| Condition Report Number: | Assigned Department: |
|---|---|
| CR-VTY-2009-0062 | Design Engineering – Mechanical /Structural |

**PROBLEM STATEMENT:**

**Feedwater piping leak resulted in an unplanned power reduction to make repairs.**

While performing rounds on 1/8/2009, an auxiliary operator reported to the Control Room that she had observed a small drip coming from the bottom of Feed Reg Valve B Inlet Drain Valve V63-21E. This drain line is located on an 18" x 10" reducer located between Blocking Valve V63-11B and Feed Reg Valve FCV 6-12B. Insulation was removed to determine the source of the drip. During the insulation removal process, when the outer metal cover was being removed, steam was observed coming through a small hole in the insulation. This line cannot be isolated with the plant at full power, therefore to safely perform further inspection and repairs, it was necessary to reduce power approximately 50% and remove this piping from service.

**Does this ACE report require an Equipment Failure Evaluation (EFE)?** ☒ Yes ☐ No

**IF Yes, THEN** complete Attachment 9.7 Equipment Failure Evaluation **AND** attach in PCRS

**IF No, THEN** an EFE analysis is not required.

**Was an HPER assigned & performed for this CR?** ☐ Yes ☒ No

**IF Yes, THEN** ensure results of the EN-HU-103 HPER are discussed in the Event Description.

**EVENT DESCRIPTION:**

The following is a timeline and relevant discussion of the event.

While performing rounds during the morning of 1/8/2009, an auxiliary operator reported to the Control Room that she had observed a small drip coming from the bottom of the drain line to valve V63-21E. This drain line is located on an 18" x 10" reducer located between Isolation valve V63-11B and Flow Control Valve FCV 6-12B.

The Engineering Duty Manager (EDM) was notified and contacted the Feed System Engineer (SE). Maintenance was requested to remove insulation in the area of the drip in order to try and determine the source of the drip [note: Design Temperature for this piping is 400°F].

A/2

The SE arrived as the outer insulation layer was being removed. Steam was observed exiting around the outer metal cover for the insulation and removal work was suspended. The SE and Insulators conferred and determined a safer position to take the metal cover and insulation off from the pipe. When the outer metal cover was removed, steam similar to what one might see from a boiling tea pot was noted to be coming through a hole in the outer mineral (block) insulation on the back side of the pipe between the 11B blocking valve and the FCV-12B Reg Valve. The area where the steam was emanating appeared to be round and rust stained with spider web like streaking emanating from it towards the bottom of the pipe. The interior of the removed metal insulation cover was also rust stained

At this time work was again stopped and the Control Room was notified. A Field Support Supervisor (FSS) was dispatched to the scene with steam suits and after observing the situation and conferring with the SE agreed that no more insulation should be removed with the plant at full power. The Control Room was informed and the OPS camera requested. Photographs were taken and the Duty Operations Shift Manager (OSM) reviewed them with the FSS and the SE. The OSM determined that a downpower was needed to proceed safely, contacted upper management, and ordered the Control Room Supervisor (CRO) to prepare for a downpower briefing.

The line cannot be isolated with the plant at full power, therefore it was necessary to reduce power by approximately 50% so that the area could be isolated which would allow the safe removal of the block insulation to better determine the leak location. The OSM held a brief to prepare for a reduction in power.

The EDM was contacted by the SE who suggested that Design Engineering start pulling pipe drawings to determine the pipe configuration in the area; specifically to determine if there was a weld or mechanical joint in the area indicated in the photographs. A management team meeting was conducted in the Ops Focus Room to assign tasks and consider repair options. During the meeting the downpower commenced (1/9/09; 12:10), tagging preps were underway, and it was estimated that it would take 6 hours for the pipe to cool to allow for a UT to be performed.

Power was reduced to below 50% (42% at 13:45 on 1/9/09) and the subject piping single valve isolated on both sides of the leak area (14:04; 1/9/09). Tags were hung as part of the pipe isolation.

Mechanical/Structural Design Engineering reviewed the Feedwater System Flow Diagram, Feedwater Piping Isometric Drawings, and spool piece (fabrication) drawings for the piping component exhibiting the leak. It was determined that there is an access hole and plug at this location based on the piping isometric and spool piece sketch. The Ebasco Specification for Piping, Piping Components, Hangers, and Supports for Station Piping Systems (BWR QC-10) states:

> 1.7.1.1. <u>Radiographic (RT) Procedures</u>
>
> a) <u>Access Port</u>
>
> It is intended that all field radiography will be made through access ports in pipe walls for pipe sized 10 inches and larger. The access ports shall be as described in Specification Ebasco 73 – latest revision, Section I-C

A search of MERLIN was performed to locate the referenced specification to obtain the description of the access ports, however the document could not be located. The spool piece sketch for the

18" x 10" reducer calls for an "Access hole and plug per FDW-D-2". Sketch FDW-D-2 indicates a 1½" diameter hole in the pipe wall tapped with 6 NC-3 threads and a fabricated plug to be used in the hole.

Subsequent to the power reduction, Programs and Components was requested to perform a visual inspection to determine the actual location and characterization of the leak, provide physical measurements of the component, and perform an Ultrasonic Inspection (UT) of the area surrounding the leak and wherever possible on the plug. There are no code requirements for inpection of seal welds. The requested inspections were to provide information to assist in determination of the actual configuration (Reports are attached to CR-VTY-2009-0062, CA6). In the late evening (approximately 2000 hrs) when piping temperatures were sufficiently reduced, the visual and UT inspection were performed. The as-found access hole and plug detail was determined to be a 2" diameter by approximately 1" thick plate with a ½" plug threaded into a hole near its' center. A seal (fillet) weld was applied over the threaded area of the plug. The leak was identified as a small pinhole (approximately 0.020" – 0.030" diameter) in the seal weld around the ½" threaded plug at approximately the 10 o'clock position when viewing the weld head on. The pinhole was located approximately in the center of the plate to plug fillet weld. Water was observed leaking from the pinhole, confirming the leak path. Ultrasonic Thickness measurements of the pipe wall surrounding the plug did not indicate any thinning that would present a structural concern for the integrity of the pipe. The lack of thinning also provides assurance the Flow Accelerated Corrosion (FAC) is not a contributing cause of the leak.

The Level III inspector that performed the examination discussed the results with the Design Engineering Manager, Mechanical/Structural Supervisor, and a Civil/Structural Engineer. A number of possible repair scenarios were discussed. Agreement was reached among these individuals that the repair process should be to remove the existing seal weld of the ½" plug and re-weld with a sufficiently sized fillet such that it was capable of resisting the system pressure loads on the plug. This consensus was reached at approximately midnight of 1/8/09.

The proposed repair was discussed with Senior Management on the morning of 1/9/09. A Fleet phone call was scheduled for the afternoon of 1/9/09 to discuss the repair. In the interim, actions were initiated to begin drafting the Engineering Change (EC) and perform the requisite calculations to support the change. A Work-at-Risk was generated for review so that, barring any impact of the Fleet phone call effecting the proposed change, work could commence on the repair prior to the completion of the EC. There were several areas of concern raised during the fleet phone call that were incorporated into the EC. These included assurance that the ANSI B31.1 Piping Code for this type of work was met; that the repair weld would be made using multiple passes, and that since the material composition of the ½" plug and 2" diameter plate could not be determined other than it was a carbon steel, the welding process be acceptable for P1 through P4 materials. Given the results of the Fleet Phone call, the Work-at-Risk was signed and field work began.

EC 12656 was completed, reviewed, and approved in the early evening of 1/9/09. Field Work was also completed in the evening of 1/9/09 (Tags cleared 00:41; 1/10/09). The plant returned to 100% power at 10:57 on 1/11/09.

**APPARENT/CONTRIBUTING CAUSE(S):**

The "Why Staircase" method is used for this investigation.

A pinhole leak in the Radiography Inspection (RT) access hole in an 18" x 10" reducer in the non-safety related feedwater system occurred. The leak was in a seal weld for an access plug in the RT access plate. The access plate was required to perform RT inspection of field welds in the ANSI B31.1 piping system during initial construction to ensure the integrity of the pipe system. A plant power reduction to approximately 41% power was required in order to relieve piping pressure and reduce temperature to safely remove insulation to locate, inspect, and repair the leak.

1) WHY WAS THERE A DECREASE IN POWER TO 41%?
The plant power level was reduced to 41% so that a Feedwater pipe could be isolated to investigate the source of a Feedwater Leak.

2) WHY WAS IT NECESSARY TO ISOLATE THE FEEDWATER PIPE TO INVESTIGATE THE SOURCE OF THE FEEDWATER LEAK?
The Design pressure and temperature of this section of piping is 1500 psi (Operating pressure +/- 1200 psi) and 400°F respectively. The initial efforts to remove insulation revealed a steam leak, therefore the section of piping in which the leak occurred needed to be isolated so that the pressure and temperature could be reduced to a level to safely allow removal of the insulation so that an inspection of the pipe could be performed to specifically identify the leak location.

3) WHY WAS THERE A STEAM LEAK IN THE FEEDWATER PIPING?
The leak (water flashing to steam) was due to a pinhole leak in a seal weld located on a plug for a radiography inspection (RT) port (i.e. hole) in an 18"x10" eccentric reducer located downstream of the "B" Flow Control Valve. The plug is a ½" plug installed in a 2" diameter by approximately 1" thick plate welded over the inspection port. A 5/32" seal weld (fillet weld) was installed over the thread area of the plug. This detail for plugging RT access ports varies from the detail indicated on the fabrication (spool piece) sketch for the reducer. Since the original construction code did not require radiographic inspection of seal (fillet) welds, any inclusion (pitting) or indication on the inner surface of the weld would have gone undetected. **[Apparent Cause – Equipment Failure/Degradation – EF1I]**

4) WHY DID THE INCLUSION OR INDICATION PROPAGATE?
The threads in the plug would not be leak tight by themselves under the >1200 psi pressure in the Feedwater piping, therefore a seal weld was applied over the threads. It is believed that water forced through the threads due to the high system pressure eventually found a flaw (pit) in the fillet weld. Existing pit corrosion would be exacerbated by the Feedwater system operating conditions. Corrosion was identified at 3 locations at the threaded plug to plate interface in the Visual Examination Report. Pitting corrosion usually occurs in the direction of gravity, however due to the high operating pressure of this system an inclusion or weld anomaly such as porosity, in any

location in the seal weld would exacerbate propagation whenever the system is in operation, which for the Feedwater system is whenever the plant is operating. The as-found configuration of the plug and seal weld provided a shorter distance for the flaw to propagate to the surface than would have been provided by the detail specified on the spool piece sketch.

5) WHY DID THE AS-FOUND PLUG CONFIGURATION PROVIDE A SHORTER DISTANCE FOR FLAW PROPAGATION THAN THE SPECIFIED DETAIL?
The as-found construction detail to plug the radiography access hole is not the same detail as indicated on the spool piece sketches. The as-found condition was reviewed to determine if it was adequate for the conditions. Although the exact details were not identical, the mechanisms employed were essentially the same, specifically, a threaded plug with a seal weld were employed. It is noted that, although the detail provided for the spool piece sketches did not specifically call for a weld, the plug details would indicate that it was prepped to include a full penetration weld around the threaded area. The threaded plug installed in the 2" diameter plate is capable of resisting system pressure, however under the Feedwater service conditions a threaded connection does not guarantee a leak tight connection, therefore, a seal weld is applied over the threads as a defense-in-depth against any potential fluid finding an exit pathway through the plug threads. The plug detail specified on the spool piece sketch would have been more resistant to this type of failure because: (1) the plug is circular, therefore the effective weld would be consistent around its' circumference and (2) the weld prep would result in a weld depth (i.e. travel path) of approximately 3/8". The installed plug has a square head for use in installing the plug with a wrench. The fillet provided had 5/32" legs, however due to the configuration of the weld (a circular weld around a square plate) the available weld above the plane of the threads (i.e travel path) would be much smaller than the leg length at locations along the centerlines of the ½" plug. **[Contributing Cause – Design Configuration and Analysis - DC1G]**

6) WHY WAS THE ACCESS PLATE COVER DETAIL DIFFERENT THAN THE ONE SHOWN ON THE SPOOL PIECE SKETCH?
The detail shown on the spool piece sketch would require each plug to be machine fabricated and the pipe spool pieces to be tapped to receive the plug. The configuration found at the leak location utilizes a commercially available plug and the 2" diameter cover plate would have been easy to mass produce. A similar plug detail was found at the location of a Feedwater leak which occurred in 1993 (refer to Internal OE Section, CAR #93-011). It is not known at this time if the detail shown on the spool piece sketch is used anywhere on the Feedwater piping. No documentation approving the detail change could be found, however since quality requirements for non-safety related systems were not very stringent during the late 1960's and early 1970's when the plant was constructed and, as stated in 2) above, the exact details are not identical but the mechanisms employed are essentially the same it is likely that no official documentation was ever generated. **[Contributing Cause – Design Configuration and Analysis - DC1G]**

**In summary the cause of the leak was due to corrosion pitting of the threaded pipe plug seal weld.**

Attachment 9.1 Typical higher Tier Apparent Cause Evaluation & Response Template

## O&P DISCUSSION:

EN-LI-118, Att. 9.5 (Evaluation for Organization & Programmatic Issues) was reviewed for the presence of local O & P issues. The spool piece drawings depicting the expected plug detail were issued during the construction era for the plant. As discussed in the Apparent/Contributing Cause section, quality requirements for non-safety related systems were not very stringent during that time. No documentation approving the detail change could be found. Quality requirements for non-safety related systems were not very stringent during the late 1960's and early 1970's when the plant was constructed and, as stated in 2) above, the exact details are not identical but the mechanisms employed are essentially the same, it is likely that no official documentation was ever generated. Based on the time passed since these documents were transferred from the design/construction organizations to the plant and the review of EN-LI-118, Att. 9.5 there are no existing Organizational or Programmatic issues identified that would have contributed to the identified Apparent/Contributing causes. In summary, no additional corrective actions were identified that are required to be added to the corrective action section

## EXTENT OF CONDITION:

The leak in the Feedwater piping that necessitated the downpower to 41% occurred in a seal (fillet) weld at a Radiography Inspection (RT) access port. The plug configuration found in the field did not match the detail indicated on the construction drawing for the piping component (18" x 10" eccentric reducer) where the RT access port was provided. A previous leak at a similar RT access port plug in the Feedwater piping also caused a plant shutdown (Refer to Internal OE CAR 93-011). A search was performed to identify other possible locations where similar type details may exist.

Section 17 of the Piping Specification BWR QC-10 indicates that access ports would be made for all piping 10" diameter and greater that are required to meet Paragraphs 1.1 through 1.5. Those systems that met this are Feedwater, Main Steam, RHR, CS, and HPCI. Both isometric drawings and spool piece drawings for these systems were reviewed. No access ports are indicated for either the RHR or CS systems on these drawings.

The Feedwater system isometric drawings call for a total of 76 access ports; the Main Steam system spool piece drawings call for a total of 49 access ports; and the HPCI system spool piece drawings call for a total of 17 access ports. Note that the Main Steam spool piece drawings refer to a separate sketch for the plug detail(s), similar to the Feedwater spool piece drawings, however the plug detail(s) for the Main Steam system could not be retrieved. It is likely that they call for a plug detail similar to the Feedwater plug detail.

Proactive Corrective Actions are recommended to avoid the necessity to downpower to repair similar leaks that might occur in the future based on the fact that two have occurred out of a possible 76 for the Feedwater system over approximately 36 years of plant operation, with a potential to operate for 24 more. Corrective Actions are only recommended for the Feedwater system. The HPCI system is not operating (other than for testing) during normal plant operation, therefore it is not likely that a leak of the type identified would occur, and if it did would not require a downpower. It is recognized that there are sections of the HPCI system that are upstream of isolation valves and may be pressurized during operation. These sections will be reviewed as part of the recommended Corrective Actions. The Main Steam system is not considered to be a candidate for this type of leak since the steam is "dry" and therefore would not exacerbate corrosion in a manner similar to the Feedwater which is a "wet" system. In summary, no additional corrective actions were identified that are required to be added to the corrective action section

## SAFETY IMPLICATIONS:

There are minimal nuclear or industrial safety concerns associated with the Feedwater system leak which caused a plant downpower to 41%. The leak was a very small pinhole leak in a seal weld for the RT access port plug, therefore there was no significant reduction in feedwater being supplied to the Reactor Vessel. The integrity of the threads on the plug remained capable of resisting system pressure. The ability of the Feedwater system to perform its' design function was not impaired by the pinhole leak. The corrosion pitting type leak is a very slow process so it is not expected that a major leak would be caused prior to it being identified by onshift operators or monitoring sump levels. The threaded plug will remain in place and capable of maintaining system pressure. Radiological implications were also minimal since the Feedwater leak was limited to approximately 20 dpm at the time of discovery. Since the Feedwater system is a high energy system, there are personnel safety concerns with working on this piping when it is operational. In fact, during the initial efforts to remove insulation to identify the leak location, it was necessary to stop work and regroup to prevent possible burns of the work crew (refer to CR-VTY-2009-0072). The downpower was implemented in order to provide a safe working environment for identifying and repairing the leak. In summary, no additional corrective actions were identified that are required to be added to the corrective action section

## INTERNAL (Site/Fleet) OPERATING EXPERIENCE:

Searches were performed to obtain Internal Operating Experience using the CR Database. A search was performed for "B" HT ACE and "A" Root Cause using search criteria ("water leak" and "weld"). A total of 36 hits were received with none being relevant. There were instances where fillet welds at socket fittings for branch connection, instrument taps, vents, or drains that were attributed, at least in part, to vibration. Vibration is not considered to be a contributor to the leak being evaluated here. There was one hit (CR-IP3-2008-02026 Through-Wall Leak in Service

Water Piping Header 18" line #408) that describes a pin hole leak in a butt weld on Service Water Piping, however this event is not considered relevant since Service Water operating conditions are very different than the Feedwater system, the pipe is cement lined, and the cause was attributed to the "brackish" nature of the Hudson River.

The OE reported in the EC 12656 for the repair of this leak were also reviewed. The following Item identifies a condition nearly identical to this event.

**Vermont Yankee CAR 93-011** addresses a similar leak at an RT access port on the Feedwater System. The as-found configuration of the port plug was identical to that described in the Event Description Section. The apparent cause identified for this leak was also porosity with contributing causes of fatigue cracking due to uneven weld geometry and a poor NPT thread seal which put additional stress on the weld. Extent of Condition consisted of a walkdown of the majority of the Condensate and Feedwater systems looking for patches in the insulation similar to one originally found over the test plug. No additional plugs were identified. Insulators were instructed that if any other test plugs were located they should be brought to the attention of the ME & C Group. Immediate corrective actions were to replace the square headed plug with a new plug fabricated without wrench flats and the new plug was seal welded with a 3/8" fillet weld. The actions taken for the leak that was discovered on 1/8/09 were similar to those used for this OE. The major difference is that the plug was not replaced. The decision to not replace the plug was based on the following: (1) There were concerns that FME could be might be initiated by the plug removal and (2) the fact that the 1993 event identified that the leak was due to seal weld failure and the plug threads in that event were intact. UT performed on the plug thickness (UT Reports attached to this CA) provided evidence that the plug had sufficient thread engagement. The weld size of the replacement weld was sized based on the applicable leg at the plane of the plug threads to assure that sufficient material is available to provide a sound seal and as a defense-in depth, is capable of retaining the plug in place. In summary, no additional corrective actions were identified that are required to be added to the corrective action section

## EXTERNAL (Industry) OPERATING EXPERIENCE

Searches were performed to obtain External Operating Experience using the INPO OE Database using search criteria ("water leak" and "weld") and ("water leak" and "Feedwater"). A total of 23 hits were received, however none were considered relevant. There were instances where fillet welds at socket fittings for branch connection, instrument taps, vents, or drains that were attributed, at least in part, to vibration. Vibration is not considered to be a contributor to the leak being evaluated here.

A search of the Plant Events Database using search criteria ("leak", "vibration", and "weld") was also performed. A total of 6 hits were received with one being relevant.

Since the RT plugs have been identified in the Main Steam and HPCI system as well, A search of the INPO database was also conducted using the criteria ("steam leak" and "weld"). This search resulted in 46 hits, some of which were duplicates of the previous searches, but none of which were relevant to the condition being evaluated.

**OE23199 – Feedwater Leakage from a Construction Radiograph Test Plug (Crystal River 3)**

This event was very similar to the leak being evaluated. The configuration of the plug at Crystal

River was closer to the detail provided on the spool piece drawings for the VY leak. The plug was threaded into the pipe wall and seal welded with a fillet weld. The likely cause of the leak was poor seal weld quality that left a slag inclusion. The leak had originated at the bottom of the weld, at the seam where the . . . beads originated. The Extent of Conditions for this event identified locations of similar plugs and walking down those accessible areas at operating power to look for additional leaks. Corrective actions were replacement of the plug and seal welds. Actions taken for the leak discovered on 1/8/09 were similar (refer to Internal OE Event CAR 93-011). In summary, no additional corrective actions were identified that are required to be added to the corrective action section

## ACTIONS COMPLETED

| APPARENT OR CONTRIBUTING CAUSE, OR EXTENT OF CONDITION ISSUE | ACTION COMPLETED [note any Work Orders/Requests, ER'S, other] |
|---|---|
| AC - Equipment Failure/Degradation – EF1I – Equipment erosion or corrosion | EC 12656 was generated to provide repair details for the leak. Repairs included removing existing weld, VT and UT area of repair, re-weld, check for leaks when system is re-pressurized. Work was performed under WO 178218. |
| Contributing Cause – Design Configuration and Analysis - DC1G – Unauthorized or Unreviewed Modification | A feedwater system drawing review was performed to identify 22 potential locations where the substitute plug detail may have been installed to walkdown accessible areas (with plant at +/- 41% power) to look for indications of leaks. Walkdowns of Feedwater piping (with insulation in place) in accessible areas were performed by Programs and Components personnel. No additional leaks were identified. Also two additional plugs were reviewed/inspected with insulation removed. These plugs showed that one was shown to be similar to the one having the leak, and the other was similar to the detail shown on the drawings from original construction, however UT was not employed to determine the thickness of the access port cover to determine if it was a cover plate or plug with a seal weld. |
| EOC – There are 76 RT Access Ports in the Feedwater System with the potential for the same condition. | Isometric drawings and spool piece sketches for the Feedwater, Main Steam, RHR, CS, and HPCI systems were reviewed to determine if there are additional locations where RT access ports were employed and plugged during original construction. No access ports were found on RHR or CS. The Main Steam and HPCI system piping is provided with access ports, however they are not considered to be potential leak locations (except normally pressurized sections of the HPCI system) for the reasons previously described in the EOC Section. |
| | |
| | |
| | |

## PROPOSED CORRECTIVE ACTIONS

| APPARENT OR CONTRIBUTING CAUSE, OR EXTENT OF CONDITION ISSUE | CORRECTIVE ACTION DESCRIPTION [note any Work Orders/Requests, ER's, other] | Assigned Department | Due Date |
|---|---|---|---|
| CC – Design Configuration and Analysis – DC1G – and EOC – There are 76 RT Access Ports in the Feedwater System with the potential for the same condition. | Review Feedwater Isometric drawings and Flow diagrams to determine if any RT plugs are located on piping or areas that can be isolated during 100% power.. These plugs will be removed from the scope of additional Corrective Actions. HPCI Isometric drawings, flow diagrams, and Spool Piece Sketches will also be reviewed to determine if any RT ports are located upstream of isolation valves as part of this action. | Design Engineering Mech/Struct | 2/20/09 |
| AC - Equipment Failure/Degradation – EF1I – Equipment erosion or corrosion | Determine which access ports are in pipes or areas which would require a plant shutdown in order to repair a leak. Establish a repair scope and schedule for future Refueling Outages.. Generate an ECR and present to URT. | Design Engineering Mech/Struct | 5/15/09 |
| AC - Equipment Failure/Degradation – EF1I – Equipment erosion or corrosion | Determine which access ports are in pipes or areas which would require a downpower in order to repair a leak. Establish a repair scope and schedule for future Refueling Outages. Generate an ECR and present to URT. | Design Engineering Mech/Struct | 5/15/09 |
| AC – Equipment Failure/Degradation – EF1I – Equipment erosion or corrosion | Present the results of the URT presentation to CARB. | Design Engineering Mech/Struct | 5/20/09 |
| | | | |

## TREND DATA:

Cause Codes:

| Human Performance Causal Factor(s) (List all) | Equipment Causal Factors (List all): | O&P Causal Factor(s) (List all): |
|---|---|---|
| | | |

| | | |
|---|---|---|
| **NA** | **EF1I, DC1G** | **NA** |

EFE Codes (see Procedure step 5.5 [5]):

| INPO PO&C codes: | Failure Mode Codes: |
|---|---|
| **NA** | **FM08, FM13,** |

| |
|---|
| ACE Evaluator (print Name): J. Michael O'Brien |