

U.S. NUCLEAR REGULATORY COMMISSION
REGION III

Reports No. 50-315/87027(DRS); 50-316/87027(DRS)

Docket Nos. 50-315; 50-316

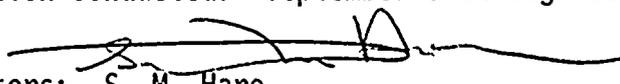
Licenses No. DPR-58; DPR-74

Licensee: American Electric Power Service Corporation
Indiana Michigan Power
1 Riverside Plaza
Columbus, Ohio 43216

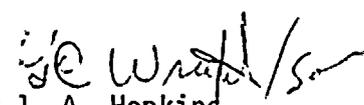
Facility Name: D. C. Cook Nuclear Plant, Units 1 and 2

Inspection At: D. C. Cook Site, Bridgman, Michigan

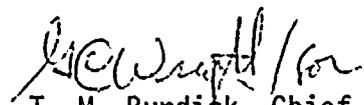
Inspection Conducted: September 8 through October 23, 1987

Inspectors: 
S. M. Hare

11/30/87
Date


J. A. Hopkins

12/2/87
Date

Approved By: 
T. M. Burdick, Chief
Operating Licensing Section

12/2/87
Date

Inspection Summary

Inspection on September 8 through October 23, 1987 (Reports No. 50-315/87027(DRS);
No. 50-316/87027(DRS))

Areas Inspected: Special safety inspection by regional inspectors of NRC administered requalification exam results, joint NRC/facility requalification exams and their results, and a review of the requalification training program (41701).

Results: No violations or deviations were identified; however, significant deficiencies were identified in the requalification training program. These deficiencies which were identified through requalification examinations resulted in the issuances of two Confirmatory Action Letters, CAL-RIII-87-012 and CAL-RIII-87-012, Amendment 1, dated July 15 and September 4, 1987, respectfully (these CALs are included as Attachment 1 in this report). The Confirmatory Action Letters resulted in meetings on July 24 and September 9, 1987, at the Region III office between NRC and D. C. Cook management.

DETAILS

1. Persons Contacted

Indiana Michigan Power

M. Alexich, Vice President Nuclear
*W. G. Smith, Jr., Plant Manager
*J. E. Rutkowski, Assistant Plant Manager
*K. R. Baker, Operations Superintendent
+*W. A. Nichols, Training Manager
*L. Mathias, Administrative Superintendent
B. A. Svenson, Licensing Action Coordinator
+ J. A. Stubblefield, Operations Training Supervisor
*J. R. Sampson, Superintendent Safety and Assessment
*R. L. Strasser, Requalification Training Instructor
*J. D. Dickson, Senior Training Instructor
*R. T. Huerter, Supervisory Auditor
R. Anderson, Training Instructor
P. W. Leonard, Training Instructor
B. Sailor, Training Instructor

NRC

B. L. Jorgenson, Senior Resident Inspector
*J. K. Heller, Resident Instructor
*T. M. Burdick, Chief, Operating Licensing Section

*Denotes those attending the preliminary exit interview on September 11, 1987.

+Denotes those participating in the final exit teleconference held on October 23, 1987.

2. Background

Region III administered requalification examinations (written and oral) to licensed Reactor Operator (RO) and Senior Reactor Operator (SRO) personnel at D. C. Cook the week of June 22, 1987. The result of these examinations was that five of twelve SRO's and three of five RO's passed the written examination which is an overall 47% pass rate. In accordance with NUREG 1021, which states a requalification program is unsatisfactory when less than 60% of evaluated operators pass the examination, the D.C. Cook requalification program was determined to be unsatisfactory.

The licensee was informed of this unsatisfactory program determination by telephone on July 15, 1987. During the telephone conference, the licensee committed to certain remedial actions and to meet with the NRC on July 24, 1987, to discuss the deficiencies identified in their

requalification program. The commitments made during the telephone conference were the subject of a Confirmatory Action Letter (CAL-RIII-87-012) dated July 15, 1987, issued to American Electric Power Service Corporation (AEP).

On July 24 at the Region III office, licensee management presented their findings regarding the requalification examination results. Their presentation indicated, that the poor performance on the examinations was due in part to several questions on the written exams that had limited applicability toward a requalification exam. The results of the meeting were: (1) the licensee would commence accelerated retraining for the operators who failed the exams and; (2) the NRC would participate in the licensee's annual requalification written exams, substituting questions in areas in which the previous exam had revealed generic weaknesses.

The NRC participated in the first of five facility scheduled annual requalification written exams in parallel with replacement exams the week of August 3, 1987. NRC evaluation of the requalification examination results indicated that two of twelve SROs and five of five ROs passed. This translates into a 17% pass rate for the SROs and a 100% pass rate for the ROs. Facility grading of these examinations indicated that six of the twelve SRO's and five of five RO's passed the examination. These examinations which were administered with NRC participation to a second 20% representative sample confirmed the original determination that the licensee had an unsatisfactory requalification training program. The differences between NRC and Facility examination grading is discussed in more detail in Paragraph 3.d.(1) of this report.

The licensee was informed of these deficient requalification examination results by telephone on September 4, 1987. The commitments made by the licensee during the telephone conference were the subject of a Confirmatory Action Letter (CAL-RIII-87-012, Amendment 1) dated September 4, 1987, which required the licensee to remove from licensed duties those individuals who had failed these examinations and to meet with the NRC to discuss the results of the examinations in light of the shift manning requirements for the upcoming startup of both units.

Concurrent with the issuance of the second CAL, regional inspectors were sent to the D. C. Cook station to perform a performance-based requalification training inspection to determine the root cause of the unsatisfactory requalification test results. The following sections document the findings from this inspection and summarize the licensee's commitments made during the subsequent September 9, management meeting and the inspectors' preliminary exit held on September 11, 1987.

No violations or deviations were identified.

3. Licensed Reactor Operator Program Review

Initial NRC review of the June 22 examination results identified that operator knowledge was weak in the areas of instrumentation and control



systems. Subsequent analysis of the June and August SRO examination results identified low scores in all areas with specific weaknesses in the following:

- System Design
- Thermodynamics
- System Instrumentation

Interviews were performed with training management, instructors and licensed operators to determine the cause for these weak areas and deficient exam results. The inspectors found that while the requalification program was adequate to maintain RO knowledge level, it was inadequate to maintain the SRO knowledge level at an acceptable level. The following paragraphs contain the inspector's findings relative to the effectiveness of the licensee's requalification program in all of the areas required by 10 CFR Part 55.59.

a. Schedule

The licensee's requalification program is conducted on a two year cycle with each cycle divided into two separate requalification years. Each requalification year contained ten one-week training weeks for each of the five operating crews. Licensed operators, who were not on shift and categorized as "staff licenses" were also divided into these five groups.

The inspectors noted to the licensee that the five shift, five week training rotation was good and could be very effective if the time spent in training was properly utilized.

When the crews were off-shift for their week in training, they were allowed by the plant management to spend four ten hour days in training in lieu of five eight hour days. Even though this revised schedule required approval of the operating crew, the general consensus of the licensed operators interviewed indicated that while on the ten hour training shifts, the last two hours of the training day was non-productive. The inspectors discussed this with the plant manager and training manager at the preliminary exit interview. The plant manager was very responsive to these concerns and committed to modify the training week schedule to five eight hour days.

b. Lecture

Formal classroom lectures are an integral part of any requalification training program and a requirement of 10 CFR Part 55.59. The lectures should be performed on a regular and continuing basis throughout the license period and include those areas where the annual exams indicate a need for more coverage.

Formal lecture periods were scheduled to take place during seven of the ten shiftly training weeks. The remaining three weeks of the ten week requalification year was comprised of one week of self

study on Emergency procedures, a week on the simulator (non plant specific) and one week in the evaluation (testing) process. The inspectors interviewed Senior Reactor Operators and reviewed the lecture series for requalification year 12 (Labor Day 1986 to Labor Day 1987) to determine if the deficient requalification program could be traced to deficiencies in the implementation of the lecture series. As a result of the interviews and the inspector's review of the lecture series, the following areas/items were identified as having negative impact on the requalification programs effectiveness:

- 73 hours lecture performed in year 12
- Majority of time in Requalification training was unstructured
- Lecture attendance policy
- Staffing was low
- RO and SRO's training at same level.

(1) Time Spent in Lecture

The seven weeks of formal lecture included one week of Emergency Preparedness training, one week of team skills/diagnostics and five weeks of systems and theory training. The time spent in formal lecture during this period totalled 73 hours which translates into approximately ten hours per week or 25% of available training time.

While the 73 hours lecture time exceeds the amount required by the licensee's approved requalification program (30 hours annually), the inspector's felt, in light of the NRC requalification exam results and personnel interviews, that the time was insufficient to maintain the SRO's knowledge at a level needed to ensure the safe operation of the D. C. Cook Plant. Candidate performance on the two NRC administered written requalification exams (40% sample) revealed, as delineated earlier in the report, weaknesses in System Design, Thermodynamics and System Instrumentation (C&I). The general consensus of the Senior Reactor Operators interviewed was that the questions on the written exams in these areas were reasonable questions to ask; however, their requalification training had not been of sufficient detail or depth to enable them to answer the questions effectively. Subsequent interviews with training personnel and management indicated that this cycle's requalification training had decreased emphasis in the system areas due to identified deficiencies in previous requalification cycles (see Paragraph 3.d.(1)), and changes in requalification due to INPO accreditation in the Replacement Training Program (new lesson plans, team skills).

The personnel interviews lend support to the inspector's conclusions regarding the requalification exam deficiencies; specifically, the senior licensed operators had not received adequate requalification training in the system areas to maintain their knowledge at a sufficiently high level.

(2) Unstructured Training

Since approximately ten hours per week were spent in formal lecture, it was the responsibility of the individuals to productively use the remaining 30 hours. Through interviews and program review, the following; while not intended to be all inclusive, is a listing of what was accomplished during these non-lecture time periods:

- Shift meetings with Operations Superintendent.
- Shift safety meetings.
- Licensed operators assisting in the training of non-licensed individuals.
- Self Study.
- Technical Specification review.
- Required Reading Packages ("Read Its").
- General Employee Training.
- Fire Brigade Training.

Some of the tasks like General Employee and Fire Brigade training were only performed once a year, yet the others were generally performed every shifty training week. Interviews with Senior Reactor Operators revealed that of the 30 hours available, generally only between four and eight hours were spent constructively pursuing these tasks, with the remaining time in self study or spent non-constructively.

The inspectors recommended at the exit interview that the licensee review the time spent in nonstructured training to determine if the time spent was being used effectively. The effective use of nonstructured training time has the potential for improving the requalification training program.

(3) Attendance Policy

During the review of the "Requalification Training Program Procedure," 12-PMP-2070 TRN.104, the inspectors found that in Paragraphs 4.3.2 and 4.4.1.3, certain allowance were made to enable personnel in the program to miss lectures and make them up by either personal consultation with instructors or by passing the quiz. After a review of requalification year 12 attendance records and interviews with personnel participating in the program, the lecture attendance policy did not appear to be a problem with the exception of one individual who had missed numerous lectures. However, conversations with instructors revealed that at times, significant periods of their time was taken up to individually retrain "staff licenses" (licenses held by plant staff that were not on shift), who had missed lectures and subsequently failed the quizzes.



The inspectors discussed with training management their concern regarding allowances for missing lectures and the potential problems that could be created if its' implementation became common place. Training personnel indicated that a new draft of the procedure was in the review cycle which would limit the number and type of lectures that could be missed. A review of this draft procedure revealed that in Section 4.4.5.3, allowances were made for missing "Fundamentals Review Topics" provided the periodic exam associated with the subject lecture was passed. Appendix 2 to the procedure identified the following areas as Fundamental Review Topics:

- (a) Applied Theory and Principles of Reactor Operations.
- (b) Applied Heat Transfer, Fluid Flow, and Thermodynamics.
- (c) Plant Systems Review.
- (d) Plant Instrumentation and Control Review.
- (e) Radiological Protection Review.
- (f) Plant Protection Systems including ESF, ECCS, and Reactor Protection.

Due to the licensee's poor performance in areas (c), (d) and (f), the inspectors recommended to the plant manager and training management that these areas be changed from optional to mandatory lecture attendances areas. The licensee stated they would review this area. This issue on lecture attendance policy will be tracked as an Open Item (No. 315/87027-01(OLS); No. 316/87027-01(OLS)) pending the licensees issuance of revised Procedure 12-PMP-20.70.TRN.104.

(4) Staffing

The inspectors found that the designated requalification staff was insufficient to meet the training needs of the licensed operators in the requalification program and the administrative demands of the program itself. The licensee had committed 1.5 man-years to the previous requalification training year not including contractor time (to prepare exams) and subject matter experts not associated with the Training Department. This was insufficient to provide responsible training when licensed operators at the plant spent over 13 man-years in the requalification training program.

This was communicated to the licensee's management prior to and at the preliminary exit interview, at which station management committed to increase the training staff responsible for the administration of the requalification program to three. In



addition, they also committed to reducing the number of licenses held by non operations personnel, which would reduce the workload on their staff responsible for the requalification program.

The approach the licensee is taking by increasing the requalification training staff two fold and decreasing their workload by decreasing the number of staff licenses should improve the quality of the training in the program. Plant management should continue to monitor the effectiveness of the program and be sensitive to the manpower needs in the requalification training area.

(5) Level of Training

A review of the training program schedule revealed that the Reactor Operators and Senior Reactor Operators attended the same lectures and in general trained together throughout the entire requalification year. A review of numerous lesson plans revealed that the objectives with a few exceptions were targeted toward both RO's and SRO's.

The inspector's were concerned that the potential for training the SRO's at the RO level existed. This concern was supported by the good RO requalification exam results relative to the poor SRO exam results.

This concern was brought to the attention of station management at the preliminary exit interview. At that time, they committed to review the area to determine if it is a programmatic deficiency. This concern will be tracked as an Open Item (No. 315/87027-02(OLS); No. 316/87027-02(OLS)) pending the NRC review of an analysis regarding level of training for SROs.

c. On-the-Job-Training

The requalification training program in large part relies upon on-the-job training to ensure the operators maintain familiarity and understanding of the plant control systems, design changes and abnormal and emergency procedures.

Areas reviewed that fall under the on-the-job training category were required reading and simulator training.

During the shift training weeks, one of the tasks performed by the licensed operators outside of the lecture period was required reading, more commonly referred to as their "read-it" package. During the interviews with the SRO's, it was the general consensus that the time spent on required reading varied, but generally took no longer than four hours. The inspectors were concerned that there was no testing or other method to monitor the effectiveness of the required reading process. The inspectors notified training management of this concern, and at the preliminary exit interview the licensee's

management committed to address this concern by developing a method for testing the material covered in the "read its." This will be tracked as an Open Item (No. 315/87027-03(OLS); No. 316/87027-03(OLS)) pending review of their "read its" testing practices.

Simulator training was provided once a year for a week at a non-site specific simulator. The licensee has been very aggressive in an effort to improve their training in this area and has procured a new plant specific simulator. The inspectors noted to the licensee that a fully utilized simulator could markedly improve their requalification training program in the areas of normal and abnormal integrated plant operations. At the preliminary exit interview, the licensee stated that requalification training on their new simulator would be performed in excess of 40 hours a year.

d. Evaluation Process Review

The accepted evaluation method for operator knowledge and the effectiveness of a requalification training program is the comprehensive written examination. An examination is required by 10 CFR Part 55.59, and should be designed to determine areas where retraining is needed to upgrade operator knowledge. During the review, the inspectors identified the following areas that contributed toward the deficient requalification program:

- Examination grading was often times subjective, not objective, and not graded per the examination answer key.
- Poor examination grading quality assurance.
- The weekly quizzes and annual requalification examinations tested at the memorization level, not at the comprehension or analysis level.
- Examination/Quiz questions were overly simple in some cases and too many questions were assigned point values in excess of their true worth or importance.
- Examination security may have been compromised due to excessive question duplication between successive exams.

(1) Examination Grading

NRC grading of the June 22, 1987, NRC generated (no facility participation) exams resulted in an SRO pass rate of 42%. NRC grading of the August 3, 1987, SRO examination (week one of annual exam) which had been jointly generated by the NRC and the facility, resulted in a pass rate of 17%. The results of a parallel grading effort conducted by facility personnel was that six of twelve or 50% of the SRO's passed the examination.

A subsequent review of the facility graded exam revealed differences in grading of as much as 8.2 points on a 60 point examination. The following is a breakdown of the differences in the grading for one exam in which the differences amounted to 5.2 points:

Grading errors (not per key)	+ 1.6	points
Grading judgement differences	+ 0.2	points
Unapproved answer key revisions	+ 2.4	points
Unapproved deletion of one question	+ 0.5	points
Disregard of NRC resolution to facility comment	+ 0.5	points
Total	5.2	points

Discussions with the graders of the exams left the impression that they were trying to second guess what the candidates believed the questions intent was and were grading the answers accordingly. The inspectors indicated that this was subjective and was a poor practice when grading examinations. After further evaluation by the inspectors, several of the points the licensee had made were determined to be valid. Subsequently, a regrade of the examination resulted in an additional two people passing the August 3rd examination, which took the overall pass rate to four of twelve, or 33%.

The inspectors reviewed additional exams from weeks 2, 4 and 5 of the annual requalification examinations. These reviews revealed much the same type of deficiencies in subjective grading, errors in grading, and poor post exam grading quality assurance. The inspectors review of the weekly quizzes administered at the conclusion of every week in training revealed the same type of problems in grading.

The root cause for these problems with examination grading can be traced back to three areas. The first area is requalification staff manning, which has been addressed by the licensee (see Paragraph 3.b.4) by doubling the staff devoted to requalification training. The second area is the subjectivity in which the examinations were graded. The inspector noted to the licensee that examinations must be graded objectively to ensure valid results and trending conclusions. To facilitate objective grading, the licensee should have their personnel responsible for exam generation and grading receive training in these areas. The licensee has made progress in this area as indicated by their sending one of their requalification instructors to a one week class on exam generation. The third area is examination grading quality assurance. The inspectors noted numerous examples of grading mistakes both in the annual requalification exams and in the weekly quizzes. These grading mistakes can be partially attributed to inadequate reviews by the person(s) performing the quality assurance checks. The inspectors discussed these



deficiencies with licensee personnel involved in the grading process and identified this at the preliminary exit interview, as an area that requires improvement.

(2) Question Content

During the development of the August 3, 1987, RO and SRO examinations, the inspectors/examiners observed the predominance of the examination questions (which paraphrased Learning Objectives) were at the "knowledge and recall" level of knowledge. NUREG 1021, Section ES-203 identified five categories of "depth of knowledge" as follows:

- Knowledge and Recall
- Comprehension and Interpretation
- Application of Rules and Principles
- Analysis and Deduction
- Synthesis and Deduction

These levels of knowledge can further be broken down into memory, comprehension and Application/Synthesis areas. Questions posed at the memorization level do not necessarily test for true understanding of the underlying concepts or issues, relative to comprehension or application based questions.

The inspectors discussed this with individuals in the training department who acknowledge that a large number of the questions were at the memorization level. A review of the lesson plans used during the previous requalification year was performed to determine content, depth, and adequacy of their objectives. The inspectors found that a large number of the learning objectives contained in the lesson plans were also at the memorization level of knowledge.

A further review of the examinations was performed to draw some conclusions relative to the quality of the examinations versus that of the learning objectives. The inspector concluded that the reason the examinations were predominately at the memorization level was that the learning objectives used to generate the exams were predominately at the memorization level.

The inspectors indicated that in addition to improving the quality of exam questions, the licensee should review the quality of the learning objectives with respect to their level of knowledge. Licensee management acknowledged these statements and acknowledged that this area would be addressed in their program review.

In addition to problems with the questions level of knowledge, the inspectors noted that questions on the licensee's generated requalification exams were at times overly simple and assigned



an inordinate amount of credit relative to their actual worth in accordance with the guidance contained in NUREG 1021, Revision 4. Questions of this nature on the first annual requalification exam were discussed with licensee training personnel and were reassigned credit appropriate to their worth. The inspectors continued to work with licensee training personnel on questions in the subsequent annual requalification examinations and the exams administered to individuals in their accelerated training program, and found the quality of the questions improved over this time period (see Section 4 of this report). While the licensee has shown improvement in this area, their training staff should continue to devote resources toward the improvement of their question content.

(3) Examination Security

The D. C. Cook requalification program allowed as much as 80% duplication between successive weekly quizzes and annual exams. While the licensee indicated that in general, duplication did not exceed 30%, the inspectors noted that the duplication between SRO annual exams two and three exceeded 50%. Both the SRO and RO annual exams were analyzed to see what effect, if any, duplicate questions had on subsequent exam scores. The SRO exams had an increase of 2.5% between scores of duplicate versus non-duplicate exam questions, which was inconclusive. However, on the RO exams, the examiners identified an increase of ten percent on the duplicate questions versus the non-duplicate questions. This difference is significant and is indicative of examination compromise.

The inspectors noted to the licensee training staff that in order to avoid examination compromise, no more than 20% of the question should be repeated in subsequent examinations and quizzes. The licensee acknowledged the inspectors statements regarding the 20% maximum reuse of questions and discussed with the inspectors their plans for beginning an examination question bank which would reduce the potential for compromise.

(4) Examination Feedback

The licensee's Training Administrative Manual, Section 3.03 entitled "Licensed Operator Requalification Program," establishes the administrative requirements for requalification program implementation. Paragraph 5.3.5 of the manual states that "Quizzes will normally be graded by the instructor who presented the lecture" and should be returned to the students in three days "to provide rapid feedback to the individuals taking the quiz."

Through interviews with training personnel and students participating in the program, the inspectors identified



this requirement of the program was not being implemented. The students interviewed expressed concern over not receiving their quizzes unless they took time out from their normal schedules. The inspector's emphasized to the training management the importance of feedback as a training tool and that this practice was currently not being implemented.

The root cause for their failure to implement this portion of the program was due, in part, to their limited manpower available to implement the requalification program (see Paragraph 3.b.(4)).

At the exit interview where this finding was discussed, the plant manager committed to implement this portion of their requalification program.

e. Records

The inspectors reviewed of records associated with the documentation of operator participation in the D. C. Cook requalification program. In all cases, records were complete and participation was well documented. During a tour of the training facility, the training manager stated that the training records would be placed onto a computerized data base system.

Improving a training records system that has no apparent problems (other than bulkiness) is an indication that licensee management is interested in the improvement of their program.

No violations or deviations were identified.

4. Accelerated Retraining

The inspectors participated in the makeup examinations administered to the individuals who had participated in accelerated retraining as a result of failing one or more sections of the annual SRO requalification examination. The first examinations covering Sections 7 and 8 (procedures sections) had examination questions replaced by the inspectors and were administered on September 25, 1987. The inspectors graded these examinations in the Region III office in parallel with the facility. The passing criteria of 80% in any section was consistent with the facilities programmatic requirements.

NRC grading of Section 7 of the exam resulted of six of eight people passing the examination. NRC grading of Section 8 of the exam resulted in four of seven people passing the examination. After reviewing the facilities grading the inspector found several instances where individuals' exams were graded subjectively on Questions 7.15, 8.08, and 8.11 (see Attachment 2 of this report). However, the pass/fail results were identical between NRC and facility graders.

The second accelerated retraining examination for Section 5 and 6 were administered on October 9, 1987. The inspectors replaced only two questions on these exams due to the improved quality of the questions the licensee had developed. The inspector also graded these examinations in parallel with the facility. NRC grading of Section 5 of the exam resulted in all seven people passing the examination. NRC grading of Section 6 of the exam resulted in all four people passing the examination. A review of the licensee's grading of the examinations revealed that the facility grading was in agreement with the grading performed at the Region III office.

The individuals who passed these accelerated examinations and satisfied the other administrative requirements of the program returned to shift. Other individuals who failed the accelerated examinations or did not take the examinations due to them not having completed the accelerated training, are still in the accelerated retraining process. The inspectors, based on improvements seen in the program, chose not to monitor the examinations scheduled for these other individuals.

Throughout the entire examination process, the inspectors noted an improvement in the quality of examinations, examination answer keys, and the grading of the examinations. Licensee attention in this area should remain at a high level, however, due to small number of individuals in the licensee staff who were involved in this process and the influx of additional training personnel into the requalification process.

No violations or deviations were identified.

5. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during this inspection are discussed in Paragraphs 3.b.(3), 3.b.(5) and 3.c.

6. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) throughout the inspection period, at the preliminary exit interview on September 11, 1987, and at the final exit teleconference held on October 23, 1987. The inspectors informed the licensee of the likely informational content of the report. The licensee did not identify any documents/processes documented in the report as proprietary.

Attachments: As stated