to be one reactor coolant system equilibrium cycle inventory. The Kr-85 inventory represents the activity at the end of a 40-year plant life. The maximum dose was defined as an assumed release that results from gross failure of any process system storage tank, represented in the analysis by a gas decay tank, resulting in an instantaneous release of its volatile and gaseous contents to the atmosphere.

Enclosure 3

The thyroid dose at the exclusion area boundary (EAB) was determined to be negligible, and the whole body dose was determined to be 1.5 roentgen equivalent man (rem). The original plant licensing basis did not report values for the low population zone (LPZ). The exclusion area is that area surrounding the reactor, in which the licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area. The LPZ is the area immediately surrounding the exclusion area which contains residents, the total number and density of which are such that there is a reasonable probability that appropriate protective measures could be taken in their behalf in the event of a serious accident.

The supplements dated February 9, 2015, and July 31, 2015, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on October 28, 2014 (79 FR 64227).

2.0 REGULATORY EVALUATION

The NRC staff reviewed the impact of the proposed changes on previously analyzed design basis WGDT radiological consequences. The regulatory requirements for which the staff based its acceptance are the accident dose guidelines in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 100, "Reactor Site Criteria," as supplemented by Section 11.3 of the NRC's Standard Review Plan (SRP).

3.0 TECHNICAL EVALUATION

3.1 Background

The licensee proposes to update the activity to be the maximum amount that could accumulate over a 60-year plant lifetime from operation with one percent of the rated core thermal power being generated by rods with clad defects. For all isotopes except Kr-85, the postulated amount of activity is taken to be one reactor coolant system equilibrium cycle inventory. The Kr-85 inventory represents the activity at the end of a 60-year plant life. The maximum dose is defined as an assumed release that results from gross failure of any process system storage tank, represented in the analysis by a gas decay tank giving an instantaneous release of its volatile and gaseous contents to the atmosphere.

3.2 NRC Staff Evaluation

During its review of the information submitted by the licensee, the NRC staff determined the need for additional information in order to complete the review. The staff requested that the licensee address the following:

1. Explain if the Table D.7.1 of the Updated Safety Analysis Report (USAR), including the update of Kr-85 to reflect the radioactivity at the end of the 60-year plant life, reflects the input from both Prairie Island, Units 1 and 2, into the WGDT, since the tank is common to both units and, therefore, receives input from both units.

2. Provide the basis for the WGDT curie limit in the Technical Specifications (TS), including the dose criteria used to establish the dose equivalent xenon-133 (Xe-133) limit of 78,800 curies, and explain how the limit is accounted for in the WGDT rupture dose analysis.
3. What is the technical basis for adding the beta skin dose to the whole body gamma dose?
4. Given that the only change in the projected WGDT inventory is the increase in Kr-85, and given that Kr-85 is a low energy beta emitter, please explain the impact of the additional Kr-85 inventory on the WGDT TS dose equivalent Xe-133 limit of 78,800 curies.

In its letter dated February 9, 2015, the licensee responded to the NRC staff requests for additional information. Upon review of the licensee's responses, the staff determined that the licensee did not fully address the concerns and that additional clarification was necessary in order to complete the review. On February 24, 2015, a teleconference was held to discuss additional information needed from the licensee to further clarify its responses. In a letter dated July 31, 2015, the licensee provided a supplement to the license amendment request that provided the additional information.

In its response to Request 1, the licensee stated, in part, that:

The data in Table D.7-1 of the USAR assumes activity from the reactor coolant system of a single unit. This is consistent with the original licensing basis of the gas decay tank rupture accident analysis, and that no changes to the method have occurred since.

The total activity inventory of the WGDT in the accident analysis was calculated to be 140,000 Ci DEX (dose equivalent Xe-133) for 40 years of plant operation. The total activity inventory of the WGDT in the accident analysis assuming a 60-year plant life is greater than 140,000 Ci DEX due to the additional Kr-85 that accumulates. If the accident analysis were to assume that two units contribute to the WGDT inventory, then the total activity inventory of the WGDT in the accident analysis would be twice that calculated for one unit.

However, the maximum allowable WGDT activity inventory is specified by TS 5.5.10b to be 78,800 Ci DEX, a value that is much lower than the hypothetical activity inventory for a two-unit accident analysis case or even the current one-unit case. While the Gaseous Radwaste System, of which the WGDT is a part, supports both units, the TS limit on WGDT activity inventory does not depend on the number of units. The TS results in a system operation limitation that is more restrictive than the accident analysis.

The NRC staff reviewed this response and agrees with the licensee that the 60 year input into the WGDT would be twice that calculated for one unit, and that Prairie Island TS 5.5.10b limits the quantity of radioactivity contained in each WGDT to less than or equal to 78,800 curies of noble gas considered as dose equivalent Xe-133.

In its response to Request 2, the license stated, in part, that:

The WGDT activity inventory limit in TS 5.5.10 was originally issued by the NRC on October 21, 1982, as TS 3.9.B.4.f in Amendment Nos. 59 and 53 to the Facility Operating Licenses for Prairie Island, Units 1 and 2, respectively. The amendments revised the TS to implement the requirements of Appendix I of 10 CFR Part 50, based on the guidance provided by draft NUREG-0472, "Radiological Effluent Technical Specifications for Pressurized Water Reactors," and NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," dated October 1987:

[TS 3.9.B.4.f] The quantity of radioactivity contained in each gas storage tank shall be limited to 78,800 curies of noble gases (considered as dose equivalent Xe-133).

The TS WGDT curie limit assures an uncontrolled release does not result in exposure at the exclusion area boundary (EAB) that exceeds 0.5 rem. As stated in the Prairie Island TS Bases,

Specification 3.9.B.4.f is provided to limit the radioactivity which can be stored in one decay tank. Restricting the quantity of radioactivity contained in each gas storage tank provides assurance that in the event of an uncontrolled release of the tank's contents, the resulting total body exposure to an individual at the nearest exclusion area boundary will not exceed 0.5 rem.

The WGDT rupture accident analysis does not explicitly account for the TS 5.5.10b activity limit. However, the maximum WGDT activity inventory of less than or equal to [\leq] 78,800 Ci DEX allowed by TS 5.5.10b effectively imposes an upper limit of 0.5 rem whole body dose on the consequences of the hypothetical tank rupture in the accident analysis.

The NRC staff reviewed the safety evaluation for Prairie Island Amendment Nos. 59 and 53 (ADAMS Accession No. ML022180206) along with this response, and agrees with the license that, in the safety evaluation for Prairie Island Amendment Nos. 59 and 53, the NRC staff determined that the tank inventory limits were to ensure that the rupture of a radwaste tank would not cause an offsite dose greater than the limits set in 10 CFR Part 20, "Standards for Radiation Protection," for non-occupational exposures, and that Prairie Island had been found to be in compliance with the requirements of the NRC regulations or with the intent of NUREG-0133 and NUREG-0472.

In addition to reviewing the safety evaluation for Amendment Nos. 59 and 53, the NRC staff performed an independent calculation which confirmed that the WGDT TS limit of \leq 78,800 curies of dose equivalent Xe-133 corresponds to a 0.5 rem whole body dose limit.

In response to Request 3, the licensee stated, in part, that:

The WGDT rupture dose consequence analysis was reconstituted in 2010

because documentation of the original design basis analysis could not be found, and thus the technical basis and complete details of the methodology for calculating the whole body dose in original design basis analysis are unavailable. The dose consequence analysis for the revised WGDT rupture licensing basis analysis sums the gamma and beta doses since 1) the reconstituted analysis shows that summing the beta skin dose and the whole body gamma dose gives a result consistent with the result originally reported in the Prairie Island Final Safety Analysis Report, and 2) summing the doses conservatively overestimates the whole body dose relative to the gamma or beta dose alone.

The NRC staff reviewed this response and agrees with the licensee that summing gamma and beta doses conservatively overestimates the whole body dose at the exclusion area boundary and the low population zone.

In response to Request 4, the licensee stated, in part, that:

The additional Kr-85 inventory has no impact on the WGDT TS limit of 78,800 Ci DEX (dose equivalent Xe-133), since the limit depends on the total DEX activity inventory, and not on a particular isotopic composition of the inventory. To demonstrate compliance with TS, the activities of Kr-85 and other nuclides that accumulate in a WGDT are converted to dose equivalent Xe-133 that is compared to the TS activity limit, but additional Kr-85 has no impact on the activity limit itself.

The NRC staff reviewed the licensee's response and determined that although the amount of dose equivalent Xe-133 increases as the additional Kr-85 inventory increases, the WGDT limit is stationary at a maximum of 78,800 Ci of dose equivalent Xe-133 and, therefore, the increase in Kr-85 has no direct impact on the WGDT TS limit.

3.3 Conclusion

The NRC staff reviewed the technical evaluation used by the licensee to assess the radiological impacts of 60 years of plant operation on the WGDT rupture at Prairie Island. The staff determined that the analysis assumptions and inputs were consistent with the current licensing basis at Prairie Island, which is the original licensing basis, and is described in Section 14.5.3 of the USAR. The licensee's methods are consistent with the regulatory requirements identified in Section 2.0 of this safety evaluation.

The NRC staff performed independent confirmatory dose evaluations, as needed, to ensure a complete understanding of the licensee's methods. In addition, the staff confirmed that the WGDT TS limit of $\leq 78,800$ curies of dose equivalent Xe-133 limits the whole body dose at the EAB and LPZ, and that the dose is less than the limits in 10 CFR Part 100.

The NRC staff finds that the proposed change to update the licensing basis analysis for a WGDT rupture to reflect a maximum activity amount that could accumulate over a 60-year plant lifetime in the WGDT is acceptable based on 1) the whole body dose is limited at the EAB and LPZ due to the WGDT TS limit; 2) no proposed change to the WGDT TS limit; and 3) the regulatory limits of 10 CFR Part 100 continue to be met.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Minnesota State official was notified of the proposed issuance of the amendment on August 24, 2015. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to the use of facility components located within the restricted area as defined in 10 CFR Part 20 or changes surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued finding that the amendments involve no significant hazards consideration and there has been no public comment on such finding as published in the *Federal Register* on October 28, 2014 (79 FR 64227). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments.

6.0 CONCLUSION

The NRC staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations; and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: Kristy Bucholtz, NRR

Date: August 26, 2015

August 26, 2015

Mr. Kevin K. Davison
Site Vice President
Prairie Island Nuclear Generating Plant
Northern States Power Company - Minnesota
1717 Wakonade Drive East
Welch, MN 55089

SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2 –
ISSUANCE OF LICENSE AMENDMENTS REGARDING REVISION TO
LICENSING BASIS ANALYSIS FOR A WASTE GAS DECAY TANK RUPTURE
(TAC NOS. MF4680 AND MF4681)

Dear Mr. Davison:

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A copy of our related safety evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Terry A. Beltz, Senior Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-282 and 50-306

Enclosures:

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ADAMS Accession No.: ML15229A176

OFFICE	NRR/DORL/LPL3-1/PM	NRR/DORL/LPL3-1/LA	NRR/DRA/ARCB/BC
NAME	TBeltz	MHenderson	UShoop
DATE	8/17/2015	8/18/2015	8/12/2015
OFFICE	OGC (NLO)	NRR/DORL/LPL3-1/BC	NRR/DORL/LPL3-1/PM
NAME	BMizuno	DPelton	TBeltz
DATE	8/21/2015	8/25/2015	8/26/2015

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