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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.  
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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

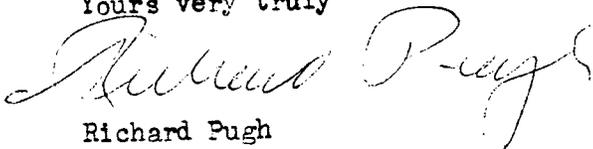
Thank you for having the public meeting yesterday at Cedar Rapids, regarding the safe end repair at DAEC. This was very informative, and an excellent thing for engineers to present to the public.

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  
rp/n

REGULATORY DOCKET FILE COPY

7811210329 P

Adm  
11/1

the pipe cracks, attention to making sure is acceptable nuclear plant

weekend

that six of the could be repaired. We want to finish he said. The goal ant restarted by interim allowed

d that the corro- sion in the old n, where mate- could precipitate, intrusion in the

acement safe-end icker, nearly an if-inch. There will be noted, and the nection point is shift stress away

C considers the a "serious" prob- the chances of ublic were still

ion pipe

a question is part ation system that the bottom of the to the top of the bottom movement s the nuclear fuel ore efficient oper- ained.

he water, and re- drawn off to drive or.

e had completely Streama, backup e maintained sur- e reactor to keep omersed.

ms fall, he went ld occur, and ulti- f radio active ma- nement.

STAINLESS STEEL



VESSEL NOZZLE  
CARBON STEEL

Dads

# OLD TYPE

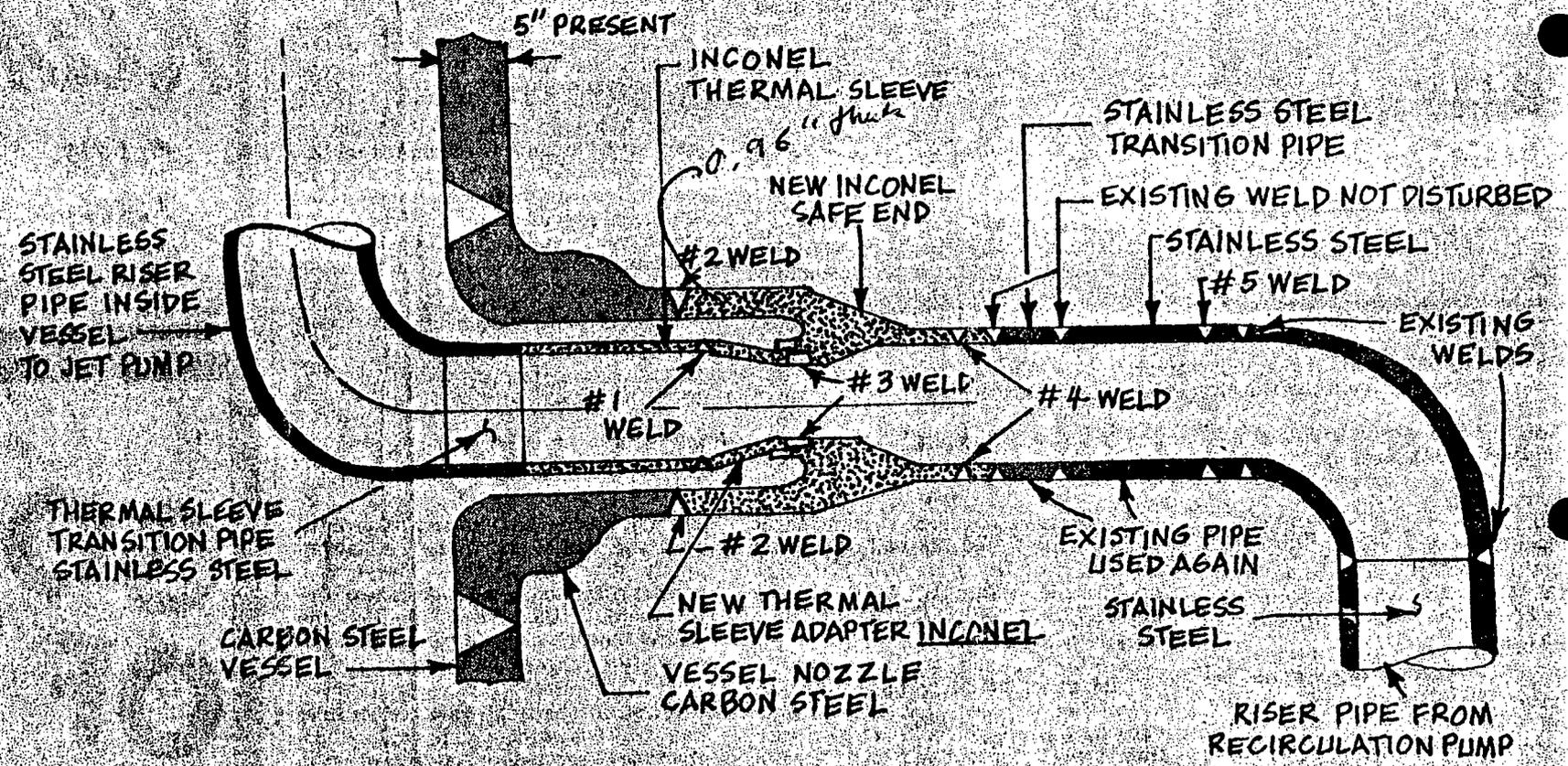
STAINLESS STEEL



RISER PIPE FROM  
RECIRCULATION PUMP

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