

ANALYSIS SUPPORTING CONTINUED OPERATION
OF DAVIS-BESSE NUCLEAR POWER STATION UNIT 1
WITH DUAL LEVEL SETPOINT CONTROL OF THE STEAM GENERATORS

The Davis-Besse Unit 1 procedures presently require manual control of steam generator level, at 35 inches on the startup range level indicators, following anticipated operational occurrences where auxiliary feedwater is required to remove decay heat. This steam generator level was chosen to provide adequate natural circulation capability and additional margin in maintenance of indicated pressurizer level.

A combination of both test data and system analysis support the use of a 35 inch indicated steam generator level. The natural circulation test at Davis-Besse 1 (TP800.04) demonstrated that 4.6% of full RCS flow will exist when the startup range level indicated 35 inches of water in both steam generators. The minimum acceptable flow is 1.63% at the test power level of about 3.85% of full power; consequently, for all anticipated events, adequate decay heat removal capability will be provided with or without forced RCS flow. The impact of a 35 inch steam generator level of auxiliary feedwater on plant response has been analyzed for various reactor trip events. Our analysis results demonstrate the following:

1. For a reactor trip from 15% of full power with a concurrent loss of all RC pumps and main feedwater pumps (as will occur in the loss of offsite power test), maintaining a 35 inch steam generator level results in an indicated pressurizer level of approximately 84 inches with a steam pressure of 950 psig. In contrast, pressurizer level indication could be lost if SG level were raised to approximately 100 inches by the auxiliary feedwater pumps. (A complete loss of pressurizer level would not occur with a 120 inch steam generator level.)
2. For a reactor trip from 15% of full power with a loss of the main feedwater pumps (RC pumps operative), pressurizer level may approach zero indication but will return (if lost momentarily) via operation of the makeup system if steam generator levels are maintained at the 35 inch level.

The above analysis results show that, under conditions that would result in minimum pressurizer levels, maintenance of a 35 inch steam generator level during anticipated events will result in an indicated pressurizer level in accordance with General Design Criteria 13.

A 35 inch steam generator level has not been analyzed under postulated small RCS break conditions. Rather than redoing the small break ECCS analysis (BAW-10075A, Rev 1), a dual setpoint for auxiliary feedwater control is utilized. Use of 120 inches of auxiliary feedwater in the steam generators during post LOCA conditions will provide accident mitigation.

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The manual control of the steam generator level at 35 inches indicated will be a temporary measure until the "Auto Essen" level control can be modified with a dual setpoint. Since November, 1977 the Davis-Besse Unit 1 operators have successfully manually controlled the steam generator levels on each occasion that auxiliary feedwater was automatically started by the steam and feedwater rupture control system (SFRCS).

This manual control does not reduce the capability of each auxiliary feedwater pump (AFP) to deliver 800 gpm to each steam generator, as they will be delivering this flow before the operator can take over manual control of steam generator level. When the 35 inch indicated level is reached, a total flow capacity of less than 400 gpm per steam generator with both steam generators in service is required to remove the decay heat from the RCS.

The "Auto Essen" level control was installed at Davis-Besse Unit 1 in 1976 to prevent a steam generator from flooding if two AFP's were feeding it. Prior to this time, the only automatic steam generator level control was provided by the integrated control system (ICS) and the only essential level control was manual. When SFRCS initiated auxiliary feedwater flow, the AFP turbine was started at full speed with the steam generator level control in the essential manual mode. In 1976, it was determined that when two AFP's were running at full speed and supplying a single steam generator, it would flood the steam generator in less than ten minutes if an operator failed to take manual action to control the steam generator level. (Two AFP's will supply one steam generator only after a steam or feedwater line break.) With the "Auto Essen" level control and a single active failure of one level controller (which allows one AFP to continue running at full speed above 120 inch steam generator level), the steam generator will become flooded in approximately 15 minutes. This allows ample time for operator intervention.

The manual control of the steam generator level when auxiliary feedwater is required is a change to the steam generator level discussions described in the Davis-Besse Unit 1 FSAR. The safety evaluation given above should be considered the 10CFR50.59 review of this change. All manual steam generator level control actions will be eliminated from the plant procedures when final modifications are made to provide a dual setpoint for the "Auto Essen" level control.

FAX TO LES CONSTABLE FROM TROJANOWSKI

analysis of 0.16 nanocuries / square meter iodine-131.

Analysis of two of the ground level air samples resulted in positive iodine-131 concentrations of 9.5×10^{-12} microcuries / cubic centimeter and 5.9×10^{-12} microcuries / cubic centimeter. The air samples were collected at the same time in two instruments run side-by-side at approximately 11:45 A.M. on 4/13/79 at a location along the railroad tracks approximately half way between Plainfield and Goldsboro. The other ground level air sample analysis resulted in radioiodine less than MRLA.

The one sample taken by the helicopter in the plume approximately 100 meters due south of TMI, Unit 2 resulted in an analysis of 1.19×10^{-10} microcuries / cubic centimeter iodine-131. The sample was collected at approximately noon on 4/14/79.

POOR ORIGINAL

10 ³² / hr

0925

	<u>Partic</u>	<u>Radio</u>	<u>Noble gas</u>
unit 1 Fuel handling bldg	1.47 ⁻⁷	1.23 ⁻⁶	2.78 ⁻⁵
Aux bldg unit 1	1.37 ⁻⁷	1.15 ⁻⁶	2.78 ⁻⁵
Unit 1 plant vent	5.94 ⁻⁸	8.46 ⁻⁷	3.1 ⁻⁵

Plant
instrumentation

POOR ORIGINAL

10 ⁵⁰/_{77m}

0600	W side of river	7.47×10^{-8} ul/cc I ¹³¹
0650	Control Room	1 m/hr
0710	• Containment dome	3000 R/hr
	• deck monitor failed	-
	and logged out of service	
	• Personnel hatch	10 m/hr
0715	West side of river	1 m/hr
0721	" " "	2 m/hr
0728	" " "	3 m/hr
0735	W edge of island	3.5 m/hr
0745	Unit 2 Control Room	1.5 m/hr
45	~ 4 mi N of site	1 m/hr
0815	wind from 150° ↔ 120° @ 6-8 mph	

POOR ORIGINAL

0 Goldsboro - due west 1 mile 20 mem/hr
30 mem/hr

GE 7 Southern Boundary of Island
0430 26 mem/hr

GE 8 west Boundary of Island
0410 28 mem/hr
0420 26 mem/hr

GE 9 just west of Rx Bldgs
0355 20 mem/hr
0410 50 mem/hr
0530 100 mem/hr

GE 10 west river bank on Island
0400 1 mem/hr
0405 25 mem/hr
0530 2 mem/hr

North Gate - 0425 - 27 mem/hr

POOR ORIGINAL

W wind from site to Trailer
@ 45 mph gust.

Local monitor in Trailer

.02 mph to ca 0.35 mph

POOR ORIGINAL

We have a report from Byce

① 200 ~~000~~ k/hr at top of Dome

② 1 mv/hr at site boundary

③ 1500 #/SI 572° F primary
in primary coolant
(system is intact)

POOR ORIGINAL

Ground level readings - 2300

Parking lot - 70 mms/hr on site
Harrison AP - 12 mms/hr 2 miles NNW
Almsted Plaza - 5 mms/hr 3 miles NNW
Highpine - 3 mms/hr ~5 miles NNW

W 10 mi from SSE

POOR ORIGINAL

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ON-SITE DATA READINGS (MR/HR)

TIME	LOCATION	Beta Gamma	Gamma
0500	GE-1		3
0615	GE-1	1	0.6
0520	GE-2		5
0615	GE-2		0.6
0630	GE-2		4
0334	GE-3		2
0340	GE-3	10	
0340	Between GE-3 + GE-4	30	
0520	GE-3		0.01
0615	GE-3		10
0630	GE-3		8
0334	GE-4		20
0340	GE-4		3
0520	GE-4		4
0615	GE-4		0.4
0334	GE-5		5
0520	GE-5		3
0615	GE-5		0.4
034	GE-6		3
0615	GE-6		0.6

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	<u>Rel. Grams</u>	<u>Grains</u>
GE-7		< 2
GE-7		3
GE-7		0.6
GE-7		2
GE-8		3
GE-9		0.6
GE-9		3
GE-9		0.6
GE-10		3
GE-10		0.6

0374
0524
0615
0630
0520
0615
0520
0615

POOR ORIGINAL

ARMS DISPATCH
TO CUMBERLAND
AIRPORT JUST
CONFIRMED.

ETA 3:00p.

POOR ORIGINAL

POOR ORIGINAL

Noon

Air

3 mi	rather	to $\frac{1}{2}$	\rightarrow 1 mi/hr	ATMS.
1 mi	"		\sim same	
$\frac{1}{2}$ mi	"		1 mi/hr	
$\frac{1}{4}$ mi	"		8-30 mi/hr	

Current

highest 2.6 mi/hr at \sim 1 mi.

Working exposures

TWO PLUMES

[A] Residual Plume - NR/Ar readings estimate

- Direction - N to NW - Between Hershey and Mechanicalurg
- Vertical Heights -
Top - 32000 ft. > activity greatest
Bottom - 500 ft. in middle of plume
- No indication of plume at 3-4 miles from plant.

[B] New Plume

- Direction - S
- Measurements - G.M. Survey - Window Closed
10 m/hr - fence line - south of plant
0.5 " - 1/2 mile south of plant over river.

Next flights - 7 p.m. - use ion chamber and compare with Met. Ed. Helicopters

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EG & G is dispatching a backup ARMS
team from Las Vegas and has dispatched
the van from Andrews AFB by road.

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Hospital ready
of Iodine content

$< 10^{-10}$ mg/cc I

w^h which one?

POOR ORIGINAL