

June 27, 1985

Docket No. 50-220

Mr. B. G. Hooten  
Executive Director, Nuclear Operations  
Niagara Mohawk Power Corporation  
300 Erie Boulevard West  
Syracuse, New York 13202

Dear Mr. Hooten:

SUBJECT: MEETING SUMMARY - DETAILED CONTROL ROOM  
DESIGN REVIEW (DCRDR) - MAY 9 - 10, 1985

Re: Nine Mile Point Nuclear Station, Unit No. 1

A meeting was held with Niagara Mohawk Power Corporation at its contractor's (ARD) offices in Columbia, Maryland to discuss concerns identified in a previous NRC audit. No concerns were resolved as a result of the meeting. However, the discussions with the licensee were open and frank and, in the staff's judgement, should lead to an improved DCRDR Summary Report.

A copy of the meeting minutes and attendance list are enclosed.

Sincerely,

Original signed by DBVassallo for/

Robert A. Hermann, Project Manager  
Operating Reactors Branch #2  
Division of Licensing

Enclosures:  
As stated

cc w/enclosures:  
See next page

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Mr. B. G. Hooten  
Niagara Mohawk Power Corporation  
Nine Mile Point Nuclear Station, Unit No. 1

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Minutes of Meeting  
Between NRC and NMPC on the  
DCRDR for Nine Mile Point Nuclear Station, Unit 1

The following are minutes of a meeting held on May 9 and 10, 1985, between NRC and Nine Mile Point Corporation (NMPC). Also in attendance were staff from Advanced Resources Development Corporation (ARD) and Science Applications International Corporation (SAIC). Specific attendees and organizations which they represent are shown in Attachment 1.

The purpose of the meeting was to discuss concerns that resulted from an in-progress audit of the Detailed Control Room Design Review (DCRDR) at NMPC in November 1984. The results of that audit were documented in a report and forwarded to NMPC on February 14, 1985. Prior to the meeting NMPC had provided documentation to the NRC to indicate further DCRDR activity subsequent to the audit that satisfies some of the requirements of Supplement 1 to NUREG-0737. As a result of the meeting NMPC provided NRC with more information regarding its satisfaction of those requirements. NRC informed NMPC of the types of documentation to include in its Summary Report to assure that NRC staff can evaluate the DCRDR processes and results and NMPC's satisfaction of the requirements.

1. Establishment of a Multidisciplinary Team

A concern that resulted from the in-progress audit was whether an adequate team had been assembled to conduct portions of the DCRDR, namely the task analysis. NMPC responded to this concern by stating that in addition to human factors specialists, nuclear systems engineers and nuclear operations experts were participants in the function and task analysis. Resumes for all team members and their task assignments will be documented in the Summary Report.

2. Function and Task Analysis

As a result of the in-progress audit the audit team concluded that the task analysis was incomplete and was not providing a thorough, auditable record of operator tasks and the corresponding information and control requirements.



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Prior to the meeting NMPC provided a description of their methodology and a new set of documentation generated from the task analysis - a printout of the task instruments and control requirements. It was reviewed prior to the meeting to permit discussion of any issues. Gaps in the data were noted by a reviewer but appeared to be a minor documentation issue. NMPC indicated that they would "clean up" the printout/database. Conclusions regarding the adequacy of NMPC's satisfaction of the requirement will be drawn after evaluation of the Summary Report.

### 3. Control Room Inventory

As a result of the in-progress audit the audit team concluded that the inventory and the process to compare it with a task analysis was incomplete due to the inadequacies with the task analysis and with the computer capability to perform the comparison.

NMPC discussed the collection of an inventory and its comparison with the information and control requirements as determined from the task analysis. NRC staff informed NMPC of the need to provide a complete and accurate task analysis in order to satisfy this requirement. NMPC indicated the analysis is complete and the comparison was carried out with successful results; potential HEDs were documented and no missing instruments or controls resulted. Full review of NMPC's satisfaction of this requirement will be completed on receiving the Summary Report.

### 4. Control Room Survey

NMPC has conducted the control room survey during two separate efforts. The first was conducted by the Boiling Water Reactor (BWR) Owners Group in July 1981 using the BWR survey and the second by ARD Corporation using the supplement to the BWR survey. Subsequent to the in-progress audit, efforts were undertaken to assure completeness. Those efforts were noise and lighting surveys at the remote shutdown panels and in the control room. Control room air velocity, temperature and humidity were also measured. NMPC indicated that as a result of audit comments they have checked over the documentation and the control room to assure completeness. Also, during the assessment phase they stated that they often returned to the control room to clarify findings and in so doing made additional findings. The survey also



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encompassed the human factors acceptability of the SPDS by evaluation against NUREG-0700, Section 6 and NUREG-0835.

NRC understands that NMPC will fully document all survey activities in the Summary Report for final review of the satisfaction of this requirement of NUREG-0737, Supplement 1.

#### 5. Assessment of HEDs

The process to assess HEDs was found to be unacceptable at the time of the in-progress audit. Prior to the meeting NMPC provided documentation to demonstrate the criteria and procedure, and results of that procedure. Those results were evaluated by SAIC and provided to the NRC in a report (see Attachment 2). During the meeting NMPC was informed of the evaluation and were advised to improve the discussion of HEDs and proposed corrective actions when submitted in the Summary Report. Examples of deficiencies in their documentation were given to illustrate the problems reviewers might have.

As a result of the meeting NMPC was advised to provide the appropriate level of documentation in the Summary Report to show reviewers that the assessment process has resulted in the correction of safety significant HEDs or a reasonable justification for partial or no correction.

#### 6. Selection of Design Improvements

NMPC briefly described the process to correct design improvements; it had not progressed far enough at the time of the audit to be addressed. The process includes conceptualization of corrections by all team members and the development of an integrated cosmetic package. A human factors manual was developed to help guide design improvements and assure a consistent and integrated approach is taken. The package contains conventions for changes such as labeling, abbreviations and color coding. As mentioned in the previous paragraph, NMPC was informed of the need to provide comprehensive documentation of proposed design improvements to permit a full evaluation of the DCRDR at Summary Report time. Inclusion of the human factors manual would be useful to the Summary Report reviewer in drawing conclusions regarding NMPC's satisfaction of this requirement.



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7. and 8. Verification that selected design improvements correct the HED without creating new HEDs

The process by which selected design improvements will be verified was briefly described by NMPC during the meeting. The integrated cosmetic package will be presented on the plant simulator for human factors acceptance and for operators to work with during training. Operator comments will be solicited by ARD Corporation who will be verifying the corrective actions. NMPC should assure that verification activities and results are documented in the Summary Report.

9. Coordination.

The integration of the DCRDR with other improvement programs as described by NMPC involves the new upgraded EOPs, SPDS, training and Regulatory Guide 1.97 instrumentation. The target date for Revision C of the NMPC EOPs is June 1985 with a full implementation during the 1986 refueling outage.

EOPs have been generated from the most current BWR Owners Group EPGs - Rev. 4 (as yet unreviewed by NRC). The EOPs will be validated in August 1985 and will be integrated with the SPDS. The SPDS is not structured into the EOPs but will be validated at the time the EOP validation activity is performed. Also at this time a verification of equipment availability and suitability will be performed. Those results will then be compared with DCRDR results. NMPC indicated that during EOP revisions, the task analysis product was checked for adequate coverage of all tasks required by the EOPs.

Operator training to the control room changes will be accomplished during operator requalification with all modifications in place. Regulatory Guide 1.97 instrumentation are in the control room and were in place for the DCRDR. NMPC indicated that any new modifications to the control room will receive evaluation against their human factors manual which is part of the plant engineering procedure for all control room design changes. Descriptive information to reflect the planned, completed and implemented DCRDR changes with other programs should be provided in the Summary Report.



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## Conclusions

The meeting between NMPC and NRC resulted in an exchange of information regarding the accuracy and completeness of the DCRDR processes. Concerns resulting from the in-progress audit were clarified and in some instances diminished by documentation and discussion. In other cases, such as the assessment of HEDs and selection of design improvement, more complete documentation in the Summary Report will have to be provided to address NRC concerns with the DCRDR organization, process and results. Complete documentation and description of the DCRDR will facilitate review of the Summary Report.



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Attachment 1

Meeting Attendance/NMP

May 9, 1985

Name	Affiliation
Carol Kain	USNRC/SAIC
Steve Fleger	USNRC/SAIC
Robert Kershner	ARD Corp.
Jack Benson	NMPC
Dennis I. Serig	USNRC
Robert Hermann	USNRC
Bob Klein	ARD Corp.
Ray Pasternak	NMPC
Don Taylor	ARD Corp.
Don Matthews	NMPC

Meeting Attendance/NMP

May 10, 1985

Carol Kain	USNRC/SAIC
J. L. Benson	NMPC
Dennis Serig	USNRC
Don Taylor	ARD Corp.
Bob Klein	ARD Corp.
Bob Kershner	ARD Corp.
Don Matthews	NMPC
Ray Pasternak	NMPC
R. A. Hermann	USNRC
Dom Tondi	USNRC
Saba Saba	USNRC



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## Attachment 2

### Analysis of Justification for HEOs Left Uncorrected for Niagra Mohawk Power Corporation's Nine Mile Point Nuclear Station, Unit 1

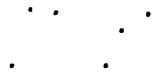
#### INTRODUCTION

Subsequent to the Nine Mile Point Nuclear Station Unit 1 (NMP-1) Detailed Control Room Design Review (DCRDR) in-progress audit, Niagra Mohawk Power Corporation (NMPC) submitted to the United States Nuclear Regulatory Commission (USNRC) documentation pertaining to the results of their control room survey. The documentation included a copy of the NMP-1 Integrated Cosmetic Package, which contains plant-specific conventions and specifications, and a computer printout of the human engineering observations (HEOs) documented to date. The NRC forwarded this information to Science Applications International Corporation (SAIC) and asked that an assessment be made of NMPC's justification for not correcting HEOs. The results of SAIC's review, together with a discussion of our findings, are contained in the remaining sections of this report.

#### RESULTS

NMPC has documented a total of 527 HEOs. From this total, approximately 50% (261) will have action taken against them, with 83 (16%) identified as having already been resolved and 178 (34%) being slated for corrective action. Of the remaining HEOs, approximately 97 (18%) have been identified as invalid and 169 (32%) have been rejected for correction. The evaluation conducted by SAIC concentrated on those HEOs that had been rejected and those categorized as invalid. A summary of the HEOs by category and disposition has been provided in Appendix A.

For those HEOs where NMPC has provided justifications for not taking corrective actions, our evaluation found some, but not all, to be satisfactorily resolved. These HEOs have been grouped in the following two sections: (1) HEOs Rejected for Correction; and (2) Invalid HEOs. This organization parallels NMPC's categorization scheme. Each of these two sections presents a categorical summarization of our findings resulting from a review of the HEOs which had been documented in the computer printouts.



The HEOs listed under these categories represent those in which we found NMPC's justifications for not taking corrective actions to be either inadequate or ambiguous. The complete HEO listing can be found in Appendices B and C. Appendix D lists those HEOs categorized as either invalid or rejected for which no justification was provided. A total of five HEOs fall within this category. The remaining unlisted HEOs, are those which we found to be adequately resolved.

The following two sections contain an elaboration of our findings. Examples have been provided of HEOs that were found to be inadequately resolved.

#### HEOs Rejected for Correction

Appendix B of this report contains the complete list of HEOs left uncorrected for which justifications were provided but were found to be inadequate for one of the two reasons listed below. Of the 169 HEOs rejected for correction, 142 (84%) were found to be unsatisfactorily justified. Examples within each category/reason are provided below.

- a. The justification for HEO description is too brief, general, ambiguous, or must be seen on the panels prior to making a judgment to allow an adequate evaluation to be made.

#### HEO No.

OCS-207.0 The discrepancy says that the Differential Pressure System discharge route on Panel L does not clearly indicate the close position. NMPC essentially states that no corrective action will be taken because the center closed position is common to both systems, and status lights clearly indicate valve position. Both the description of the discrepancy and the explanation of why no corrective action will be taken are too brief to allow an adequate evaluation to be made. For example, exactly how is the closed position indicated? How is the open position indicated? What convention (if any) has been established for similar components within this system?



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HEO No.

FP-002.0 The discrepancy states that zone groupings within the major areas of the fire panel are not enhanced by an appropriate form of demarcation or summary labeling. NMPC says that no action will be taken because there is demarcation used on the panels ("zone grouping through demarcation panel") but does not explain what is meant by this comment. It is further stated that "zone grouping through demarcation or other techniques would not enhance the understanding of the panel." These two statements are ambiguous. It is difficult to see why demarcation or summary labeling would not improve the user's ability to locate specific components. Without an illustration of the panel arrangement, a complete evaluation of this HEO is not possible.

OCS-152.0 The discrepancy described is that the Generator A-C Megawatts indicator is scaled with subdivisions other than multiples of 1, 2, or 5. NMPC's justification for not taking corrective action is that these are redundant indicators which provide information for the operator. However, an adequate evaluation cannot be made without providing more specific information such as details on the present scaling of the megawatt indicator, locations of the redundant indicators, and importance and frequency of use data stemming from the task analysis.

VER-017.0 According to the results of the task analysis, the indication of primary containment level should be displayed in feet with one-foot increments. The associated meter displays level in inches with 25-inch divisions. NMPC justifies taking no corrective action by stating "a scale of inches is appropriate." They state further that the "scale is marked to provide a rapid identification by the operator on the status of the parameter." However, no explanation of this statement is given. More information is required in order to assess the adequacy of this justification.

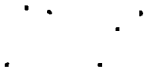


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- b. The basis for the justification is not adequate (i.e., the justification does not address operational or behavioral factors or issues).

HEO No.

- CS-034.0 The discrepancy states that the pointers on the GE circular meters obscure the numerals. The justification provided by NMPC for not correcting this discrepancy is that the circular meters have numbered intervals with 15 divisions between numbers, and that adding additional numbers to the scale would crowd the scale and make reading difficult. This justification does not address the discrepancy.
- OCS-003.0 The discrepancy is that all of the benchboard annunciator windows exceed the maximum recommended height. NMPC justifies taking no corrective action by the fact that the alarm silence button is located on Panel E, allowing the operator a greater angle for using the annunciators. This justification is inadequate because NMPC does not consider the readability of the annunciator tiles. The problem is not so much that of height above the floor as that of readability of the annunciators from the operator's normal viewing position. NMPC should conduct a readability study and base their justification for not taking correction action on empirical data rather than conjecture.
- OCS-204.0 The discrepancy described relates to a violation of plant convention of the Chiller System switches, with OFF located in the center position and Standby and Auto to the left. NMPC's justification for not taking corrective action is that the switches are vendor-supplied equipment, and that the location of the test position to the right requires the present orientation. This justification is inadequate because it is not couched in behavioral or operational rationale. Citing the existence of a test function does not satisfactorily justify not taking corrective action.





HEO No.

QS-006.0 The discrepancy states that an indication of relative speed is needed for the #13 Feedwater Shaft Pump. NMPC justifies taking no corrective action by stating "the info is not required." This justification offers no valid reason for leaving the discrepancy uncorrected. The NMPC justification begs the question "Why is this information not required?"

Invalid HEOs

Appendix C of this report contains the complete list of HEOs which have been categorized as invalid. Justifications were provided but were found to be inadequate for one of the two reasons listed below. Approximately 42% (41) of the 97 HEOs categorized by NMPC as invalid were found to be inappropriately categorized. The rationale behind this unsatisfactory ranking and examples within each category/reason are provided below.

- a. The justification (or HEO description) is too brief, general, ambiguous, or must be seen on the panels prior to making a judgment to allow an adequate evaluation to be made.

HEO No.

VER-038.0 According to the task analysis, an indication of shutdown cooling flow is required when initiating shutdown. The discrepancy states that there is no indication of shutdown cooling flow available in the control room. NMPC essentially states that the amount of cooling flow is not the needed feedback, but rather that valve positions and temperature indication are the critical parameters, and therefore an indication of shutdown cooling flow is not necessary. However, NMPC adds that if cooling flow data is needed, local flow indicators are available. This last comment contradicts NMPC's justification and introduces a degree of ambiguity preventing an adequate evaluation.



HEO No.

OCS-242.0 The discrepancy says that "no reference with respect to annunciators is provided." NMPC's justification for not taking corrective action is that the "annunciators are coded and referenced in procedures." The information provided by NMPC is too general and brief. In order to make an adequate evaluation, more descriptive information should be provided surrounding the discrepancy and the explanation as to why this discrepancy is invalid.

VAL-019.0 A discrepancy was identified during the validation of control room functions and states that the operator does not have appropriate feedback of RPV Pressure at Panel K when increasing reactor water cleanup flow. This discrepancy was judged invalid by NMPC because an indication of RPV pressure entitled Cleanup System Inlet Pressure is available. However, without providing more detailed information concerning the appropriateness of this indication and its location in the control room with respect to Panel K, an adequate evaluation cannot be made.

- b. The basis for the justification is not adequate (i.e., the justification does not address operational or behavioral factors or issues).

HEO No.

CS-022.0 The discrepancy states that meters are not designed so that a failure mode is evident. The explanation offered by NMPC as to why this constitutes an invalid discrepancy is that there is a design failure mode convention of down scale for the meters. Without further elaboration on this statement, SAIC is forced to conclude that the meter does not fail off-scale. Without off-scale failure or some secondary indication of failure mode, the possibility exists of failing to notice a faulty indication.



HEO No.

VER-031.0 The discrepancy says that units, ranges, and divisions relating to Control Rod Drive Injection Water Flow were found unsuitable during the verification phase of the task analysis. A meter ranging from 0-80 x 10<sup>2</sup> lb/hr is required rather than the present indication of 0-5 GPM. The reason given by NMPC as to why this discrepancy is invalid is that a controller with a total CRD System Flow ranging from 0-100 x 10<sup>3</sup> lb/hr is available and suitable for this task. Since flow indication provided by controllers typically presents demand status rather than actual flow information, the justification for invalidating this discrepancy is inappropriate. Furthermore, no information was given about the divisions of measurement.

VER-036-0 According to the results of the verification plan of the task analysis, the ranges for the SRMS indications were found to be unsuitable. The justification given as to why this constitutes an invalid discrepancy was that the lower ranges provided by the present 0.1 x 10<sup>6</sup> - 1 x 10<sup>6</sup> indication are sufficient for reading low power, and that an SRM reading of 0-1 x 10<sup>6</sup> was not necessary. However, no reason was given as to how it was determined that this range is suitable. If in fact it is suitable, then the thoroughness of the verification process is suspect. This suspicion is reinforced by the fact that of the 67 HEOs generated during the verification and validation phase of the DCRDR, 61 were judged invalid or rejected for correction.

**CONCLUSIONS**

As a result of our review of the 266 HEOs which will not be corrected, 77 (29%) contained adequate justification. The justifications provided by NMPC for not correcting the remaining HEOs were judged unsatisfactory for one of two reasons: the justifications were either too general or ambiguous to allow an adequate evaluation to be made, or the justifications did not adequately address the operational or behavioral issues of the discrepancy. Of the 189 HEOs judged unsatisfactory, approximately 60% fall into the first category and 40% into the second.



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As described in SAIC's January 30, 1985, NMP-1 in-progress audit report to the NRC, the HEO assessment process to which NMPC subscribed categorized HEOs according to general approaches to correction. The potential for operator error and the consequence of that error may have been considered; but based on the auditable record, the assessment typically included "secondary" considerations such as how the HEO would be corrected. SAIC concludes that in order to meet the intent of NUREG-0737, Supplement 1, para. 5.2b, NMPC should provide additional information relating to those HEOs, listed in Appendices B and C, that are identified as unsatisfactory.

According to NUREG-0800, Section 2.5, discrepancies are to be assessed to "determine their significance on operator performance and plant safety." No "hard" evidence was uncovered during SAIC's HEO review to indicate that discrepancies with safety significance had been systematically assessed and categorized appropriate to the guidance recommended in NUREG-0800. However, a Risk Category header was found on all HEO forms with the majority containing an alphanumeric designator suggesting that some formal process was implemented to determine discrepancy significance. Without a description of the procedure and methodology employed, SAIC cannot comment on the appropriateness of the process.

A cursory review of the 261 HEOs slated for revision was undertaken by SAIC to assess the comprehensiveness of the NMP-1 BWROG survey. Since guideline or criteria identifiers were not provided on the HEO forms, the validity of our results is disputable. Nonetheless, our brief analysis revealed that NMPC has apparently undertaken a fairly rigorous survey. Explanations of the discrepancies and proposed corrective actions indicate that both potential for error and consequence of error were considered. However, since no formal assessment scheme was established, the extent to which this process was carried out remains open to debate.

A review of the improvements and proposed corrective actions for the 261 HEOs earmarked for resolution was also undertaken. Unlike the detailed analysis of the justifications for HEOs left uncorrected, this review was conducted to assess the general adequacy of the corrective actions proposed. The results of our review indicate that, in many instances, the corrective actions proposed should satisfactorily resolve the discrepancies and result in a more "usable" control room sensitive to the capabilities and limita-



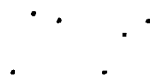
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tions of the human operator. However, HEOs were identified for which the corrective actions proposed were found inadequate for one of the four reasons cited below:

- The description of the proposed corrective action was too brief or ambiguous to allow an adequate evaluation to be made.
- The proposed corrective action was not finalized.
- The proposed corrective action will not correct the discrepancy.
- The proposed corrective action only partially corrects the discrepancy.

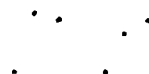
In summary, NMP<sup>2</sup> appears to have conducted a fairly rigorous BWROG control room survey. However, in order to assess the justification for HEOs with safety significance to be left uncorrected or partially corrected, NMPC should submit an explanation of the procedure used to determine the risk category for those HEOs rejected for correction, and by corollary, a list of all safety-related HEOs. Additionally, supplemental information should be provided for those HEOs where the justification given for not correcting the discrepancy was judged unsatisfactory. Finally, the NMP-1 Integrated Cosmetic Package should be reviewed in concert with the Human Factors Manual, when issued, in order to assess more reliably the adequacy of the proposed corrective actions.



**APPENDIX A**  
**HEO CATEGORIZATION**

<u>Disposition</u>	<u>Resolution Category</u>	<u>No. of HOEs</u>
1. Resolved (In-Progress)	03 Functional - Normal	9
	04 Functional - Emergency	4
2. Resolved (Completed)	01 Cosmetic - Individual	27
	02 Cosmetic - Panel/System	1
	03 Functional - Normal	22
	04 Functional - Emergency	20
3. Fix	01 Cosmetic - Individual	65
	02 Cosmetic - Panel/System	71
	03 Functional - Normal	32
	04 Functional - Emergency	10
4. Invalid	01 Cosmetic - Individual	3
	02 Cosmetic - Panel/System	2
	03 Functional - Normal	6
	04 Functional - Emergency	2
	06 Invalid	84
	04 Functional - Emergency	24
5. Reject	01 Cosmetic - Individual	41
	02 Cosmetic - Panel/System	17
	03 Functional - Normal	87
	04 Functional - Emergency	<u>24</u>

TOTAL = 527



APPENDIX B  
HEOs REJECTED FOR CORRECTION

HEOs for which justifications for not taking corrective action were provided but were found to be inadequate for one of the following two reasons:

- a. The justification (or HEO description) is too brief, ambiguous, or must be seen on the panels prior to making a judgement to allow an adequate evaluation to be made.

OCS-062.0	OCS-205.0	COM-010.0	OCS-222.0	VER-034.0
OCS-072.0	OCS-206.0	COM-011.0	OCS-223.0	VER-039.0
OCS-084.0	OCS-207.0	COM-012.0	OCS-244.0	CS-009.0
OCS-086.0	OCS-208.0	COM-013.0	QS-005.0	OCS-010.0
OCS-094.0	OCS-209.0	COM-014.0	QS-010.0	OCS-095.0
OCS-109.0	OCS-230.0	COM-018.0	QS-013.0	OCS-232.0
OCS-119.0	CS-038.0	COM-026.0	QS-029.0	OCS-231.0
OCS-122.0	CS-045.0	COM-030.0	QS-030.0	SPD-001.0
OCS-123.0	FP-002.0	CS-032.0	SPD-006.0	SPD-010.0
OCS-124.0	OCS-132.0	CS-037.0	VAL-001.0	SPD-013.0
OCS-183.0	OCS-152.0	CS-068.0	VAL-005.0	VER-008.0
OCS-192.0	OCS-153.0	OCS-001.0	VAL-008.0	VER-017.0
OCS-193.0	OCS-191.0	OCS-013.0	VAL-014.0	VER-018.0
OCS-195.0	COM-002.0	OCS-058.2	VER-013.0	VER-020.0
OCS-196.0	COM-003.0	OCS-166.0	VER-015.0	VER-025.0
OCS-198.0	COM-009.0	OCS-184.0	VER-024.0	



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b. The basis of the justification is not adequate (i.e., the justification does not address operational or behavioral factors or issues).

CS-003.0	OCS-170.0	COM-004.0	OCS-204.0	VAL-004.0
CS-015.0	OCS-174.0	COM-019.0	OCS-210.0	VAL-012.0
CS-034.0	OCS-176.0	COM-021.0	VER-028.0	VAL-016.0
OCS-060.0	OCS-177.0	COM-024.0	OCS-220.0	VAL-025.0
OCS-063.0	CS-036.0	CS-002.0	OCS-225.0	VER-030.0
OCS-071.0	CS-042.0	CS-008.0	OCS-235.0	CS-053.0
OCS-074.0	CS-051.0	CS-016.0	OCS-236.0	ENV-001.0
OCS-081.0	OCS-087.0	CS-021.0	OCS-278.0	ENV-002.0
OCS-096.0	OCS-088.0	CS-024.0	QS-006.0	ENV-003.0
OCS-117.0	OCS-151.0	CS-046.0	QS-016.0	OCS-221.0
OCS-125.0	OCS-160.0	CS-054.0	QS-021.0	VER-042.0
OCS-168.0	OCS-161.0	OCS-003.0	QS-026.0	
OCS-169.0	OCS-162.0	VER-019.0	QS-035.0	



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**APPENDIX C  
INVALID HEOs**

HEOs categorized as invalid for which justifications were provided but were found to be inadequate for one of the following two reasons.

- a. The justification (or HEO description) is too brief, general, ambiguous, or must be seen on the panels prior to making a judgment to allow an adequate evaluation to be made:

OCS-276.0	OCS-057.0	VAL-019.0
OCS-155.0	OCS-070.0	VAL-020.0
COM-005.0	OCS-213.0	VAL-021.0
OCS-242.0	OCS-218.0	VAL-023.0
OCS-268.0	OCS-275.0	VER-001.0
CS-057.0	QS-002.0	VER-007.0
OCS-033.0	QS-003.0	VER-023.0
OCS-037.0	VAL-003.0	VER-035.0
OCS-038.0	VAL-007.0	VER-038.0
OCS-040.0	VAL-009.0	VER-041.0
OCS-054.0	VAL-018.0	

- b. The basis for the justification is not adequate (i.e., the justification does not address operational or behavioral factors or issues).

CS-029.0	CS-013.0	TA-002.0
OCS-212.0	CS-022.0	VER-031.0
COM-015.0	CS-062.0	VER-036.0



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**APPENDIX D**  
**UNJUSTIFIED HEOs**

HEOS categorized as either Invalid or Rejected for which no justification was provided:

OCS-165.0	VER-014.0
QS-008.0	SPD-004.0
OCS-233.0	

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