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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION  
JOINT SURREBUTTAL TESTIMONY OF  
CAROLYNE WASS AND CASEY CARROLL  
ON BEHALF OF  
DeSOTO COUNTY GENERATING COMPANY, LLC  
DOCKET NO. 130007-EI  
OCTOBER 23, 2013

**Q. Ms. Wass, please state your name and business address.**

A. My name is Carlyne Wass, and my business address is 1700 Broadway, New York, NY 10019.

**Q. Mr. Carroll, please state your name and business address.**

A. My name is Casey Carroll, and my business address is 400 Chesterfield Center, Suite 110, St. Louis, MO 63017.

**Q. Ms. Wass, by whom are you employed and in what capacity?**

A. I am employed by LS Power Development, LLC, as Senior Vice President, Asset Management. LS Power Development, LLC is the indirect owner of DeSoto County Generating Company, LLC, which owns the DeSoto Generating Facility.

**Q. Ms. Wass, have you previously submitted testimony in this proceeding?**

1 A. Yes, on September 13, 2013, I submitted my direct testimony in which I described  
2 DeSoto County Generating Company (DeSoto), its affiliates LS Power Group and LS  
3 Power Development, and the DeSoto Generating Facility (Facility, or DeSoto  
4 Facility), and its operational history. My direct testimony also described DeSoto's  
5 proposals to sell either the Facility's output or the Facility itself to Florida Power &  
6 Light Company (FPL) as a cost-effective means of meeting FPL's desire to add more  
7 efficient, environmentally preferable peaking capacity to its system in advance of  
8 possible implementation of the EPA's 1-Hour National Ambient Air Quality Standard  
9 (NAAQS) for nitrogen dioxide (NO<sub>2</sub>).

10

11 **Q. Mr. Carroll, by whom are you employed and in what capacity?**

12 A. I am employed by LS Power Development, LLC, as a Project Manager. LS Power  
13 Development, LLC is the indirect owner of DeSoto County Generating Company,  
14 LLC, which owns the DeSoto Generating Facility.

15

16 **Q. Are you sponsoring any exhibits to your joint surrebuttal testimony?**

17 A. Yes. We are sponsoring the following exhibits.

- 18 Exhibit CW/CC-1 Resumé of Casey Carroll
- 19 Exhibit CW/CC-2 William Yeager Deposition Exhibits 3&4 (CONFIDENTIAL)
- 20 Exhibit CW/CC-3 GE Technical Information Letters
- 21 Exhibit CW/CC-4 Results of Economic Evaluation for DeSoto Alternatives

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23

1                    **PURPOSE AND SUMMARY OF SURREBUTTAL TESTIMONY**

2    **Q.    What is the purpose of your surrebuttal testimony?**

3    A.    The purpose of our surrebuttal testimony is to rebut and refute the conclusions  
4           described by FPL in its rebuttal testimony. More specifically, our testimony  
5           addresses several aspects of FPL’s new economic analyses that are referred to in the  
6           rebuttal testimony of Mr. William Yeager and Mr. Juan Enjamio.

7  
8    **Q.    Please summarize the main conclusions of your surrebuttal testimony.**

9    A.    The new economic analyses prepared by Mr. Enjamio and discussed in his rebuttal  
10          testimony, which were relied upon by Mr. Enjamio and Mr. Yeager to support their  
11          conclusions and recommendations regarding FPL’s decision to reject DeSoto’s offer  
12          to sell FPL the DeSoto Facility are flawed in a number of ways. The most overriding  
13          flaw in these analyses is FPL’s failure to evaluate the comparative economics, or  
14          cost-effectiveness, of a number of additional scenarios that would include FPL  
15          purchasing the DeSoto Facility, and that would, in our opinion, provide more cost-  
16          effective ways for FPL to meet its stated desire of ensuring compliance with the 1-  
17          Hour NO2 Standard at its Ft. Myers Plant while satisfying its need for fast-start-  
18          capable generation, adequate strategically located voltage support resources, and  
19          maintaining an adequate reserve margin on FPL’s system. Our testimony will show  
20          that there are at least three additional feasible scenarios that will accomplish FPL’s  
21          objectives, and that those additional scenarios can reasonably be expected to achieve  
22          FPL’s stated objectives and needs at a lower present value cost than FPL’s proposal  
23          to add three new combustion turbines (CTs) at the Ft. Myers Plant.

1           Additionally, our surrebuttal testimony identifies a number of additional flaws  
2           and omissions in FPL’s new economic analyses that systematically (a) overstated the  
3           difference in costs between the “DeSoto purchase” scenarios that FPL has put  
4           forward and its preferred self-build scenario and (b) understated the value of adding  
5           the DeSoto Facility to FPL’s system.

6  
7   **Q.    What is your understanding of the economic analyses that FPL has put forward**  
8   **in which FPL evaluated the possible purchase of the DeSoto Generating Facility**  
9   **as an option to installing all three of the new CTs that FPL proposes to install at**  
10 **Ft. Myers as part of its NO2 Compliance Project?**

11 **A.**   As a starting point, in its NO2 Compliance Project, FPL proposes to install five new  
12   CTs at its Lauderdale Plant and three new CTs at its Ft. Myers Plant. Our surrebuttal  
13   testimony, like Ms. Wass’s direct testimony, addresses only the proposed new CTs at  
14   the Ft. Myers Plant. This focus on Ft. Myers is supported by FPL’s recognition that  
15   the DeSoto Facility meets FPL’s criteria for voltage support and transmission  
16   reliability. The new CTs that FPL proposes to install at Ft. Myers are assumed to be,  
17   or have the characteristics of, new 7FA.05 combustion turbine units made by General  
18   Electric (GE). (For convenience, in the remainder of our testimony, we will refer to  
19   these proposed units as 7FA.05 units; however, that should be understood to mean  
20   that they would be similar to, or in the class of, such units.)

21           As recounted in Ms. Wass’s direct testimony, DeSoto offered to sell the  
22   Facility to FPL for a purchase price of \$52.75 million, with terms and conditions to  
23   be typical and standard for transactions of this type, and with the closing proposed to

1 occur in April 2014. DeSoto also offered to sell FPL the Facility's output pursuant to  
2 alternate purchase agreements (PPAs); however, since DeSoto agrees with FPL that  
3 an outright purchase and sale of the Facility makes more sense than a PPA, our  
4 surrebuttal testimony addresses only the flaws in FPL's analyses of the DeSoto-  
5 purchase option. In its rebuttal testimony, FPL addressed the possible DeSoto  
6 purchase by evaluating two options: (a) an option that included purchasing DeSoto  
7 and adding two of the GE 7FA.05 CTs, and (b) an option that included purchasing  
8 DeSoto and adding two smaller GE 7FA.03 CTs. (The GE 7FA.03 CTs are virtually  
9 identical to the GE 7FA 7241 CTs that comprise the DeSoto Facility.) The 7FA.05  
10 units have an approximate summer capacity of 201 MW each, while the 7FA.03 units  
11 have summer capacity of approximately 155 MW each.

12 The first plan described by FPL's witness Enjamio – purchasing DeSoto and  
13 adding two of the proposed 7FA.05 CTs – had a total cumulative net present value of  
14 revenue requirements (CPVRR) that, according to FPL, was \$48 million greater than  
15 FPL's proposed plan of installing the three new 7FA.05 CTs. (Mr. Enjamio's  
16 conclusions to this effect are stated at page 8 of his rebuttal testimony and also  
17 reflected in the one-page summary spreadsheet that is his Exhibit JEE-6.) Similarly,  
18 the second option – purchasing the DeSoto Facility and adding two smaller CTs –  
19 had, according to FPL, a CPVRR that was \$70 million greater than FPL's proposed  
20 plan.

21

1 **Q. Do you believe that FPL’s new economic analyses are incorrect? If so, please**  
2 **summarize why you hold such an opinion.**

3 A. Yes. We believe that FPL’s new economic analyses are incorrect in several ways.  
4 First, and most significantly, those analyses do not include viable, feasible  
5 alternatives – i.e., alternative combinations of generating resources that include the  
6 DeSoto Facility – which would enable FPL to meet its stated objectives of having  
7 generation in the Ft. Myers region that (a) would not cause exceedances of the 1-Hour  
8 NO2 Standard, (b) would satisfy FPL’s stated need for fast-start contingency reserves  
9 on its system (specifically 400 MW available within 15 minutes and approximately  
10 1,300 MW within 30 minutes, as described on pages 4-5 of Mr. Enjamio’s rebuttal  
11 testimony), (c) would satisfy FPL’s need for generation in the Ft. Myers geographic  
12 area for voltage support under certain conditions (as described in Mr. Enjamio’s  
13 rebuttal testimony, beginning at page 4, line 1), and (d) would enable FPL to meet its  
14 20% reserve margin criterion.

15 Additionally, we believe that FPL’s new economic analyses of the DeSoto  
16 purchase options overstated the net costs to FPL of owning and operating the DeSoto  
17 Facility and understated the value of FPL purchasing and owning the DeSoto Facility  
18 to FPL and its customers.

19

20 **Alternate Combinations of Generating Resources**

21 **Q. In your summary, you state that FPL’s analyses of scenarios that included**  
22 **purchasing the DeSoto Facility did not include certain feasible alternatives that**  
23 **would meet FPL’s claimed needs and goals more cost-effectively than FPL’s**

1           **proposed plan (i.e., FPL building three new 7FA.05 CTs at its Ft. Myers Plant).**  
2           **What additional combinations of generating resources do you believe FPL could**  
3           **implement that would meet its stated goals more cost-effectively than its plan to**  
4           **install three new CTs?**

5    A.    Based on a review of all available information, we believe that FPL could implement  
6           at least the following three combinations of generating resources to meet all four of  
7           FPL’s stated goals, i.e., its goal of having generation in the Ft. Myers region that  
8           would not result in exceedances of the 1-Hour NO2 Standard and its three reliability  
9           goals (fast-start contingency reserves, strategically located voltage support resources,  
10          and reserve margin). These alternate combinations include the following:

11       A.    DeSoto Alternative A: Purchase DeSoto, add one 7FA.05 CT at Ft. Myers,  
12           and keep two of the existing GTs operating in regular-duty mode (as used  
13           herein, this is meant to describe the units as being available as fast-start  
14           capable capacity resources), rather than for black-start use only;

15       B.    DeSoto Alternative B: Purchase DeSoto and keep six of the existing GTs  
16           operating in regular-duty mode, rather than for black-start use only; and

17       C.    DeSoto Alternative C: Purchase DeSoto and add one 7FA.05 CT at Ft.  
18           Myers.

19

20    **Q.    What do you believe the economic results of FPL adopting DeSoto Alternative A**  
21           **would be? Please explain your response.**

22    A.    Based on available information, it appears to us that this combination should produce  
23           CPVRR savings for FPL’s customers of approximately \$56 million as compared to

1 FPL's preferred Replace Resource Plan. We reach this conclusion using testimony  
2 from FPL witness William Yeager and FPL witness Juan Enjamio as inputs to FPL's  
3 Fixed Cost Spreadsheet, which FPL uses to model total system CPVRR costs over the  
4 analysis term. Beginning with the Fixed Cost Spreadsheet for FPL's Resource Plan 1  
5 (DeSoto and two 7FA.05s), we made several appropriate adjustments to model the  
6 CPVRR cost of this DeSoto Alternative A, including:

- 7 • Correction of generation capital and capital replacement charges for DeSoto  
8 as described later in this testimony;
- 9 • Proportionate reduction of Ft. Myers 7FA.05 fixed costs, reflecting the change  
10 from two units to one;
- 11 • Assumption that the two GTs retire from regular duty service in 2026 (after  
12 approximately 52 years of operation), resulting in their replacement by 101  
13 MW of generic combined cycle in 2026 to maintain reserve margins,  
14 consistent with FPL's practice in its alternatives;
  - 15 ○ It should be noted that only these costs are specifically accounted for  
16 in the Fixed Cost Spreadsheet; we can only approximate the fuel and  
17 other variable cost savings derived from FPL's production cost model  
18 PMAREA at \$59 million. As a baseline, we know that the difference  
19 in variable costs from 2026 to 2047 between FPL's Resource Plan 1  
20 and 2 (corresponding to offsetting 100 MW of combustion turbine  
21 capacity with combined cycle capacity) yields \$59 million in variable  
22 cost savings – primarily fuel savings – so we believe this to be an  
23 appropriate approximation.



1           ● No incremental costs for the GTs. In FPL’s Replace Resource Plan, FPL  
2           proposes to keep two GTs in reliable operational status for black-start only.  
3           Given the very low capacity factor (less than 1% according to Mr. Enjamio’s  
4           deposition testimony, at page 61, lines 24-25, we would not anticipate  
5           significantly higher fixed or variable costs to operate the two GTs as fast-start  
6           firm capacity resources compared to black-start only. Furthermore, FPL would  
7           still be retiring ten GTs at Ft. Myers, creating an abundance of spare parts to  
8           substantially offset the need for capital replacement charges.

9           A summary of fixed and variable costs for the DeSoto Alternatives is provided  
10          as Exhibit CW/CC-4: Results of Economic Evaluation for DeSoto Alternatives,  
11          which further supports the fact that FPL did not evaluate all viable alternatives and is  
12          not recommending the lowest cost solution for its customers.

13

14   **Q.    How can you be confident that your proposed smaller number of GTs could**  
15       **continue to operate without causing exceedances of the 1-Hour NO2 Standard?**

16   **A.    First, it is obvious that the DeSoto Facility, which is located approximately 30 miles**  
17       **away from the Ft. Myers Plant, is not going to cause any exceedances at or near the**  
18       **boundary of the Ft. Myers Plant site. Second, DeSoto witness Kathy A. French, P.E.,**  
19       **has testified, and presented modeling evidence to confirm, that the DeSoto Facility**  
20       **would not exceed the 1-Hour NO2 Standard at the boundary of the DeSoto Facility**  
21       **site. Third, FPL’s own analyses show that FPL would only have to reduce the**  
22       **NOx/NO2 emissions from the Ft. Myers GTs by between 37 percent and 44 percent,**  
23       **depending on the modeling method applied, in order to comply with the 1-Hour**

1 NAAQS for NO2 emissions. It follows that reducing the emissions from the Ft.  
2 Myers GTs by 83.3 percent, i.e., by removing 10 units from service but keeping the  
3 other 2 operating in regular-duty mode, would easily satisfy the 1-Hour NO2  
4 emissions standard. This result is confirmed by Ms. Kathy French in her surrebuttal  
5 testimony.

6 Additionally, FPL's witness Terry Keith testified at his deposition that "if it  
7 wasn't from the new standard, we would be happy to continue operating the GTs.  
8 We would not be taking this project on." Deposition of Terry Keith, page 43, lines  
9 21-23, October 9, 2013. It follows logically and directly that, if FPL can keep some  
10 number of its Ft. Myers GTs running without exceeding the 1-Hour NO2 Standard, it  
11 would choose to do so.

12  
13 **Q. Please explain how this alternative would also enable FPL to meet its stated**  
14 **needs for fast-start contingency reserves on its system, for strategically located**  
15 **voltage support resources, and for an adequate reserve margin.**

16 A. This alternative combination of generating resources would provide FPL with  
17 approximately 619 MW of fast-start capable generating capacity in the Ft. Myers  
18 region: 310 MW from DeSoto, 201 MW from the assumed new CT at Ft. Myers, and  
19 108 MW from keeping two of the existing GTs running in regular-duty mode. This  
20 more than satisfies FPL's stated needs for (i) 400 MW available within 15 minutes;  
21 (ii) approximately 1,300 MW available within 30 minutes (including the 1,000 MW  
22 available from the proposed CTs at the Lauderdale Plant); and (iii) minimum  
23 generation capacity in the Ft. Myers area to support voltage under certain conditions.

1                   Accordingly, FPL's new analyses of options including the purchase of the  
2                   DeSoto Facility failed to identify and evaluate all potentially cost-effective  
3                   alternatives, and thus resulted in the erroneous conclusion to reject the option to  
4                   purchase the DeSoto Facility.

5  
6   **Q.    Please describe DeSoto Alternative B and why you believe it would be more cost-**  
7                   **effective for FPL's customers for FPL to pursue that option than to install 3 new**  
8                   **CTs at Ft. Myers.**

9   A.    A second alternative combination of generation resources that we believe FPL should  
10                   have, but did not, evaluate is the purchase of the DeSoto Facility while keeping six of  
11                   the existing Ft. Myers GTs operating in regular-duty mode, rather than keeping only 2  
12                   GTs for black-start use only.

13  
14   **Q.    What do you believe the economic results of FPL adopting DeSoto Alternative B**  
15                   **would be? Please explain your response.**

16   A.    Based on available information, it appears to us that this combination should produce  
17                   CPVRR savings for FPL's customers up to \$145 million as compared to FPL's  
18                   preferred Replace Resource Plan. We reach this conclusion using testimony from  
19                   FPL witness William Yeager and FPL witness Juan Enjamio as inputs to FPL's Fixed  
20                   Cost Spreadsheet, which FPL uses to model total system CPVRR costs over the  
21                   analysis term. Beginning with the Fixed Cost Spreadsheet for FPL's Resource Plan 1  
22                   (DeSoto and two 7FA.05s), we made several appropriate adjustments to model the  
23                   CPVRR cost of this DeSoto Alternative B, including:

- 1
- 2 • Correction of generation capital and capital replacement charges for DeSoto  
3 as described later in this testimony;
  - 4 • Removal of Ft. Myers 7FA.05 fixed costs, reflecting the change from two  
5 units to zero;
  - 6 • Assumption that the six GTs retire from regular duty service in 2026 (after  
7 approximately 52 years of operation), resulting in their replacement by 302  
8 MW of generic combined cycle in 2026 to maintain reserve margins,  
9 consistent with FPL’s practice in its alternatives;
    - 10 ○ It should be noted that only these costs are specifically accounted for  
11 in the Fixed Cost Spreadsheet; we can only approximate the fuel and  
12 other variable cost savings derived from FPL’s production cost model  
13 PMAREA at a maximum of \$177 million. As a baseline, we know  
14 that the difference in variable costs from 2026 to 2047 between FPL’s  
15 Resource Plan 1 and 2 (corresponding to offsetting 100 MW of  
16 combustion turbine capacity with combined cycle capacity) yields \$59  
17 million in variable cost savings – primarily in fuel savings – so we  
18 believe that applying a factor of 3 to be an appropriate approximation  
19 of the maximum fuel savings.
  - 20 • No incremental costs for the GTs. In FPL’s Replace Resource Plan, FPL  
21 proposes to keep two GTs in reliable operational status for black-start only.  
22 Given the very low capacity factor (less than 1% according to Mr. Enjamio’s  
23 deposition testimony at page 61, lines 24-25), we would not anticipate  
significantly higher fixed or variable costs to operate two GTs as fast-start

1 firm capacity resources compared to black-start only. We recognize that there  
2 will be some additional cost to operating and maintain the four incremental  
3 GTs, but would have little basis for estimating these costs. In any case, we  
4 believe that these costs will be inconsequential compared to the savings of up  
5 to \$145 million. Furthermore, FPL would still be retiring six GTs at Ft.  
6 Myers, creating an abundance of spare parts to substantially offset the need  
7 for capital replacement charges.

8 Further, the Commission should again note that Mr. Enjamio testified in his  
9 deposition that either the 7FA.05 CTs proposed by FPL or the DeSoto Facility would  
10 operate at very low capacity factors, on the order of 1 percent, and Mr. Yeager  
11 testified that the differences in heat rate and fuel costs are not material to the analysis.  
12 This information further bolsters our conclusion that FPL's economic analyses are  
13 flawed because they did not consider more cost-effective alternative combinations of  
14 generating resources to meet FPL's needs.

15  
16 **Q. How can you be confident that FPL could continue to operate as many as six of**  
17 **the existing Ft. Myers GTs without causing exceedances of the 1-Hour NO2**  
18 **Standard?**

19 **A.** Again, it is obvious that the DeSoto Facility, which is located approximately 30 miles  
20 away from the Ft. Myers Plant, is not going to cause any exceedances at or near the  
21 boundary of the Ft. Myers Plant site. Second, DeSoto witness French has testified,  
22 and presented modeling evidence to confirm, that the DeSoto Facility would not  
23 exceed the 1-Hour NO2 Standard at the boundary of the DeSoto Facility site. Third,

1 FPL's own analyses show that FPL would only have to reduce the NO<sub>x</sub>/NO<sub>2</sub>  
2 emissions from the Ft. Myers GTs by between 37 percent and, at most, 44 percent in  
3 order to comply with the 1-Hour NAAQS for NO<sub>2</sub> emissions. It follows that  
4 reducing the emissions from the Ft. Myers GTs by 50 percent, i.e., by removing half  
5 of them from service but keeping the other six operating in regular-duty mode, would  
6 easily satisfy the 1-Hour NO<sub>2</sub> emissions standard. This result is also confirmed by  
7 Ms. Kathy French in her surrebuttal testimony.

8 And again, FPL's witness Terry Keith testified at his deposition that FPL  
9 would not be undertaking the NO<sub>2</sub> Compliance Project if FPL could keep running the  
10 GTs. Thus, it follows logically and directly from Mr. Keith's testimony that, if FPL  
11 can keep some number of its Ft. Myers GTs running without exceeding the 1-Hour  
12 NO<sub>2</sub> Standard, it would choose to do so.

13  
14 **Q. Please explain how this alternative would also enable FPL to meet its stated**  
15 **needs for fast-start contingency reserves on its system, for strategically-located**  
16 **voltage support resources, and for an adequate reserve margin.**

17 **A.** This alternative combination of generating resources would provide FPL with  
18 approximately 634 MW of fast-start capable generating capacity in the Ft. Myers  
19 region: 310 MW from DeSoto plus 324 MW from keeping six of the Ft. Myers GTs  
20 running in regular-duty mode. This more than satisfies FPL's stated needs for (i) 400  
21 MW available within 15 minutes; (ii) 1,300 MW available within 30 minutes  
22 (including the 1,000 MW available from the proposed CTs at the Lauderdale Plant);

1 and (iii) minimum generation capacity in the Fort Myers area to support voltage  
2 under certain conditions

3 Accordingly, FPL's new analyses of Resource Plans including the purchase of  
4 the DeSoto Facility failed to identify and evaluate all potentially cost-effective  
5 alternatives, and thus resulted in the erroneous conclusion to reject the option to  
6 purchase the DeSoto Facility.

7

8 **Q. Please describe DeSoto Alternative C and why you believe it would be more cost-**  
9 **effective for FPL's customers for FPL to pursue that option than to install 3 new**  
10 **CTs at Ft. Myers.**

11 A. A third alternative combination of generation resources that we believe FPL should  
12 have, but did not, evaluate is the purchase of the DeSoto Facility and the installation  
13 of only one of the proposed new CTs at Ft. Myers. In this case, it is assumed that  
14 FPL would, as it has proposed, keep two of the existing GTs available as black-start  
15 only units.

16

17 **Q. What do you believe the economic results of FPL adopting your third proposed**  
18 **combination of generating resources would be? Please explain your response.**

19 A. Based on available information, it appears to us that this combination should produce  
20 CPVRR savings for FPL's customers of approximately \$56 million as compared to  
21 FPL's preferred Replace Resource Plan. We reach this conclusion using testimony  
22 from FPL witness William Yeager and FPL witness Juan Enjamio as inputs to FPL's  
23 Fixed Cost Spreadsheet, which FPL uses to model total system CPVRR costs over the

1 analysis term. Beginning with the Fixed Cost Spreadsheet for FPL’s Resource Plan 1  
2 (DeSoto and two 7FA.05s), we made several appropriate adjustments to model the  
3 CPVRR cost of this DeSoto Alternative C, including:

- 4 • Correction of generation capital and capital replacement charges for DeSoto  
5 as described later in this testimony;
- 6 • Proportionate reduction in Ft. Myers 7FA.05 costs, reflecting the change from  
7 two units to one;
- 8 • Assumption that an additional 101 MW of generic combined cycle would be  
9 added in 2026 to maintain reserve margins, consistent with FPL’s practice in  
10 its alternatives;
  - 11 ○ It should be noted that only these costs are specifically accounted for  
12 in the Fixed Cost Spreadsheet; we can only approximate the fuel and  
13 other variable cost savings derived from FPL’s production cost model  
14 PMAREA at \$59 million. As a baseline, we know that the difference  
15 in variable costs from 2026 to 2047 between FPL’s Resource Plan 1  
16 and 2 (corresponding to offsetting 100 MW of combustion turbine  
17 capacity with combined cycle capacity) yields \$59 million in variable  
18 cost savings – primarily fuel savings – so we believe this to be an  
19 appropriate approximation.

20

21 **Q. Would this option also satisfy FPL’s stated needs for fast-start capability on its**  
22 **system and in the Ft. Myers region, as well as FPL’s stated needs for**



1 **strategically-located voltage support resources and long-term reserve margin**  
2 **needs?**

3 A. This option would clearly satisfy FPL's stated needs for fast-start capability on its  
4 system (400 MW within 15 minutes and 1,300 MW in 30 minutes). In terms of  
5 FPL's stated need for a minimum of 600 MW of strategically-located voltage support  
6 resources in the event of a certain contingencies in the Ft. Myers area, such as the loss  
7 of the Andytown-Orange River 500 kilovolt transmission line during a period when  
8 the Ft. Myers combined cycle unit was out of service for maintenance, we question  
9 the precision of the 600 MW requirement. We are not aware of any evidence  
10 demonstrating a precise figure for the voltage support need. As a result, we have  
11 attempted to replicate the transmission analyses demonstrating a need of 600 MW for  
12 voltage support via using the PSS-E (Power System Simulator-Energy) model  
13 maintained by the Florida Reliability Coordinating Council (FRCC). While we have  
14 run only 2016 summer cases to date, the preliminary results provide valuable insight  
15 that the modeling results, specifically nominal voltages in the Ft. Myers area, are  
16 extremely sensitive to relatively minor changes in assumptions or system changes.  
17 This being the case, we believe there would be a significant difference if the actual  
18 number produced by FPL in its transmission analyses were rounded to 600 MW from,  
19 for example 610 MW (which would not be achievable by FPL's preferred Replace  
20 Resource Plan) or 510 MW (which would make DeSoto Alternative C a viable  
21 alternative).

22           Regarding reserve margin, this option would result in a reduction of  
23 approximately 90 MW of reserves on FPL's system, as compared FPL's Replace

1 Resource Plan. FPL could easily meet its 20% reserve margin target by adding a  
2 corresponding amount of Firm Capacity Summer Purchase in 2020 and 2021, if it  
3 deemed it necessary and prudent to do so.

4

5 **Additional Flaws in FPL's Economic Analyses of the DeSoto Purchase**

6 **Q. Are there any other ways in which you believe that FPL's revised economic**  
7 **analyses of the DeSoto-purchase options, and the associated alternate**  
8 **combinations of generating resources, were flawed?**

9 A. Yes. In particular, we believe that FPL's new economic analyses were flawed in that  
10 those analyses:

11 a. may have overstated the O&M cost differential between DeSoto and FPL-self-  
12 built CTs;

13 b. overstated the capital costs that FPL assumed it would have to incur to  
14 upgrade the DeSoto Facility in the DeSoto-purchase scenarios;

15 c. failed to give DeSoto full credit for its 310 MW of summer capacity, resulting  
16 in overstated costs in FPL's analyses and which thus made the DeSoto-purchase  
17 option look less economic than it would be if given full credit for the Facility's 310  
18 MW of summer capacity. (FPL only gave the DeSoto Facility credit for 300 MW, not  
19 310 MW); and

20 d. did not give DeSoto any credit for what would be lower insurance premiums,  
21 lower property damage losses, and higher reliability value because it is located much  
22 further away from Florida's Gulf Coast, at a higher elevation, and geographically  
23 diverse from FPL's other generation resources in the area, therefore being less

1 vulnerable to insurance losses and forced outages due to major storm damage than  
2 FPL's proposed units at Ft. Myers.

3

4 **Q. In your view, how might FPL's economic analyses have overstated the O&M**  
5 **cost differential between DeSoto and the FPL-self-built CTs?**

6 A. FPL correctly notes that the 7FA.05 CTs that it has proposed have longer intervals  
7 between maintenance activities, which, all other things considered equal, would be  
8 expected to result in lower maintenance costs. However, FPL does not indicate  
9 whether it recognizes that the parts for the 7FA.05 CTs are significantly more  
10 expensive than parts for the GE 7241 CTs at the DeSoto Facility. Obviously, lower  
11 parts costs for the DeSoto Facility would erode some of the cost difference assumed  
12 by FPL in its economic analyses of the DeSoto purchase.

13 Furthermore, we call into question why FPL has assumed different CPVRR  
14 capital replacement costs for the two DeSoto units as compare to the two 7FA.03s,  
15 despite the two being essentially the same combustion turbines. We believe that the  
16 approximately \$5 million CPVRR higher cost for DeSoto – even after accounting for  
17 the two year delay between the start of the two cash flows – is not appropriate and has  
18 not been justified.

19

20 **Q. How do you believe that FPL's economic analyses overstated the capital costs**  
21 **that FPL, as stated in Mr. Yeager's rebuttal testimony and as reflected in an**  
22 **exhibit to his deposition, assumed FPL would have to incur to upgrade the**  
23 **DeSoto Facility in the DeSoto-purchase scenarios?**

1 A. In his rebuttal testimony, at pages 9-10, Mr. Yeager stated that “FPL assumed it  
2 would have to spend \$20 million to mitigate fleet reliability risks that are known to  
3 exist for the type and vintage of CTs at DeSoto and to address the uncertainties  
4 discussed” in his testimony. The mitigation work and costs that make up FPL’s \$20  
5 million assumption are shown in Mr. Yeager’s CONFIDENTIAL Deposition Exhibits  
6 3 and 4. A copy of this exhibit is included as Exhibit CW/CC-2 (CONFIDENTIAL)  
7 to our surrebuttal testimony.

8           Upon further evaluation of the DeSoto Facility, Mr. Yeager’s testimony, we  
9 believe that Mr. Yeager was partially correct in that some additional work on the  
10 DeSoto Facility is necessary to meet FPL’s standards; however, his testimony was  
11 partially incorrect because it does not reflect previous work and design elements on  
12 the CTs at DeSoto. In general terms and without divulging confidential information,  
13 Mr. Yeager’s assumed mitigation work includes work on certain compressor  
14 components for both CTs (his Items 1 and 2), work on certain parts of the turbine  
15 section of both CTs (his Item 3), and miscellaneous costs for both CTs. Based on the  
16 description of the work in his exhibit, however, the work described in Item 2 is not  
17 applicable to DeSoto CT#1 as it is already equipped with the referenced design  
18 elements. Additionally, the work described in his Item 3 has been addressed by GE  
19 Technical Information Letters (TILs), and the corrective work recommended by GE is  
20 significantly less costly than indicated in Mr. Yeager’s assumptions. GE TIL No.  
21 1539-2 and TIL No. 1540-2 are included as Exhibit CW/CC-3 to our surrebuttal  
22 testimony. Furthermore, the GE-recommended solution has already been  
23 implemented on DeSoto CT#2.

1 All in, we believe that Items 1, 2, and 3, which together total to \$19 million  
2 out of the \$20 million assumed by FPL, can be fully addressed for no more than \$11  
3 million, and therefore, we believe that FPL's assumed \$20 million of additional costs  
4 is significantly overstated (by approximately \$8 million).

5  
6 **Q. How confident are you that your cost estimates are accurate?**

7 A. We are confident to the point that DeSoto will commit to have the required work for  
8 Items 1 and 2 – i.e., the work on the compressor and turbine on the CTs which has not  
9 been completed – and the GE-recommended work to address the problem identified  
10 in Mr. Yeager's Item 3, at a cost not to exceed \$11 million.

11  
12 **Q. What is the basis for your assertion that FPL failed to give DeSoto full credit for  
13 its 310 MW of summer capacity, resulting in overstated system CPVRR costs,  
14 therefore causing the DeSoto-purchase option to appear less economic than it  
15 would be if given full credit for the Facility's 310 MW?**

16 A. In its economic analyses, FPL assumed that DeSoto has a summer capacity of 300  
17 MW despite acknowledgments elsewhere in rebuttal testimony that DeSoto is capable  
18 of 310 MW at summer conditions (e.g., Yeager, Page 5, Line 1; Enjamio, Page 4,  
19 Line 14). FPL accounted for the full purchase price of DeSoto while ignoring the  
20 benefits of the 10 MW, such as delaying the need for new resources or increasing  
21 reserve margins, as appropriate in FPL's modeling methodology. While we  
22 recognize that this omission alone isn't likely to dramatically alter the overall

1 outcome of any given scenario, this is still an incorrect understatement of the DeSoto  
2 Facility's value to FPL and its customers.

3

4 **Q. What is the basis for your assertion that FPL's economic analyses were flawed in**  
5 **that they did not give DeSoto any credit for what would be lower insurance**  
6 **premiums and higher reliability value because of its location?**

7 A. DeSoto is located at Arcadia, Florida, in DeSoto County, and is about 35 miles away  
8 from Florida's Gulf Coast, as compared to the Ft. Myers Plant site, which is located  
9 on the Caloosahatchee River. Additionally, the DeSoto Facility site is approximately  
10 61 feet above mean sea level, as compared to the Ft. Myers site, which is only  
11 approximately 10 feet above mean sea level, and again, located on the tidal  
12 Caloosahatchee River. Therefore, the DeSoto Facility is less vulnerable to losses  
13 from hurricanes or tropical storm events, which should be reflected in lower  
14 insurance premiums, lower storm losses that would be absorbed by FPL (e.g., through  
15 deductibles), and fewer and less severe forced outages due to major storm damage  
16 than FPL's proposed units would be at Ft. Myers. Fewer and less severe outages  
17 translate directly into greater reliability, for the benefit of FPL's customers. Although  
18 perhaps difficult to quantify, these factors – these additional benefits from FPL  
19 owning the DeSoto Facility – all have real economic value to FPL and its customers,  
20 which FPL did not reflect in its analyses.

21

22 **Q. Does this conclude your surrebuttal testimony?**

23 A. Yes.

# CASEY CARROLL

Project Manager

## **EXPERIENCE**

2007 – present

### **LS POWER DEVELOPMENT, LLC**

St. Louis, Missouri

*Project Manager;  
Associate Project Manager;  
Project Engineer*

Responsible for identifying new business opportunities for power generation projects, including natural gas-fired, renewable and energy storage resources, based on detailed analyses of various capacity, energy and ancillary markets across the U.S.

Responsible for economic modeling of costs for power generation projects and existing assets to support investment theses and project financings in markets across the U.S.

Responsible for developing and optimizing realistic combined cycle and peaking dispatch backcast models based on historic market signals, such as hourly energy pricing and fuel costs.

Participated in analyses comparing lifetime costs of various generation plant configurations, including combustion turbine alternatives for new generation resources and combined cycle conversions of existing peaking assets.

Responsible for conducting a full spectrum of development activities related to greenfield power generation project in the U.S., including siting, securing property rights, landowner and community relations, preparation of permit applications, coordination with regulatory agencies and staff, arrangement of project contracts and participation in electrical interconnection processes.

## **EDUCATION**

**Washington University/University of Missouri – St. Louis**

Bachelors of Science in Civil Engineering

*Summa Cum Laude*

St. Louis, Missouri

August 2007 – May 2010

**Truman State University**

Bachelors of Arts in Physics

*Summa Cum Laude*

Kirksville, Missouri

August 2003 – May 2006

**DOCKET NO. 130007-EI**

**LATE FILED EXHIBITS 3 AND 4**

**OCTOBER 9, 2013 DEPOSITION OF  
WILLIAM L. YEAGER**

**DESOTO ADDITIONAL CAPITAL COSTS**

**CONFIDENTIAL**



REDACTED

CONFIDENTIAL  
INFORMATION



## TECHNICAL INFORMATION LETTER

### F-CLASS TURBINE ROTOR INSPECTION AND MAINTENANCE RECOMMENDATIONS

#### APPLICATION

Select F-class gas turbines, with turbine rotors shot-peened prior to first operation and having the original design of stage 1 wheel dovetail cooling slot geometry.

#### PURPOSE

To advise users to perform turbine rotor eddy current inspections at Hot Gas Path and Major Inspection maintenance intervals and apply buckets upgraded with the dovetail relief cut modification/design. Failure to comply with these recommendations could result in forced outage.

#### Compliance Category

<b>O - Optional</b>	Identifies changes that may be beneficial to some, but not necessarily all, operators. Accomplishment is at customer's discretion.
<b>M - Maintenance</b>	Identifies maintenance guidelines or best practices for reliable equipment operation.
<b>C - Compliance Required</b>	Identifies the need for action to correct a condition that, if left uncorrected, may result in reduced equipment reliability or efficiency. Compliance may be required within a specific operating time.
<b>A - Alert</b>	Failure to comply with the TIL could result in equipment damage or facility damage. Compliance is mandated within a specific operating time.
<b>S - Safety</b>	Failure to comply with this TIL could result in personal injury. Compliance is mandated within a specific operating time.

#### Timing Code

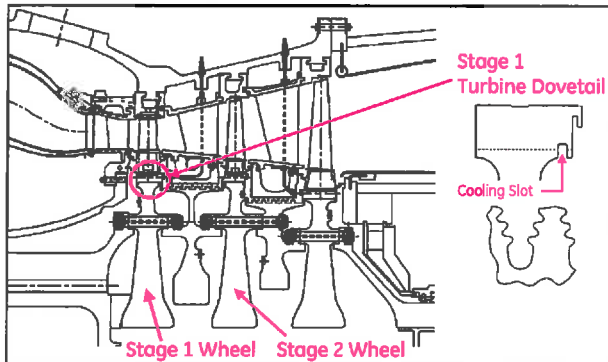
<b>1</b>	Prior to Unit Startup / Prior to Continued Operation (forced outage condition)
<b>2</b>	At First Opportunity (next shutdown)
<b>3</b>	Prior to Operation of Affected System
<b>4</b>	At First Exposure of Component
<b>5</b>	At Scheduled Component Part Repair or Replacement
<b>6</b>	Next Scheduled Outage

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## BACKGROUND DISCUSSION

The function of the turbine rotor in a heavy-duty gas turbine engine includes carrying bucket loads, transmitting torque to the compressor and generator for power generation, and supplying the buckets with cooling air. In regards to the cooling, the F-class bucket air supply is provided through cooling slots in the stage 1 and 2 turbine wheel dovetails (bucket attachment slots). (See Figure 1.)



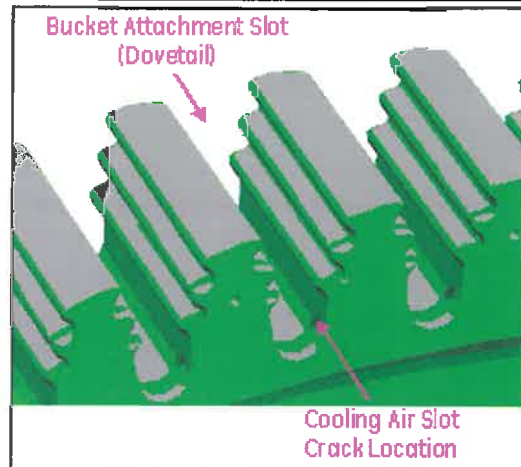
**Figure 1: F-class Turbine Rotor**

In the F-class gas turbine fleet (6FA, 7F/FA, 9FA), the turbine rotors can be divided into two populations considering how they were manufactured – those first fired with non-shotpeened turbine wheels, and those fired with shotpeened wheels. TILs 1327 and 1434 previously discussed and addresses the current inspection recommendations associated with the prior unpeened rotors.

As part of a fleet leader inspection program for the peened fleet, a few rotors were found to contain cracks in the first stage turbine wheel that required immediate removal of these wheels from service (see Figure 2). An extensive investigation identified the root cause as an adverse edge condition contained within a specific location of high stress and temperature in the wheel. This location is the acute corner formed at the intersection of the broached dovetail with the turned air slot (see Figure 3).



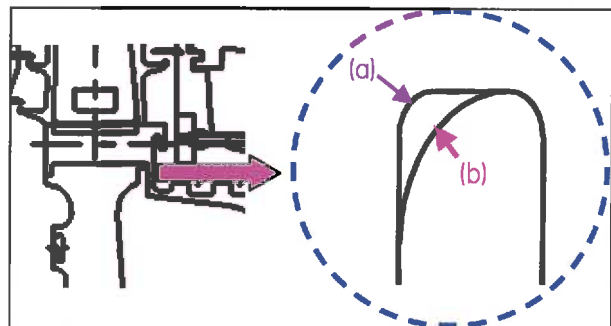
**Figure 2: Example of Turbine Wheel Crack**



**Figure 3: Crack Location in Peened First Stage Wheel**

With tensile stresses and temperatures during normal operation, the crack initiation can then expose the alloy to oxidation along its grain boundaries. With continued exposure, this crack propagation may reach critical length, resulting in potential wheelpost bucket release and Hot Gas Path damage. As such, cracked turbine dovetails warrant immediate wheel replacement.

The potential for crack propagation at the cooling slot location has been reduced in current production rotors by introducing a contoured cooling slot profile in the wheel design (see Figure 4). Recommendations for units with the newer geometry wheels (b) are addressed in TIL 1540. The recommendations that follow pertain to those rotors of geometry (a).



**Figure 4: (a) Original and (b) Contoured Cooling Slot Profiles**

## RECOMMENDATIONS

The recommendations of this TIL include:

- Eddy current inspections to be performed at Hot Gas Path Inspection (HGPI) intervals (until bucket modification) and Major Inspection (MI) intervals.
- Application of stage 1 and 2 buckets, manufactured or modified with the dovetail pressure face back-cut, at the next opportunity (HGPI or MI).

These recommendations are explained and detailed in the sections that follow. Also described is a wheel modification available to units under this TIL. This modification is not required unless otherwise specified.

### Eddy Current Inspections

Event prevention and rotor health is best maintained through regular maintenance and inspections. GE has developed an eddy current method with advanced detection devices and techniques for turbine dovetail inspection (see Figure 5). This method is the most effective non-destructive test (NDT) for identifying indications in the wheel dovetails.

Dovetail eddy current inspection (ECI) should be performed at each HGPI and MI until rotor retirement. The ECI interval may be increased after application of back-cut buckets (see the following section). ECI is available and recommended for the first and second stages of turbine dovetails. In the case of a HGPI where third stage buckets are not to be removed, elected ECI of the third stage wheel dovetails can be postponed to the MI.



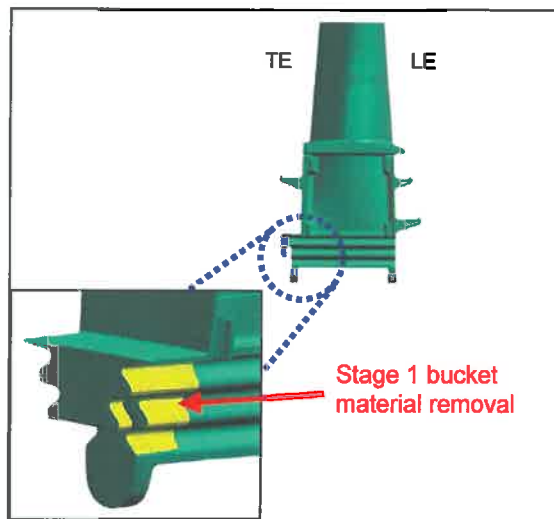
**Figure 5: Eddy Current Inspection**

Prior to the EC inspection, the turbine rotor must be appropriately cleaned to facilitate proper functioning of the ECI equipment and accurate readings. A preferred method for cleaning is by dry ice (CO<sub>2</sub>) blasting. This cleaning typically requires a single 12-hour shift to clean the rotor after bucket removal, and also requires the surfaces be free of oil beforehand. In the event that CO<sub>2</sub> blast is not available, a more arduous and lengthy hand-cleaning process is acceptable (2-3 shifts). The rotor inspection then takes approximately 3 shifts (~32 hours) to complete stages 1 and 2. Both the rotor cleaning (performed by qualified vendor) and the turbine rotor inspection can be scheduled through your local GE I&FS Service Manager or Contract Performance Manager.

### Modified Stage 1 and 2 Buckets

The potential for crack initiation at the cooling slot location can be improved by reducing the amount of bucket load passing through this part of the wheel. GE has engineered a bucket modification to change the load distribution in the wheelpost, thereby improving

the stress level at the cooling slot. This modification is accomplished by machining a tapered relief into the bucket dovetail pressure faces adjacent to the cooling slot (see Figure 6). Similar modifications to the lockwire tab locations are also applied to all stage 1 and 2 buckets per TIL-1280. These relief cut modifications have been incorporated into new production F-class buckets.



**Figure 6: Bucket Dovetail Modification**

The "back-cut" modifications are also performed as part of the standard bucket repair/refurbishment process, and should be applied to any inventory parts by a GE Service Center. It is recommended to apply modified stage 1 and 2 buckets at the next scheduled maintenance (HGPI or MI).

After application of back-cut buckets, inspection frequency can be reduced from every HGPI and MI to only MIs, where no increase in outage duration is expected.

### Stage 1 Wheel Cooling Slot Modification

GE has developed and applied to factory production units a blending process to improve the edge radius at the cooling slots of the wheels. This more generous and uniform radius provides a surface around the edge that is more conducive to providing for shotpeen benefit, while also removing the variability and potential for adverse edge conditions. This improvement is available for field applications as a rotor upgrade. The application utilizes a highly controlled blending process and a newly-developed closed-system shotpeening process to modify the entire cooling slot perimeter edge with a consistent blended, polished, and peened surface (BPP). The procedure has been applied and validated in both the field and the GE Service Centers. Contact your local GE I&FS Service Manager or Contract Performance Manager for availability for your rotor configuration and scheduling. Additional hardware removal may be required at a HGPI for equipment accessibility.

---

## PLANNING INFORMATION

**NOTE:** *If you would like to receive future TILs by email, contact your local GE I&FS Service Manager or Contract Performance Manager for assistance.*

### Compliance

- Compliance Category: A
- Timing Code: 4

### Manpower Skills

Qualified vendor to perform CO2 blast cleaning of turbine rotor.

GE Life Extension Services (LES) qualified personnel to perform the eddy current inspections.

If applicable, GE I&RS personnel to support BPP.

### Parts

Back-cut S1 and S2 buckets.

### Special Tooling

(Rotor inspection equipment and blend/peen kit are provided and applied by GE Services.)

### Reference Documents

None

### Previous Modifications

None

### Scope of Work

Buckets should already be removed per HGP outage scope. CO2 blast cleaning of turbine rotor can be completed in one (1) shift (12 hours), including a prior hand wiping to remove oil from the dovetail surfaces if necessary. ECI of first and second stages can be completed in three (3) shifts, or all 3 stages in four (4) shifts. Total time between bucket removal and installation should be 4 shifts (2 days). With BPP elected, an additional 4 shifts are needed, for a total HGPI adder of 8 shifts (4 days). These durations are estimates only.

Bucket modifications for new or previously refurbished parts are completed in GE Service Centers and have an expected 2-3 week cycle time. Buckets under-going standard refurbishment will include this repair with no affect on repair cycle.

**Contact your local GE I&FS Service Manager or Contract Performance Manager for assistance or for additional information.**

**TIL COMPLIANCE RECORD**

Compliance with this TIL must be entered in local records. GE requests that the customer notify GE upon compliance of this TIL.

Complete the following *TIL Compliance Record* and FAX it to:

TIL Compliance  
 FAX: (678) 844-3451  
 Toll free FAX: 1-888-896-TILS (1-888-896-8457)

<b>TIL COMPLIANCE RECORD</b>		For Internal Records Only # _____	
Site Name:		Customer Name:	
<b>Customer Contact Information</b>		<b>GE Contact Information</b>	
Contact Name:		Contact Name:	
Address:		Address:	
Email:		Email:	
Phone:		Phone:	
FAX:		FAX:	
<b>Turbine Serial Number(s):</b>			
<b>INSTALLED EQUIPMENT</b>		TIL Completed Date: _____	
Description:		100% TIL Completed: _____	
Unit Numbers:	Part Description:	Part Number	MLI Number
<b>Comments:</b>			
<p><b>NOTE:</b> If there are any redlined drawings that pertain to this TIL implementation, please FAX the drawings along with this TIL Compliance Record.</p>			
FAX this form to:		<b>TIL Compliance</b> <b>FAX: (678) 844-3451</b> <b>Toll free FAX: 1-888-896-TILS (1-888-896-8457)</b>	

**USER SATISFACTION SURVEY**

GE values your opinions and comments.

GE requests that you complete the *User Satisfaction Survey* below to help us better serve you with accurate and timely information on your equipment.

**Complete the following TIL Compliance Record and FAX it to:**

TIL Survey  
 GE Product Service  
 FAX: (678) 844-6737  
 Toll free FAX: 1-866-604-2668

<b>USER SATISFACTION SURVEY</b>				
<b>Serial Number:</b> _____		<b>Date:</b> _____		
1. How many days after TIL issue date did you receive this TIL?				
<b>1 - 5 days</b>		<b>6 - 10 days</b>		<b>+ 10 days</b>
<b>NOTE:</b> <i>If you would like to receive future TILs by email, contact your local GE Energy Services representative for assistance.</i>				
Rate the following based on a scale of 1 to 5, where 1 is Excellent and 5 is Poor.				
2. Please rate how well this document informed you of the technical issue.				
1	2	3	4	5
3. Please rate the overall effectiveness of this TIL.				
1	2	3	4	5
Comments / Suggestions:				
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## TECHNICAL INFORMATION LETTER

### F-CLASS TURBINE ROTOR INSPECTION AND MAINTENANCE RECOMMENDATIONS

#### APPLICATION

Select F-class gas turbines, with turbine rotors shot-peened prior to first operation and having the newer, contoured stage 1 wheel dovetail cooling slot geometry.

#### PURPOSE

To advise users to perform turbine rotor eddy current inspections at Major Inspection maintenance intervals and apply buckets upgraded with the dovetail relief cut modification/design. Failure to comply with this recommendation could result in forced outage.

#### Compliance Category

<b>O - Optional</b>	Identifies changes that may be beneficial to some, but not necessarily all, operators. Accomplishment is at customer's discretion.
<b>M - Maintenance</b>	Identifies maintenance guidelines or best practices for reliable equipment operation.
<b>C - Compliance Required</b>	Identifies the need for action to correct a condition that, if left uncorrected, may result in reduced equipment reliability or efficiency. Compliance may be required within a specific operating time.
<b>A - Alert</b>	Failure to comply with the TIL could result in equipment damage or facility damage. Compliance is mandated within a specific operating time.
<b>S - Safety</b>	Failure to comply with this TIL could result in personal injury. Compliance is mandated within a specific operating time.

#### Timing Code

- 1 Prior to Unit Startup / Prior to Continued Operation (forced outage condition)
- 2 At First Opportunity (next shutdown)
- 3 Prior to Operation of Affected System
- 4 At First Exposure of Component
- 5 At Scheduled Component Part Repair or Replacement
- 6 Next Scheduled Outage
- 7 Optional

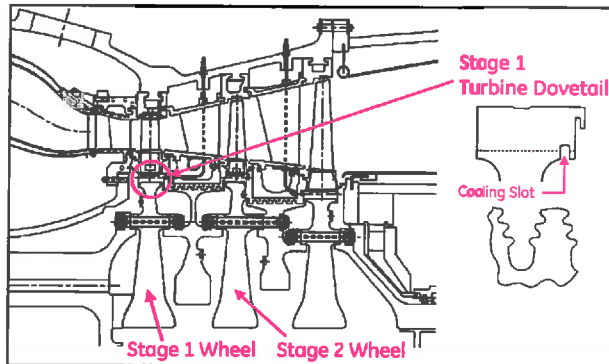
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## BACKGROUND DISCUSSION

The function of the turbine rotor in a heavy-duty gas turbine engine includes carrying bucket loads, transmitting torque to the compressor and generator for power generation, and supplying the buckets with cooling air. In regards to the cooling, the F-class bucket air supply is provided through cooling slots in the stage 1 and 2 turbine wheel dovetails (bucket attachment slots). (See Figure 1.)



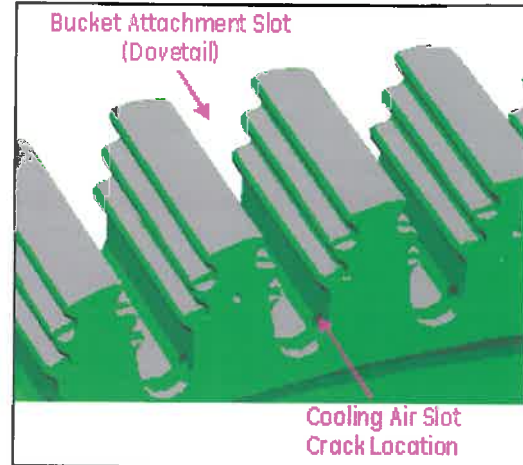
**Figure 1: F-class Turbine Rotor**

In the F-class gas turbine fleet (6FA, 7F/FA, 9FA), the turbine rotors can be divided into two populations considering how they were manufactured – those first fired with non-shotpeened turbine wheels, and those fired with shotpeened wheels. TILs 1327 and 1434 previously discussed and addresses the current inspection recommendations associated with the prior unpeened rotors.

As part of a fleet leader inspection program for the peened fleet, a few rotors were found to contain cracks in the first stage turbine wheel that required immediate removal of these wheels from service (see Figure 2). An extensive investigation identified the root cause as an adverse edge condition contained within a specific location of high stress and temperature in the wheel. This location is the acute corner formed at the intersection of the broached dovetail with the turned air slot (see Figure 3).



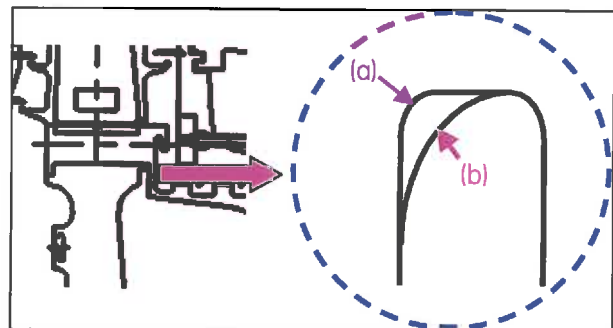
**Figure 2: Example of Turbine Wheel Crack**



**Figure 3: Crack Location in Peened First Stage Wheel**

With tensile stresses and temperatures during normal operation, the crack initiation can then expose the alloy to oxidation along its grain boundaries. With continued exposure, this crack propagation may reach critical length, resulting in potential wheelpost and bucket release and Hot Gas Path damage. As such, cracked turbine dovetails warrant immediate wheel replacement.

The potential for crack propagation at the cooling slot location has been reduced in current production rotors by introducing a contoured cooling slot profile in the wheel design (see Figure 4). Recommendations for these units with the newer geometry wheels (b) are addressed in this TIL. Recommendations pertaining to those rotors of geometry (a) are discussed in TIL 1539.



**Figure 4: (a) Original and (b) Contoured Cooling Slot Profiles**

## RECOMMENDATIONS

The recommendations of this TIL include:

- Eddy current inspections to be performed at Major Inspection (MI) intervals.
- Application of stage 1 and 2 buckets, manufactured or modified with the dovetail pressure face back-cut, at the next opportunity (HGPI or MI).

These recommendations are explained and detailed in the sections that follow. Also described is a wheel

modification available to units under this TIL. This modification is not required unless otherwise specified.

### Eddy Current Inspections

Event prevention and rotor health is best maintained through regular maintenance and inspections. GE has developed an eddy current method with advanced detection devices and techniques for turbine dovetail inspection (see Figure 5). This method is the most effective non-destructive test (NDT) for identifying indications in the wheel dovetails.

Dovetail eddy current inspection (ECI) should be performed at each MI until rotor retirement. ECI is available and recommended for the first and second stages of turbine dovetails. In the case of a HGPI where third stage buckets are not to be removed, elected ECI of the third stage wheel dovetails can be postponed to the MI.



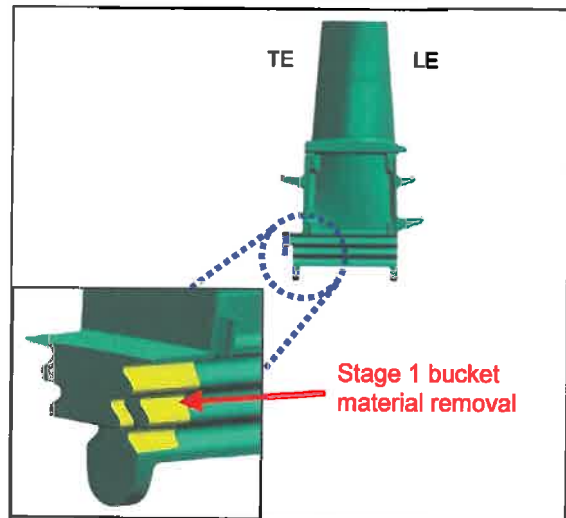
**Figure 5: Eddy Current Inspection**

Prior to the EC inspection, the turbine rotor must be appropriately cleaned to facilitate proper functioning of the ECI equipment and accurate readings. A preferred method for cleaning is by dry ice (CO<sub>2</sub>) blasting. This cleaning typically requires a single 12-hour shift to clean the rotor after bucket removal, and also requires the surfaces be free of oil beforehand. In the event that CO<sub>2</sub> blast is not available, a more arduous and lengthy hand-cleaning process is acceptable (2-3 shifts). The rotor inspection then takes approximately 3 shifts (~32 hours) to complete stages 1 and 2. Both the rotor cleaning (performed by qualified vendor) and the turbine rotor inspection can be scheduled through your local GE I&FS Service Manager or Contract Performance Manager.

### Modified Stage 1 and 2 Buckets

The potential for crack initiation at the cooling slot location can be improved by reducing the amount of bucket load passing through this part of the wheel. GE has engineered a bucket modification to change the load distribution in the wheelpost, thereby improving the stress level at the cooling slot. This modification is accomplished by machining a tapered relief into the bucket dovetail pressure faces adjacent to the cooling slot (see Figure 6). Similar modifications to the lockwire

tab locations are also applied to all stage 1 and 2 buckets per TIL-1280. These relief cut modifications have been incorporated into new production F-class buckets.



**Figure 6: Bucket Dovetail Modification**

The "back-cut" modifications are also performed as part of the standard bucket repair/refurbishment process, and should be applied to any inventory parts by a GE Service Center. It is recommended to apply modified stage 1 and 2 buckets at the next scheduled maintenance (HGPI or MI).

### Stage 1 Wheel Cooling Slot Modification

GE has developed and applied to factory production units a blending process to improve the edge radius at the cooling slots of the wheels. This more generous and uniform radius provides a surface around the edge that is more conducive to providing for shotpeen benefit, while also removing the variability and potential for adverse edge conditions. This improvement is available for field applications as a rotor upgrade. The application utilizes a highly controlled blending process and a newly-developed closed-system shotpeening process to modify the entire cooling slot perimeter edge with a consistent blended, polished, and peened surface (BPP). The procedure has been applied and validated in both the field and the GE Service Centers. Contact your local GE I&FS Service Manager or Contract Performance Manager for availability for your rotor configuration and scheduling. Additional hardware removal may be required at a HGPI for equipment accessibility.

---

## PLANNING INFORMATION

### Compliance

- Compliance Category: A
- Timing Code: 4

### Manpower Skills

Qualified vendor to perform CO2 blast cleaning of turbine rotor.

GE Life Extension Services (LES) qualified personnel to perform the eddy current inspections.

If applicable, GE I&RS personnel to support BPP.

### Parts

Back-cut S1 and S2 buckets.

### Special Tooling

(Rotor inspection equipment and blend/peen kit are provided and applied by GE Services.)

### Reference Documents

None

### Previous Modifications

None

### Scope of Work

Buckets should already be removed per HGP outage scope. CO2 blast cleaning of turbine rotor can be completed in one (1) shift (12 hours), including a prior hand wiping to remove oil from the dovetail surfaces if necessary. ECI of first and second stages can be completed in three (3) shifts, or all 3 stages in four (4) shifts. Total time between bucket removal and installation should be 4 shifts (2 days). With BPP elected, an additional 4 shifts are needed, for a total HGPI adder of 8 shifts (4 days). These durations are estimates only.

Bucket modifications for new or previously refurbished parts are completed in GE Service Centers and have an expected 2-3 week cycle time. Buckets under-going standard refurbishment will include this repair with no affect on repair cycle.

**Contact your local GE I&FS Service Manager or Contract Performance Manager for assistance or for additional information.**

**NOTE:** *If you would like to receive future TILs by email, contact your local GE I&FS Service Manager or Contract Performance Manager for assistance.*

**TIL COMPLIANCE RECORD**

Compliance with this TIL must be entered in local records. GE requests that the customer notify GE upon compliance of this TIL.

Complete the following *TIL Compliance Record* and FAX it to:

TIL Compliance  
 FAX: (678) 844-3451  
 Toll free FAX: 1-888-896-TILS (1-888-896-8457)

<b>TIL COMPLIANCE RECORD</b>		For Internal Records Only # _____	
Site Name:		Customer Name:	
<b>Customer Contact Information</b>		<b>GE Contact Information</b>	
Contact Name:		Contact Name:	
Address:		Address:	
Email:		Email:	
Phone:		Phone:	
FAX:		FAX:	
<b>Turbine Serial Number(s):</b>			
<b>INSTALLED EQUIPMENT</b>		TIL Completed Date: _____	
Description:		100% TIL Completed: _____	
Unit Numbers:	Part Description:	Part Number	MLI Number
<b>Comments:</b>			
<p><b>NOTE:</b> If there are any redlined drawings that pertain to this TIL implementation, please FAX the drawings along with this TIL Compliance Record.</p>			
FAX this form to:		<b>TIL Compliance</b> <b>FAX: (678) 844-3451</b> <b>Toll free FAX: 1-888-896-TILS (1-888-896-8457)</b>	

**USER SATISFACTION SURVEY**

GE values your opinions and comments.

GE requests that you complete the *User Satisfaction Survey* below to help us better serve you with accurate and timely information on your equipment.

**Complete the following TIL Compliance Record and FAX it to:**

TIL Survey  
 GE Product Service  
 FAX: (678) 844-6737  
 Toll free FAX: 1-866-604-2668

**USER SATISFACTION SURVEY**

Serial Number: \_\_\_\_\_ Date: \_\_\_\_\_

1. How many days after TIL issue date did you receive this TIL?

**1 - 5 days**                      **6 - 10 days**                      **+ 10 days**

**NOTE:** *If you would like to receive future TILs by email, contact your local GE Energy Services representative for assistance.*

Rate the following based on a scale of 1 to 5, where 1 is Excellent and 5 is Poor.

2. Please rate how well this document informed you of the technical issue.

**1**                      **2**                      **3**                      **4**                      **5**

3. Please rate the overall effectiveness of this TIL.

**1**                      **2**                      **3**                      **4**                      **5**

Comments / Suggestions:

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FAX this form to:              **TIL Survey**  
                                       **GE Product Service**  
                                       **FAX: (678) 844-6737**  
                                       **Toll free FAX: 1-866-604-2668**

**Results of Economic Evaluation of DeSoto Alternatives**  
 (millions, CPVRR, 2013\$, 2013-2047)

Resource Plan	System Costs			Difference from FPL Replace Resource Plan
	Fixed Costs	Variable Costs*	Total Costs	
DeSoto Alternative A (DeSoto Ownership with one 200 MW CT at FM and two 54 MW GTs in-service)	\$15,847	\$94,606	\$110,453	-\$62
DeSoto Alternative B (DeSoto Ownership with six 54 MW GTs in-service)	\$15,876	\$94,488	\$110,364	-\$210
DeSoto Alternative C (DeSoto Ownership with one 200 MW CT at FM)	\$15,847	\$94,606	\$110,453	-\$62

\*Approximation based using FPL Resource Plan 2 as a base and adjusting with the best available information as further described in the Surrebuttal testimony

**CERTIFICATE OF SERVICE**

I **HEREBY CERTIFY** that a true and correct copy of the foregoing has been furnished by electronic mail on this 23<sup>rd</sup> day of October, 2013, to the following:

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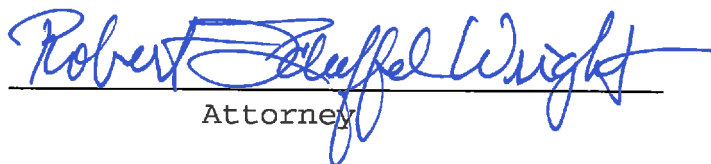
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