

Risk Assessment Safety Plan

I. Project information:

Noise Mitigation in an Organic Rankine Cycle (ORC) Turbine Bypass Line		01/20/17
Name of Project		Date of submission
Team Member	Phone Number	e-mail
Chad Adams	941-799-1905	cea12b@my.fsu.edu
Austin Houser	850-384-3415	ach14g@my.fsu.edu
William Mauch	850-591-4282	whm10@my.fsu.edu
Luis Figueroa	850-300-0880	lef12c@my.fsu.edu
Faculty mentor		e-mail
Dr. Louis Cattafesta		lcattafesta@fsu.edu

II. Project description:

Team 14's objective is to mitigate the noise that an organic rankine cycle produces when the working fluid passes through the bypass line rather than to the turbine. This must be completed in a manner that does not change the current piping setup or the flow characteristics of the existing system. Internal solutions are to be avoided to prevent any accidents that may occur if something was to hit the turbine prop.

II. Describe steps from project initiation to completion:

- Background Research
- Measurement Methodology
- Preliminary on-site Measurements
- Data Analysis
- Concept Generation
- Prototyping
- Prototype Testing
- Prototype Iterations

III. Given that many accidents result from an unexpected reaction or event, go back through the steps of the project and imagine what could go wrong to make what seems to be a safe and well-regulated process turn into one that could result in an accident. (See examples)

- Valve Failures
- Burns
- Burst Pipes
- Hearing Damage

IV. Perform online research to identify any accidents that have occurred using your materials, equipment or process. State how you could avoid having this hazardous situation arise in your project.

For both valve and piping failure, the best method for preventing any kind of abrupt failure is regular inspection and maintenance of the existing system. These failures can also be a result of damage that the turbine can create if its magnetic bearings are not functioning properly and the turbine hits the side of the shaft. The impact with the side of the turbine housing can cause fragments of turbine to pass through the piping causing damages to transducers, fittings, and the pipes themselves increasing the likelihood of dynamic pipe failure.

V. For each identified hazard or “what if” situation noted above, describe one or more measures that will be taken to mitigate the hazard. (See examples of engineering controls, administrative controls, special work practices and PPE).

-To prevent valve and pipe failures the velocity and pressures in the various stages of flow should be continuously monitored and recorded to ensure safe operating levels. If the system is operating as specified, the valves need to be regularly inspected/replaced by the manufacturers recommendation to prevent failure from excessive wear.

-Burns for this experiment would be the result of a pressure relief valve opening and superheated refrigerant venting off, or by accidentally touching any of the piping while the ORC is in operation. Proper inspection of internal pressures can prevent release Valves from opening and contact burns can be prevented by wearing appropriate thermal equipment when touching the system in operation.

-Until an appropriate concept has been implemented by team 14 to mitigate the noise for safer operation within the shipping container the recommended hearing protection gear by OSHA should be sealed ear muffs or single use plugs for short durations

VI. Rewrite the project steps to include all safety measures taken for each step or combination of steps. Be specific (don't just state “be careful”).

Preliminary on-site Measurements & Concept Validation

-For both tests the best method for team safety is pre-emptive preparation. The maintenance of the system is Verdicorp's prerogative, with this the potential harm from the piping failure should be prevented.

With this the potential harm from the piping failure should be prevented. Hearing protection will start with dispersal of personal protective equipment to each occupant in the testing vicinity, which includes one-time use ear plugs and over ear sealed earmuffs.

VII. Thinking about the accidents that have occurred or that you have identified as a risk, describe emergency response procedures to use.

To the current date there has been no identified risks to students or Verdicorp personnel while conducting the noise measurements. A long-term issue with the current route is the prolonged exposure to the ORC noise while in the shipping container while recording the noise. As mentioned earlier, the best procedure is to ensure that all members of the team are wearing the proper personal safety gear including ear muffs or ear plugs to prevent any kind of hearing related injuries. Proper Communication will be needed among team members to be sure all gear is on before any testing is conducted.

VIII. List emergency response contact information:

- Call 911 for injuries, fires or other emergency situations
- Call your department representative to report a facility concern

Name	Phone Number	Faculty or other COE emergency contact	Phone Number
Emergency Services	911	Dr. Louis Cattafesta	(850)-645-0109
		Dr. Chiang Shih	(850)-410-6321

IX. Safety review signatures

- Faculty Review update (required for project changes and as specified by faculty mentor)
- Updated safety reviews should occur for the following reasons:
 1. Faculty requires second review by this date:
 2. Faculty requires discussion and possibly a new safety review BEFORE proceeding with step(s)
 3. An accident or unexpected event has occurred (these must be reported to the faculty, who will decide if a new safety review should be performed.
 4. Changes have been made to the project.

Team Member	Date	Faculty mentor	Date
Chad Adams	1/19/17		
Austin House	1/19/17		
William March	1/19/17		
Luis Figueroa	1/19/17		

Report all accidents and near misses to faculty mentor.