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Submits questions re fluid mechanics at subj facil as a result of 781114 pub meeting in Cedar Rapids, IA. W/encl diagrams from Cedar Rapids Gazette.

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RICHARD PUGH, P. E.
CONSULTING ENGINEER
WILLIAMSBURG, IOWA 52361

November 15, 1978

Victor Stello
Division of Operating Reactors
Nuclear Regulatory Commission
1717 H St. NW
Washington, D. C. 20555

Dear Mr. Stello:

Re: Duane Arnold Energy Center
Palo, Iowa

Thank you for having the public meeting yesterday at Cedar Rapids, regarding the safe end repair at DAEC. This was very informative, and an excellent thing for engineers to present to the public.

As so often happens, I think of a question too late to ask at the right time, and would appreciate your response to these questions regarding the fluid mechanics aspect. Enclosed is a copy of the new design, as it appeared in the Cedar Rapids Gazette, November 12, 1978. I assume that the constricted actually used must be smoother, and possibly less severe than that shown on the picture.

1. What is the diameter of the pipe at the # 3 weld?

2. Is the coolant water?

3. What are the temperature and pressure of the coolant in the pipe, or range of temp. and press. during normal operation?

4. What is the direction of flow of the coolant, and velocity of flow?

5. What is the anticipated pressure at the narrow cross-section (Bernoulli effect) in p.s.i. absolute?

6. What consideration has been given to possibility of cavitation of the liquid? Will the transition from full pipe diameter to constricted, and back to full diameter be ground smooth, with good radii of curvature, and will weld # 3 be ground smooth to prevent local spots where cavitation could occur? Has a prototype been tested for possible cavitation?

7. Regarding the annulus--in the scale model tests referred to yesterday to determine the flushing action, was the model operated at the same Reynolds number as one would expect for the full scale part? Was the ratio of roughness in the model to roughness in the full scale ~~xx~~ the same as the ratio of size of model to size of full scale? Was the flow in the annulus in laminar or turbulent condition?

Thank you for any information you can send.

Yours very truly

Richard Pugh

Richard Pugh
rp/n

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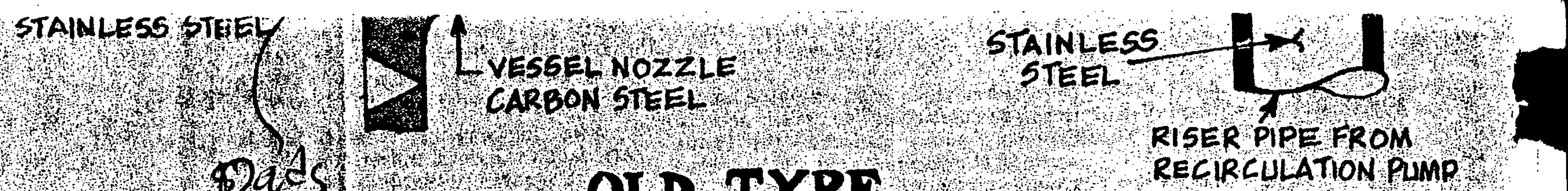
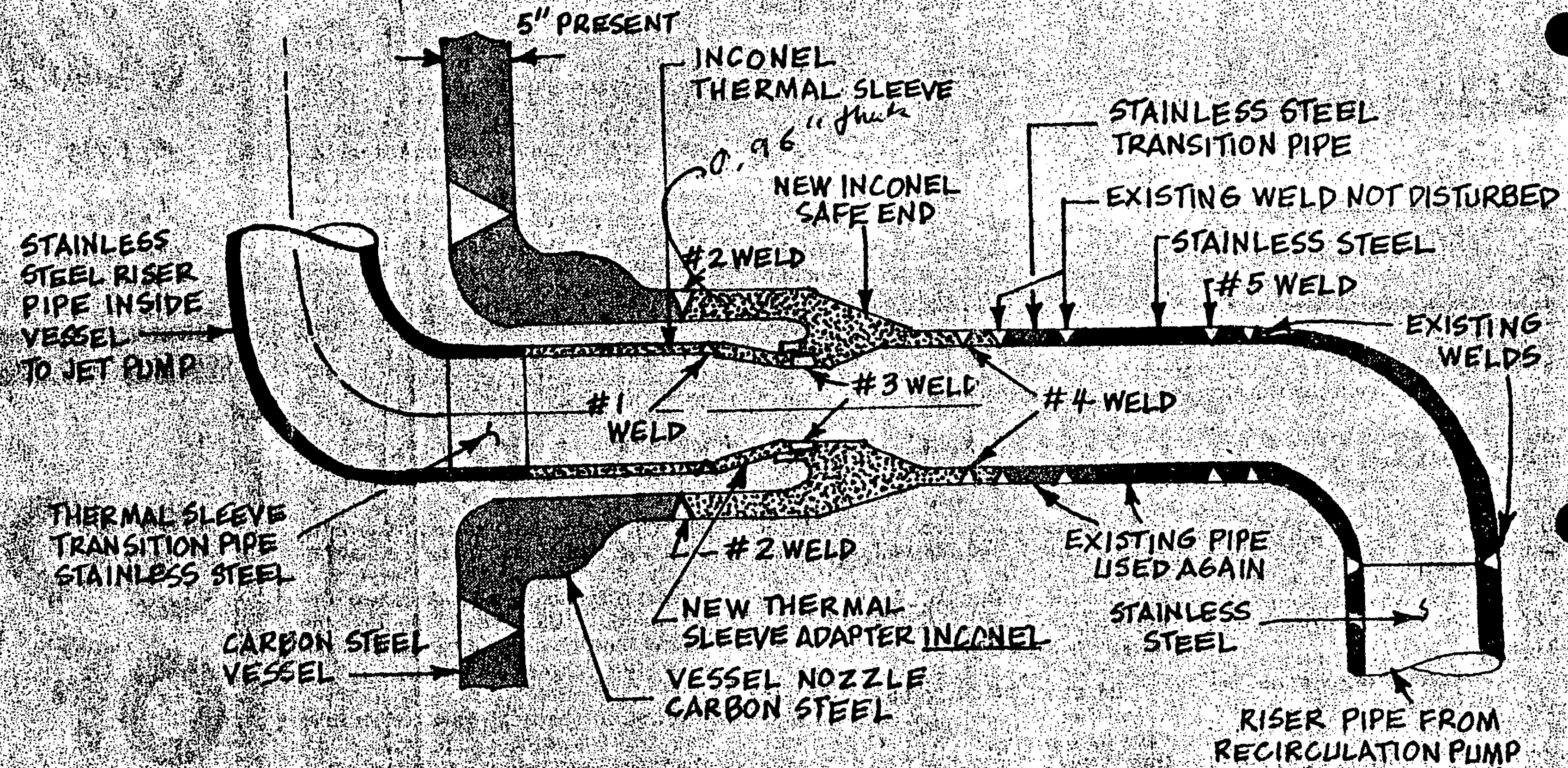


OLD TYPE

These diagrams provided by Iowa Electric Light and Power Co. show the design differences between the old and new safe-ends. It is the safe-end section (dotted area) of eight riser pipes at the Duane Arnold Energy Center which are presently being replaced. Five welds are required in the replacement procedure. The new type safe-end is designed to transfer the stress point away from the weld. The riser pipes carry water from the bottom of the reactor vessel to the top of the vessel, maintaining water circulation over nuclear fuel rods.



NEW TYPE