

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555

October 3, 1991

NRC INFORMATION NOTICE 91-63: NATURAL GAS HAZARDS AT FORT ST. VRAIN  
NUCLEAR GENERATING STATION

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to problems that could result from the presence of natural gas at nuclear facilities. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. Although this notice specifically describes hazards associated with natural gas, licensees should note that similar hazards may be imposed by other toxic, flammable, or explosive materials which may be brought into close proximity to licensee's facilities. However, suggestions contained in this information notice are not new NRC requirements; therefore, no specific action or written response is required.

Background

When the Fort St. Vrain facility was licensed in 1973, no natural gas pipelines were located nearby; thus, neither the licensee's final safety analysis report nor the NRC staff's safety evaluation report addressed the hazards associated with natural gas present in geological formations in the area. In 1974, a 16-inch low pressure natural gas collection pipeline was constructed nearby by a natural gas company. This pipeline crossed a corner of the licensee's property about 0.9 mile from the reactor building. At its closest point, this pipeline came within 0.85 mile of the reactor building. Although the pipeline was not constructed by the Public Service Company of Colorado (PSC), the Fort St. Vrain licensee, PSC was informed of its construction.

Between 1981 and 1983, 12 natural gas wells were installed within about one mile of the Fort St. Vrain reactor building. Seven of these wells were drilled on land owned by the Fort St. Vrain licensee by a company that had acquired the mineral rights from the licensee. Some of these wells were located within the Exclusion Area Boundary, but all were outside of the protected area. Nine of these wells were connected to the 16-inch collection pipeline by a 6-inch pipeline. The closest well was located 1524 feet from the reactor building, and the 6-inch pipe passed within 1340 feet of the reactor building. Personnel involved in the drilling of these wells and the licensee's manager of nuclear production concluded that possible accidents at the well sites would not

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produce adverse effects further than 300 feet from the wellheads. The licensee did not prepare any written analyses for any of the wells or pipelines.

Late in 1987, PSC allowed the drilling of a gas well within 1184 feet of the Fort St. Vrain reactor building, which was within the Exclusion Area Boundary and 300 feet from the protected area fence. The pipeline associated with this well passed within 560 feet of the Fort St. Vrain switchyard. PSC prepared a 10 CFR 50.59 safety evaluation that concluded that in the event of a well fire caused by a blow out, the area affected both by the fire and the equipment needed to control it would not be larger than the existing drillsite location. The licensee also concluded that the air temperature beyond a radius of 200 feet would not be elevated above the ambient temperature and therefore, the construction and operation of the closest well did not create the possibility of a new type of reactor plant accident or constitute an unreviewed safety question. The safety analysis did not evaluate the consequences of a rupture of either the 6-inch or 16-inch pipeline and did not postulate the release of a cloud of natural gas which might drift toward safety-related structures or equipment and ignite and either burn or detonate.

#### Description of Circumstances

On August 18, 1989, the licensee shut down the Fort St. Vrain facility and, by letter of August 29, 1989, informed the NRC that the plant would be shut down permanently. In November 1990, the licensee submitted a proposed decommissioning plan. While reviewing the proposed decommissioning plan, the NRC became concerned that plans to introduce natural gas at Fort St. Vrain as part of a proposed repowering of the facility could lead to an accident that had not been reviewed. During this review, the NRC further determined that the licensee had not adequately addressed the natural gas already on site. The licensee responded by preparing analyses that addressed the limiting failures of all natural gas pipelines existing on site. Before completing these analyses, the licensee took prompt corrective actions to limit the amount of natural gas that could be released from a large rupture of the 6-inch collection pipeline. These actions consisted of closing a 6-inch valve and opening a 1 1/2-inch bypass valve in the line that carried gas from the wells to the 16-inch collection pipeline. This configuration would reduce the gas leakage from a rupture in the 6-inch pipeline by reducing the flow of gas back from the 16-inch pipeline.

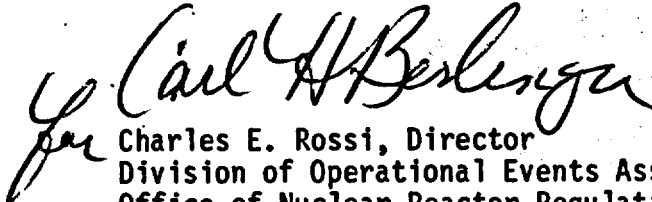
The NRC staff reviewed the licensee's analyses including those regarding flammability and explosive hazards associated with the gas cloud that could be released by a postulated worst-case rupture of a wellhead or pipelines. Both the licensee and the NRC determined that, with the compensatory measures taken, postulated accidents associated with the natural gas on site would not affect the safe storage of spent fuel or other radioactive components in the reactor building. After reaching this conclusion, the NRC issued the Fort St. Vrain possession only license (POL) amendment on May 21, 1991. The POL amendment included a license condition that requires the licensee to obtain the NRC's approval before making changes to the collection system that would involve permanently opening the 6-inch valve.

In August 1991, the licensee completed additional analyses which indicated that postulated explosions or deflagrations resulting from natural gas line ruptures with the 6-inch line open would not have resulted in unacceptable consequences at the Fort St. Vrain reactor building or at the switchyard. Nevertheless, PSC indicated that redundant check valves would be installed in the 6-inch pipeline to reduce the possibility that natural gas could flow back from the 16-inch pipeline, if the 6-inch line ruptured.

Discussion of Safety Significance

The natural gas pipelines and wells completed between 1973 and 1983 introduced additional unanalyzed external hazards that could have affected the safe operation of the Fort St. Vrain facility. These additional hazards were not evaluated by the licensee prior to their introduction to the site to determine the impacts on the safe operation of the plant and whether these hazards exceeded those evaluated during the initial licensing of the facility. For the gas well drilled in 1987, the licensee's 10 CFR 50.59 evaluation was too narrowly focused and did not consider additional possible malfunctions before concluding that an unreviewed safety question was not involved.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation project manager.

*for*   
Charles E. Rossi, Director  
Division of Operational Events Assessment  
Office of Nuclear Reactor Regulation

Technical contacts: Richard Dudley, Jr., NRR  
(301) 492-1116

Stephen Koscielny, NRR  
(301) 492-0726

Attachment:

List of Recently Issued NRC Information Notices: *see jacket*

LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
91-62	Diesel Engine Damage Caused by Hydraulic Lockup Resulting from Fluid Leakage Into Cylinders	09/30/91	All holders of OLs or CPs for nuclear power reactors.
91-61	Preliminary Results of Validation Testing of Motor-Operated Valve Diagnostic Equipment	09/30/91	All holders of OLs or CPs for nuclear power reactors and motor-operated valve (MOV) diagnostic equipment vendors identified herein.
91-60	False Alarms of Alarm Ratemeters Because of Radiofrequency Interference	09/24/91	All Nuclear Regulatory Commission (NRC) licensees authorized to use sealed sources for industrial radiography.
91-59	Problems with Access Authorization Programs	09/23/91	All holders of OLs or CPs for nuclear power reactors.
91-58	Dependency of Offset Disc Butterfly Valve's Operation on Orientation with Respect to Flow	09/20/91	All holders of OLs or CPs for nuclear power reactors.
91-57	Operational Experience on Bus Transfers	09/19/91	All holders of OLs or CPs for nuclear power reactors.
91-56	Potential Radioactive Leakage to Tank Vented to Atmosphere	09/19/91	All holders of OLs or CPs for nuclear power reactors.
91-55	Failures Caused by An Improperly Adjusted Test Link in 4.16 KV General Electric Switchgear	09/16/91	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
CP = Construction Permit

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NUCLEAR REGULATORY COMMISSION  
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\*SEE PREVIOUS CONCURRENCES

*C/SPLB:DST:NRR	*D/DST:NRR	*OGC	*RPB:ADM	D/DOEA:NRR
CMcCracken	ACThadani	LJChandler	TechEd	*CERossi(CB for)
09/16/91	09/20/91	09/04/91	09/05/91	09/27/91
*D/DET:NRR	*C/ESGB:DET:NRR	*C/EMCB:DET:NRR	*EMCB:DET:NRR	*C/OGCB:DOEA:NRR
JERichardson	GBagchi	CYCheng	SSKoscielny	CHBerlinger
09/13/91	09/12/91	09/12/91	09/12/91	09/27/91
*OGCB:DOEA:NRR	*PDNP:DAR:NRR	*PDNP:DAR:NRR	*PDNP:DAR:NRR	*D/DAR:NRR
RJKiesel	EHylton	RErickson	RDudley	DCrutchfield
09/05/91	06/20/91	06/19/91	09/07/91	09/12/91
DOCUMENT NAME:	IN 91-63			*D/PDNP:DAR:NRR
				SWeiss
				09/07/91

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Document Name: INFO NOTICE - DUDLEY, KIESSSEL  
 \*SEE PREVIOUS CONCURRENCES

<i>for</i>	<i>C. Inf</i>	<i>Richard Dudley</i>	<i>CAB</i>
C/DST: NRR	D/DST: NRR	OGC: NRR	D/DOEA: NRR
CMCracken	ACThadani	LJChandler	CERossi
09/16/91	09/20/91	09/14/91	09/27/91
D/DET: NRR	C/ESGB: DET: NRR	C/EMCB: DET: NRR	C/OGCB: DOEA: NRR
JERickson	GBagchi	CYCheng	CHBerlinger
09/13/91	09/12/91	09/12/91	09/27/91
*OGCB: DOEA: NRR	*PDNP: DAR: NRR	*PDNP: DAR: NRR	D/DAB: NRR
RJKiessel	EHylton	RErickson	DCWichfield
09/05/91	06/20/91	06/19/91	09/12/91
			D/PDNP: DAR: NRR
			SWeiss
			09/17/91
			<i>for</i>

*\*RPB: ADM TechEd 09/05/91*  
*EMCB: DET: NRR SSKoscielny 09/12/91*  
*PDNP: DAR: NRR RDudley 09/17/91*

Document Name: INFO NOTICE - DUDLEY, KIESEL

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C/SPLB:DST:NRR	D/DST:NRR	OGC	RPB:ADM	D/DOEA:NRR
CMcCracken	ACThadani	LJChandler	TechEd	CERossi
09/16/91	09/17/91	09/ /91	09/5/91	09/ /91
D/DET:NRR	C/ESGB:DET:NRR	C/EMCB:DET:NRR	EMCB:DET:NRR	C/OGCB:DOEA:NRR
JERichardson	GBagchi	CYCheng	SSKoscielny	CHBerlinger
09/ /91	09/ /91	09/ /91	09/ /91	09/ /91
XOGCB:DOEA:NRR	*PDNP:DAR:NRR	*PDNP:DAR:NRR	PDNP:DAR:NRR	D/DAR:NRR
RJKiessel	EHylton	RErickson	RDudley	DCrutchfield
<del>07/31/91</del>	06/20/91	06/19/91	09/ /91	09/ /91
9/5/91				D/PDNP:DAR:NRR
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				09/ /91

Safety Significance:

The corrective actions taken and the analyses completed by the licensee have shown that the natural gas wells completed in the early 1980s introduced additional unanalyzed external hazards that affected the safe operation of the Fort St. Vrain facility. These additional hazards were not evaluated by the licensee as required by NRC regulations to determine the impacts on the safe operation of the plant and whether these hazards exceeded those evaluated during the initial licensing of the facility. For the gas well drilled in 1987, the licensee's 10 CFR 50.59 evaluation was too narrowly focused and did not consider additional possible malfunctions before concluding that an unreviewed safety question was not involved.

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OGC	*RPB:ADM	C/OGCB:DOEA:NRR	D/DOEA:NRR	
LJChandler	TechEd	CHBerlinger	CERossi	
08/ /91	06/24/91	08/ /91	08/ /91	
D/DET:NRR	C/ESGB:DET:NRR	C/EMCB:DET:NRR	EMCB:DET:NRR	*D/DAR:NRR
JERichardson	GBagchi	CYCheng	SSKoscielny	DCrutchfield
08/ /91	08/ /91	08/ /91	08/ /91	07/22/91
OGCB:DOEA:NRR	*PDNP:DAR:NRR	*PDNP:DAR:NRR	*PDNP:DAR:NRR	*D/PDNP:DAR:NRR
RJKiessel	EHylton	RErickson	RDudley	Sweiss
07/21/91	06/20/91	06/19/91	06/19/91	07/10/91