AAM 11/2/81

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMIISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judge Gary L. Milhollin
as Special Master

In the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY	)	Docket No. 50-289
	)	(Restart)
(Three Mile Island Nuclear Station, Unit No. 1)	)	(Reopened Proceeding)
	)	

AAMODT TESTIMONY OF PROFESSOR CHARLES HOLZINGER AND PROFESSOR BRUCE MOLHOLT

SUMMARY

The purpose of this testimony is to shed light on the extent of cheating in Reactor Operator and Senior Reactor Operator examinations at the TMI-1 facility since the March 1979 Unit 2 accident. The extent of cheating is viewed from two perspectives, the number of operators who may have been involved and the degree of cooperation between O and W.

TESTIMONY OF PROFESSOR BRUCE MOLHOLT

Summary statement

Senior reactor operators O and W cheated extensively on their requalification tests 24 April 1981. There was exact coincidence in 87 percent of their answers, right down to the misspellings. Apparently, sometimes O copied W, sometimes W copied O.

There were 67 separate questions or parts of questions addressed on the SRO "B" exam. I have not graded 5 of these, which are figures. Of the remaining 62 questions or parts of questions, 54 were answered by O and W in identical or nearly identical fashion. I conclude that these two senior reactor operators collaborated on 87 percent of their answers.

A few examples of identical copy are given below:

Answers to question N 2 b

W

N. 2B You cool down the plant by increasing your steaming rate in the OTSG and lowering the pressure which lowers the Saturation temperature.

O

26. You cool down the plant by Increasing your steaming rate in the OTSG AND LOWERING the Pressure which Lowers the Sat temp accordingly.

Answers to question N 4 c

W

(C) I would immediately select the two operable NSCCW pumps for E.S. Making sure of physical separation. I would call the duty superintendent, Supervisor of Ops

O

4C we would immediately Select the two operable NSCCW pumps for ES with the 43 Selector Switch. I would CALL THE Duty Superintendent, the Supervisor of Ops

A few additional copies of nearly identical copy are given below in which the major change is that O writes in 2d person, W in 3d person:

Answers to question J 2

W	An RWP for airborne is needed when the concentration is $> 3 \times 10^{-11}$ uc/cc with no alpha present, or when you are > 25% of MPC
O	You need an RWP for airborne when the concentration is $> 3 \times 10^{-11}$ uc/cc with no alpha present or when you are > 25% of MPC

Sometimes they misspell the same word:

Question L3a	
W	in hand. When the rod drops you will get an assymetric rod alarm #
O	in hand. When the rod drops you will get an assymetrical rod alarm #

Insight is gained as to who is copying whom when O can't read W's handwriting and "collapsing" becomes "collopsing":

Question N5b	
W	Cause the pressure to increase then Collapsing the steam in the presurizer
O	Cause the pressure to increase then collopsing the steam in the pressurizer.

But then, sometimes W can't read O's handwriting (which is generally worse) either, as when "vacuum," with an ambiguous first "u" by O, becomes "vaccum" in W's answer:

	O	W
Question N3b	You won't be as Sub Cooled as you were with a better vacuum	You wont be as subcooled as you were with a better vaccum

Sometimes it appeared to me as if W were giving answers orally to O containing words which O can't spell. These words were then spelled correctly and legibly in W's answer, but misspelled in O's answer. Examples are:

Part	Question	W	O
I	6a,c	xenon	zenon
	6c	affected	effected
K	1a	asymptotically	acsomptically
	3	affect	effect
L	4a	orifice	orfice

These I believe to be examples where W is giving answers to O, perhaps orally. At least once O can't understand what W is driving at at all, undoubtedly here in a written answer and substitutes his own word rather than copy something nonsensible:

Part	Question	W	O
M	2	collorates (for correlates)	determines (!)

And, at least once, W copies O's misspelled word as something else:

Part	Question	W	O
J	5a	injecting (food!)	injesting (for ingesting)

Summary statement

Senior reactor operators O and W cheated extensively on their requalification tests 24 April 1981. There was exact coincidence in 87 percent of their answers, right down to the misspellings. Apparently, sometimes O copied W, sometimes W copied O.

There is little evidence that the other four senior reactor operators sitting in this room, but not at the same table, were involved in this cheating by operators O and W.

BRUCE MOLHOLT, Ph.D.

Birth- November 5, 1940, Menosha,WI

Ph.D.- 1967, Indiana University, Bloomington, IN (Microbiology)

Postdoctoral Fellowships

1967-69 USPHS, Department of Microbial Genetics, Karolinska Institutet, Stockholm, Sweden.

1972-73 NATO, Department of Molecular Genetics, UNiversity of Ghent, Ghent, Belgium.

Positions

1969-72 Asst Professor of Microbiology, University of Kansas, Lawrence, Kansas.

1973-74 Charge de Recherches, Department of Molecular Biology, University of Geneva, Geneva, Switzerland.

1974-75 Research Associate, Department of Molecular Genetics, University of Heidelberg, Heidelberg, West Germany.

1975-76 Exchange Scientist of US National Academy of Sciences, Institute of Biochemistry, Prague, Czechoslovakia.

1976-78 Associate Professor of Microbiology and Surgery, Medical College of Wisconsin, Milwaukee, Wisconsin.

1979-present Science Director, Environmental Cancer Prevention Center, Philadelphia, Pennsylvania.

Publications

Twenty articles on molecular genetics.

Genetic Predisposition to Cancer in Man (with A.G. Knudson).

STATEMENT OF PROFESSOR CHARLES HOLZINGER

The Aamodts received in response to discovery requests of the Licensee the PQS and ATTS RO and SRO mock exams, the Category T and Category T makeup exams, and weekly cold licensing requalification exams. The PQS and ATTS tests were provided lacking information with regard to seating arrangements, and except where the exams were dated, no indication of what candidates sat together in a given room. A further hindrance to an investigation of collusion among examinees was the fact that in some undetermined number of instances the Category T and weekly exams were take-home, unproctored and/or open book. Nevertheless, several groups of exams were assembled for analysis which, after a question-by-question analysis, yielded sufficient numbers of examples of similar responses to support the view that collusion of some sort had occurred. There were no fewer than 14 candidates who appeared to be engaged in collusion of some sort.

These forms of collusion did not follow the blatant mode of copying observed in O and W. However, since the essay-type answers to questions on the papers were characteristically very dissimilar between candidates, similarities between essay type responses, especially when there were multiple examples of such similarities between two individuals, indicate a high probability that collusion of some sort has taken place.

Several examples follow.

ATTS RO EXAM GIVEN 4/1/81--FOLLOWING SEVEN PAGES.

Analysis of this set of examinations shows collusion among U, B and Q. See the attached reproductions of A1c (page 1), A3 and A4 (page 2), B2 (pages 3 and 4) and C1 (pages 5 and 6). It should be noted that overall, any given set of essay-type answers are characteristically dissimilar, emphasizing the uniqueness of any similar pairs of answers. Note the distinctly different answers of three randomly selected papers (HH, BB, E) to questions A1c (page 1) and B2 (page 4).

Charles H. Metzger

RELATED CORRESPONDENCE

Fields of Specialization:

Area: North America
Subjects: Human Biology and Evolution; The American Indian; Psychological Anthropology

Courses currently taught: Evolution of Man; Psychological Anthropology; The American Indian; Anthropological Theory

Education:

Franklin and Marshall College, 1939-1941 (No degree)

University of Chicago, 1946-1949
Degree: M.A. in Sociology
Thesis: "Acceptance-Rejection of Belief in Equality of Opportunity"

Harvard University, 1951-1952; 1958; Department of Social Relations

Teaching Positions

Harvard University, Department of Social Relations, Teaching Fellow, 1951.

Franklin and Marshall College, Department of Sociology and Anthropology
Instructor, 1949-1953
Assistant Professor, 1953-1958
Associate Professor, 1958-1966
Franklin and Marshall College, Department of Anthropology
Associate Professor and Chairman of the Department, 1966-1968
Professor and Chairman of the Department, 1968 to present

Stanford University, Visiting Associate Professor of Anthropology, summer 1956.
University of North Carolina, Visiting Associate Professor of Anthropology, summer 1966.

Publications:

"The Through Site: A Susquehannock Cemetery," in Pennsylvania Archeological Federation Bulletin, No. 17, January 1958.

With John Witthoft and W. Fred Kinsey, "A Susquehannock Cemetery: The Through Site," in Susquehannock Miscellany, published by the Pennsylvania Historical and Museum Commission, Commonwealth of Pennsylvania, 1959.

"Some Observations on the Persistence of Aboriginal Cherokee Personality Traits," in Symposium on Cherokee and Iroquois Culture. Smithsonian Institution, Bureau of American Ethnology Bulletin 180. Washington, 1961.

"Archeological Report, Limerick Generating Station Site, Montgomery and Chester Counties, Pa.," Lathers-Ware No. 81497, York, Pa., 1972.

"Archeological Report, Peach Bottom Atomic Site, Lancaster County, Pa.," Lathers-Ware No. 82210, York, Pa., 1972.

Memberships:

American Association for Physical Anthropology
American Association of University Professors
American Anthropological Association
Eastern Sociological Society
Pennsylvania Sociological Society
Society for American Archaeology
Sociedad Mexicana de Antropologia
Society for Pennsylvania Archaeology

(Q) negative over core life due to boron depletion & buildup of more Resonance capture peaks (RE) due
1.0 to $^{240}_{94}Pu$ buildup. Thus increasing the stability of
1.0 the reactor

c) Mod coefficient becomes more - ...
1.0 (D) core life due to less boron ... and
1.0 fission product buildup.

c) Over core life Pu 240 builds into the core
(H) while U-238 remains a constant. With more Pu-240
1.0 this will increase the chances of (n) capture in
1.0 resonance peaks while the (n) is being moderated.
Over core life mod temp coef gets more neg due to
increased Pu-240 buildup and decreased boron content.
Lower boron gives less + feedback when coolant heats up.

c. At operating temperatures and BOL boron concentrations
we have a -0.77×10^{-4} ΔK/K/F° reactivity coefficient value
1.0 and -2.63×10^{-4} ΔK/K/F° with EOL Boron Concentration (≈17 PPM)
1.0 The negative reactivity change per °F increase in moderator temperature
(BR) becomes more negative due to the increase in Pu-240 in the
core, the boron reduction, and the increase in additional fission
product inventory with resonance capture peaks.

A c) The effect is called moderator temp coeff
and gets more negative over core life.
1.0 BOL .77×10^{-4} ΔK/K/°F EOL 2.63×10^{-4} ΔK/K/°F Due to
1.0 (E) boron dilution and buildup of Pu240 + other
fission products fissions to the RC peaks.

[illegible]

[R] are shutdown or would be shutdown if all rods were to drop into the core except the highest worth rod was stuck at the top and R group rods were to stay right where they are.

1.0 / 1.0

A-3) a). The amount of reactivity which the Reactor is shutdown by or would be shutdown by from its present conditions assuming all Rods inserted except group R and the

[B] 1.0 / 1.0

(A-3) a) Shutdown margin is the amount of reactivity which must be added to the core to be critical ~~with no insertion of gp 8, and the most reactive rod stuck out.~~ What you added causes def. to be erroneous.

[U] .5 / 1.0

A-4) Xe in building due to fission and the decay of Iodine and is being removed by decay or absorbtion of a n

[U]

Poor!

B 4) The rate of build-up or Iodine decay is equal to the rate of [illegible] (burn-up plus decay of xenon)

[B] .25 / 2.0

Poor

Gen into a downcomer leg where it
picturated on the way down to the bottom
of the OTSG. flows up the OTSG where
it is heated undergoes ebl & superheated steam
out the top
Emerg F.W. Enters near the top of the
OTSG right onto the tube bundle to
cool the RCS.

) a) the main feed is introduced into the otsg
by the main feed ring which is ~50% up the
otsg on the outside with nozzles that penetrate
the otsg and spray downward into the
down comer allowing some preheat of the water
by osperating steam
the emerg feed is introduced by the emerg
feed ring at the top of the otsg with
Feed nozzles spray water directly onto the
tubes of the OTSG

2-2 of Main feed enters a feedring about the center
of the OTSG just below where the main steam
lines top off. It enters at the top of the down
comer region of OTSG which located on outer circum-
ference of OTSG (outside of OTSG) & draws aspirated
steam from the Generator to preheat the FW prior to
reaching the tubesheet & tubes of OTSG thus limiting
the thermal stress on the tubesheet & tubes & the

[illegible] feed water is introduced into the steam generator section by the aspirating steam ports (which preheat feed to saturation temp by the time it reaches the tube sheet) and is directed down along the outside (of the tube [illegible]) and up through the tube sheet, and up around the tubes to be heated by Primary water.

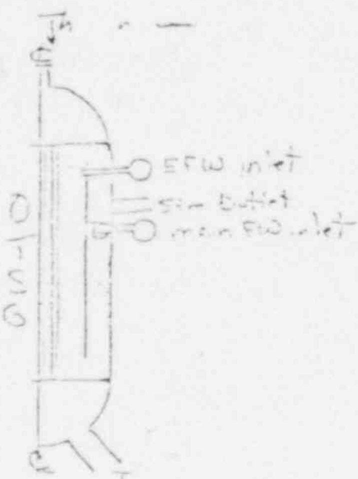
2/2 Emerg feed is introduced much higher into the steam generator and it discharges [illegible] directly on to the OTSG tubes then [illegible]... There is no preheating involved.

watch your wording!

B-2 A)

4/1/21
2.5
[illegible]

2/2



EFW Enters Tube Area High in OTSG

Main FW Enters Down Comer

B 2 a) Auxillary feedwater enters the OTSG higher than main feedwater. Aux feed enters the upper end of the OTSG and is sprayed directly on the tubes. Main feedwater enters lower and goes down

2/2 the downcomer before entering the lower tube section. This preheats the water before entering lower tube area. Aspirating steam used for preheating.

b) Aux feed is arranged in this way to promote

C.1) 50% gp S $K_1 = .983$ 1500 cps$_1$

95% gp S $K_2 = .994$ 3000 cps$_2$

$P_1 =$

$P_2 =$

$\Delta P =$

$P = \frac{K-1}{K}$

$\frac{K_2}{K_1} = \frac{1-K_1}{1-K_2}$ .0 =

$P_1 = \frac{K-1}{K}$ $P_2 = \frac{K-1}{K}$

u

$P_1 = -.012$ $P_2 = -.006$

22

$\Delta P = (K_2 - K_1)$ ← WRONG.

$\Delta P = .006 - .012 =$ ←

$\Delta P = .006 \times 100 = .6\%$ ↗ K.

95% or 6p S

NOTE - u DOES NOT DECIVE

$\Delta P = \left[\frac{K_2-1}{K_2} - \frac{K_1-1}{K_1}\right]$ BUT PULLS .006 - .012

OUT OF (1/K - 1/K ?)

Q

$\frac{CR_1}{CR_2} = \frac{(1-K_2)}{(1-K_1)}$ ✓

$CR_1 = 1500 cps \quad K_1 = .988$

$CR_2 = 3000 cps$

1.6/2

$\frac{1500}{3000} = \frac{(1-K_2)}{(1-.988)}$

$\frac{1}{2} = \frac{1-K_2}{.012}$

$.006 = 1-K_2$

$K_2 = 1-.006 = .994$

$P_2 = \frac{K_2-1}{K_2} = \frac{.994-1}{.994} = -.006036$

$P_1 = \frac{K_1-1}{K_1} = \frac{.988-1}{.988} = -.012145$

$\Delta P = P_2 - P_1 = (-.006036) - (-.012145)$

$\Delta P = .00611$

↳ should be %

$\Rightarrow$ Gp 5 @ 50% = -2.7

$(-2.7) + (.006111) = -2.69389$

Gp 5 new position is 5% $\quad$ .611%

$(-2.7) + (.6) = -2.1$

$-2.1\% \approx 95\%$ on Gr 5

F1) Because you will carbon up the valve and also unused fuel will accumulate into exhaust manifold and eventually ignite causing a fire.

[F] ▷ diesel engine does not have valves!

IF IT DOESN'T, ITS A PRETTY NOVEL ENGINE!

RELATED CORRESPONDENCE

FOLLOWING 6 PAGES.

EXAMPLES OF COLLUSION AMONG

A, P, V & T ON AITS RO EXAM 4/2/81

78.3

9.4/12

B1a Main FW block (FW-V-5) opens when SV (FW-V-16) is 90% open and closes when FW-V-16 is ~~50~~ 70% closed when in auto

1.8/2 Main FW control valve (FW-V-17) opens after SV FW control valve is open when in auto

P-4|2|21

9.1/12 = 75.8

B-1 a) The main FW Block Valve opens at 90% open on the startup FW control valve automatically and closes automatically at 70% on the startup FW control valve

1.75/2

1.8/1

SAME ELEMENTS, ORDER
" UNIQUE ERROR

(B-1) b) Clogging of the screens in the suction from the R.B. sump by Foregin ~~[illegible]~~ material could restrict flow, or shifting suction to the sump with more than 3' in the BWST could result in insufficient Net positive suction head for the decay heat pumps

high activity in sump fluid

0.5/1

P

(B-2) b - failure of DH-P1A or B

failure of DH-V-6 A or B to open DH suction from RB sump

failure of DH-V-7 A or B to open DH to MU pump suction

failure of DH-V-5 A or B to close DH suction from BWST

contaminated sump fluid

V

.5/1

ELABORATE, SIMILAR ELEMENTS,

1/2 RIGHT.

pressure for the respective sides versus S.P. + bias. Normally the bypass valves will controlling at (875) psig + 10 bias OK at low loads will starting up. As the the turbine starts to take steam, the pressure drops and the bypass valves close to maintain pressure. When the bypass valves get shut and ULD is > 15%, the bias will auto shift to + 75 psig. 1 other condition

A

2.25/3

temp increase

B4 The turbine bypass valve will close to maintain turb. header press. setpoint plus 10# bias (normaly 895 PSI(G)). The parameter it controls is turbine header press. even though it is sensing str. gen. press. The bias is shifted to +75# when 1. the turb. is reset, 2. ULD is ≥ 15%, & 3. All bypass valves are closed

not quite true

temp ↑ response

T

2.2/3

D-3 This can be caused by changes in the refrence junction temprature where the thermocouple is attached to the circuit since they are Calibrated at a certian refrence junction temprature if you change it you introduce error.

.5/2

P

This can happen durring a LOCA or Steam break on the RB as temputures are elevated under those conditions and the junctions are in the R.B.

Physical Damage, Multiple, False Junctions

03

V

.5/2

The type of failure usually associated with a loss of refernce junction against which the thermocouple measures thermionic current due to ambient conditions only. This loss of refernce junction would probable be associated with extremely high temp / moisture content conditions such as may exist in RB following a LOCA

multiple or false Junctors

ATTS - RO EXAM 4/2/81

A

.5/2

(D.3) We have found two problems at our plant like described. One was due to high resistance at junctions and the other was due to reference junction changes. Changes in the environment where the reference junction is placed can take place due to loss of cooling or steam leaks near the junction.

Multiple or False Junctions – thermal or Mech. Damage.

"A" APPEARS TO HAVE CLEAR UNDERSTANDI[NG] OF THIS LIMITED VIEW OF THE SITUATION – "P" & "V" APPEAR TO HAVE RECEIVED THIS INFORMATION FROM "A"

F-4. a. Prior to starting the 3rd reactor coolant pump must be > Rod oper. curve of figure #1, Have ICCW running, and plot 1/M. Second vent must be complete.

D

.25/2.0

b. After resetting the (S.A. Low Pressure ~~S/D Bypass~~!) bystables in RPS when coming out of S/D Bypass. Same restrictions as above
See 1102-1 Pg (2.T) 4.0

F.4 Prior to starting the 3rd RCP which actually starts the heatup, the (safety) Rods are withdrawn. You must monitor counts and plot a 1/M for the withdrawal. SD Bypass Hi Pwr @ 4.25%

when RCS pressure = 1650 you must insert rods - increase pressure to 1900 psi then reset the RPS (go out of S/D (SEEP. bypass) Hi Pwr to 104.75%) and then safeties must be withdrawn again - watch counts and plot a 1/M. Maintain <1% SDM

A

1.0/2.0

FOLLOWING TWO PAGES

EXAMPLES OF COLLUSION BETWEEN

F AND X ON SRO "A" EXAM.

SRO A
F

... immediately following the trip would be reduced due to reduction in temp at EOL would insert a larger amt of positive reactivity.

c) The Power deficit gets more [illegible] with core age mainly due to the doppler coefficient becoming more [illegible]

(4B) ii This makes our shutdown margin smaller after a trip since the [illegible] reduction after the trip will add more positive reactivity at EOL than [illegible]

SRO A
X

I (4) c.) 1. Power deficit becomes more negative over core life because it is a function of moderator temp coefficient + the doppler coefficient which both get more negative over core life due to the build-up of Pu-240 + fission products. Another factor causing power deficit to be more negative at EOL than BOL is the flux redistribution that takes place over core life.

1° only secondary
b) The basis for the 1 gpm is for system integrity, not receiving a dose > 2R site boundary and the limit for 1° ... is so you dont exceed 1.5 R in 2 hrs at site boundary on a loss of ... and the ... lift.

SRO-A
F

1½

J. ⑥ a) Primary to secondary leak rate - must not be > 1 gpm

Secondary system activity must not exceed 1.0 μC/ml.

1 gpm limit on leak rate will ensure system integrity minimize unmonitored releases of activity from the secondary plant

The 1.0 μc/ml limit is based on not exceeding 1.5 R dose at the site boundary on a load rejection.

1½

SRO-A
X

②

RELATED CORRESPONDENCE

FOLLOWING 4 PAGES

EXAMPLES OF COLLUSION BETWEEN

CC & P ON PQS RO EXAM 4/2/80

+.35 0.5 of liquid, amount that the liquid is away from the saturation or two phase condition.

A-1-a Sub cooling is that amount in
I 0.5 °F or °C that a fluid is below its saturation temp for the pressure its is at

B.4.a. Provide a passive source of borated water to recover the core in the event of a loss of coolant accident until the emergency injection systems are operating and providing cooling (borated water) to the core.

1.0 [CC]

B-4-a on a large loss to provide a passive injection source to recover the core in the time required to start HP injection & LP injection

C.5. Solid plant operation indications 1.0

1) pressurizer level - full scale
2) Wide range pressure - oscillating near relief valve setpoint
3) Pressurizer temperature less than saturation due to colder water in pressurizer (outsurges and pauses)
4) RCDT level increasing from blowdown through relief valves

1.0

C-5. to verify solid after filling up assuming plant instrumentation is working OK.

[P]

PZR level ↑ to 400" followed by (when level filled) a rapid increase of 100-200 PSI over saturation pressure for PZR temp. assuming no [illegible]

1.0

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rapidly with a change in pH or 4/D flow.
cont.

C.6.a. 1) $_{8}O^{16} + _{0}n^{1} \rightarrow _{8}O^{17*} \rightarrow _{7}N^{16} + _{1}P^{1}$

$_{7}N^{16*} \xrightarrow{T½} _{8}O^{16} + _{0}\beta^{-1} + \gamma$ (6.2 mev) Where found?

CC 0.8

C.6.a. 2) $Nd^{149} \xrightarrow{\beta} Pm^{149} \xrightarrow[\beta]{} Sm^{149}$ T½ Where found?

C.6.a 3) Krypton 85 comes from the fission process as a daughter product

C.6.b. 1. T½ 7 seconds for T½ listing of nuclides
C.6.b. 2. T½ 10^{16} years for T½ listing of nuclides
C.6.b. 3 8 years.

0.5

C-6- a&b 1) $^{16}_{8}O + ^{1}_{0}n \rightarrow ^{16}_{7}N + ^{1}_{1}P$?? Where found?

≈ 8 sec. T½

$\rightarrow ^{16}_{8}O + ^{0}_{-1}\beta + \gamma$ 6 meV

P

1.4

2) Fission gives $^{149}Nd \xrightarrow{^{0}_{-1}\beta} ^{149}Pm \xrightarrow{^{0}_{-1}\beta} ^{149}Sm$ stable

3) Krypton 85 comes from fission
T½ ≈ 10 years

-)

CC — steam generators on the control station of console 'CC' about 2 feet to the left of the power range meters — 0.5

D.3.b. 50% on the operating range recorders for the steam generators on the control station of console 'CC' below the startup range meters — 0.5

D-3-a. "1" on startup range read on console C.L.

P — 0.5

D-3-b 50% on operating range read on startup recorder console C.L.

0.5

NOTE: CC & CC' LOOKS LIKE 'CL' - WHICH P ONLY, IN THIS GROUP OF TESTS, WROTE

CC

and core-cover region with voiding
stainless for moderation and reflection
of neutrons and an increase in leakage
neutrons to be seen by the detectors

(DS) b. Voiding in the core. (Stem is
not as good a reflection & moderation
of D2 and more required to be
seen on the IR detectors)

P

1.0

FOLLOWING 2 PAGES

LIST EXAMPLES OF COPYING BY O & W

ON ATTS RO & SRO EXAMS

WE HAVE NOT COPIED ACTUAL ANSWERS

BECAUSE OF THEIR EXTREMELY OBVIOUS

SIMILARITIES.

Similarity in O and W on ATTS Exam on 4/3/81

See I 1a, I 1b, I 2 } Striking similarity in phrasing, makes collusion a necessary conclusion

J 2

J 3

J 4 — See that grades seemed to change little

J 5

K 1a

K 6d

L 3 — Note same grammatical error, "natural"

L 4

M 2

M 3a

M 3b

N 1 — See similarity in spelling error

N 2

N 3

Similarity in answers of O and W on ATTS Exam on 4/2/51

A 2 "you are seeing"
A 3
A 6
B 2a
C 1c
C 2
C 3
C 4
C 5
D 1a and b
D 3
D 4
E 3
F 1
F 6
G 1
G 3
G 5
H 1
H 2

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judge Gary L. Milhollin
as Special Master

in the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY	)	Docket No. 50-289
	)	(Restart)
(Three Mile Island Nuclear Station, Unit 1)	)	(Reopened Proceeding)

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