UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY LICENSING BOARD

In the Matter of	)	
	)	Docket No. 50-358
CINCINNATI GAS AND ELECTRIC COMPANY	)	
	)	
(Wm. H. Zimmer Nuclear Power Plant)	)	

DIRECT TESTIMONY OF THOMAS VANDEL AND HARVEY WESCOTT
REGARDING CONTENTION 14, CABLE TRAY WELDING

State of Illinois)
) ss.
County of DuPage)

Thomas Vandel, having first been duly sworn, hereby states as follows:

I am employed by the NRC and am the assigned Project Inspector for the construction phase of the Wm. H. Zimmer nuclear power plant for the Region III office of Inspection and Enforcement. I have held this assignment since April 25, 1975, along with other such project assignments.

Education

I am a graduate engineer with a Bachelor of Science in Electrical Engineering degree awarded by the University of Nebraska on June 5, 1950. In addition, I have taken courses in Mathematics and Physics at the University of Idaho, Idaho Falls extension during my work assignment at the Reactor Testing Station located near Idaho Falls, Idaho.

NRC Training

I have satisfactorily completed the following training courses required by NRC.

Boiling Water Reactors	October 1975
Pressurized Water Reactors	November 1977
Concrete Technology	June 1978
Non-Destructive Testing	January 1975
Fundamentals of Inspection	June 1978

Experience

I have been employed by the NRC (Nuclear Regulatory Commission) and before that with the AEC in the Region III office as a Reactor Inspector since December 1970 and have had a number of different facility inspection assignments. From June 1969 to December 1970, I was the Quality Assurance Manager for Peter Kiewit Sons Company, the Mechanical Contractor for the construction of the Fort Calhoun Nuclear Plant located near Blair, Nebraska. I prepared the Quality Assurance Program Manual for the project and was responsible for adequate quality of all material and components as well as for their installation. From May 1957 to June 1969, I was employed by Phillips Petroleum Company having had several assignments at different locations. Those pertinent include the assignment at Grants, New Mexico from June 1958 through March 1963 as Maintenance Superintendent of the uranium mining and milling facility located in the Ambrosia Lake area of New Mexico; and from April 1963 to June 1969 I performed assignments as the Plant Engineering Supervisor for the Test Reactor Area (TRA) and the Quality Control Engineering Supervisor for the LOFT (Loss of Fluid Test) and PBF (Power Burst Facility) safety testing programs at the reactor testing station near

Idaho Falls, Idaho. I am a registered Professional Engineer in Quality Engineering with the State of California and am a member of the American Society for Quality Control (ASQC, as well as a member of their Energy Division.

Harvey M. Wescott, having been duly sworn, hereby states as follows:

I am employed by the NRC as a Reactor Inspector in the Office of Inspection and Enforcement, U.S. Nuclear Regulatory Commission, Region III, Glen Ellyn, IL. I have been assigned to Region III since April 7, 1978. Prior to that I was a member of the NRC Region IV office in Arlington, TX as a Vendor Contractor Inspector. My educational and professional qualifications are set forth below.

Education and Training

High School Graduate	Westport, MA 1946
Electrical Power Generation	Ft. Gordan, GA 1951
Carbon Dioxide Generation	Ft. Belvoir, VA 1957
Nuclear Power Plant Operators Course	Ft. Belvoir, VA 1958
Automatic Combustion Control	Philadelphia, PA 1959
Industrial Radiography	Watertown, MA 1966
Metals Inspection	Watertown, MA 1966
Magnetic Particle and Liquid Pentetrant Inspection	Watertown, MA 1966
Welding Inspection	Watertown, MA 1966
Impact Testing	Watertown, MA 1966
Ultrasonic Inspection	Watertown, MA 1966
Radiological Safety Inspection	Ft. McClellan, AL 1970
Welding Technology and Codes Course	Ohio State University 1976
Boiling Water Reactor Course	Bethesda, MD 1976
Quality Assurance	Glen Ellyn, IL 1978

I have had formal courses in nuclear engineering, thermodynamics, radiological safety, health physics, welding, electrical engineering, mechanical engineering, mathematics and pneumatics as stated above.

Experience

My present assignment with the NRC, Region III dates from June 1978 and includes responsibilities related to reactor inspection. I am responsible for inspection of nuclear power plants in the construction phase, inspecting mechanical systems, welding and quality assurance systems and records to verify compliance with NRC requirements and licensee commitments.

My assignment with NRC Region IV dates from April 1975 where I formulated inspection plans and executed the inspection of vendor facilities supplying components to the nuclear industry.

From 1972 to 1975 I was a high school teacher at George Stevens Academy, Blue Hill, Maine.

From 1969 to 1972 I was the Plant Superintendent of the SM-1A, a pressurized water reactor located at Ft. Greely, Alaska. My responsibilities included administration of plant operations, electrical and mechanical maintenance, refueling of the reactor, shipment of spent fuel and radioactive waste and inspection of maintenance welding and plant modifications. I was also responsible for safety of plant operations and prevention of health hazards to the surrounding population.

From 1966 to 1969 I was the operations supervisor of the SM-1, a pressurized water reactor located at Ft. Belvoir, Virginia. My responsibilities include safe operation of the plant, training of operators in plant startup, normal and emergency operat ns, and shutdown, development of operating procedures, investigation and reporting of plant malfunctions, performing refueling operations.

From 1959 to 1966 I was assigned to the gas turbine test facility testing gas turbines for the ML-1 project, a portable nitrogen cooled reactor and gas turbine driven generator. My duties consisted of construction of the test assembly, electrical and mechanical maintenance, and operations. I was further assigned to the National Reactor Testing Station in Idaho and qualified as operator and shift supervisor of the gas cooled reactor experiment, a swimming pool reactor. I was further assigned to Aerojet General Nucleonics in Azusa, California as the liaison officer and performed operational duties of a gas driven turbine generator to be used in the ML-1 project. I was reassigned to Idaho where I qualified as an ML-1 operator and shift supervisor and also assisted in the initial fueling of the ML-1 reactor.

From 1958 to 1959 I was a student with the U.S. Army Corp. of Engineers Reactor Group in the Nuclear Power Plant Operators Course at Ft. Belvoir, Virginia.

I am a registered Professional Nuclear Engineer in the State of California.

The Miami Valley Power Project has raised the following Contention:

Contention Number 14, Cable Tray Welding

> Cable trays containing electrical wires have been inadequately welded by improperly qualified welders, contrary to NRC regulations. More specifically, three piece verticals and two piece channels were welded by people not fully ASME certified. These welders were not consistently able to produce a quality weld with good fusion, a situation aggravated by Husky Product's incentive system which induced quick blasting techniques to be employed. Further disregarding standard procedures production welding techniques and test welding techniques were not identical. Any meaningful inspection of the crucial three piece vertical welds is impossible because the trays have been galvanized. Therefore, the existing system of cable trays must be dismantled and a new set welded by fully certified welders and installed.

Our testimony addresses this contention

Cable trays used in the Zimmer facility were manufactured by Burndy-Husky Incorporated of Florence, Kentucky and consist of three types of trays: (1) three piece straight tray used horizontally normally 10 feet long having two side channels and a corrugated bottom plate (solid) welded together by resistance spots welds by an automatic resistance spot weld machine, (2) three piece vertical tray utilized in straight vertical runs also having two side channels but with a flat plate for the back of the tray. These trays are also welded with the same automatic resistance spot weld machine, and (3) fittings that provide the transition trays from horizontal to vertical, changes in direction horizontally or vertically or T-sections. These transition trays may have either single piece side channels or 3 piece side channels fabricated from three separate pieces by welding. This welding being done by a manual Tungsten Inert Gas (TIG) process by a qualified welder. The tack welds are approximately one inch

long and are spaced every two to three inches along the welded joint. These side channels are then spot welded to a corrugated solid bottom plate. This welding is done by either a resistance spot weld machine or by semiautomatic metal inert gas (MIG) process as necessary.

These trays when installed in the Zimmer facility are supported by seismically designed hanger with support spacing of straight runs not to exceed 9 feet in length. Fittings are supported on both ends by seismically designed hangers. The designer, Sargent and Lundy Engineers, (S&L) specified that the cable raceway system for Zimmer (both conduits as well as cable trays) will be designed adequately to sustain a seismic event by reliance on the support hanger system not the trays themselves. The trays, themselves, provide little or no support for the electrical wires, basically being used only to separate and direct the wires. Almost all of the support for the wires comes from the seismically designed hangers anchored in the structures themselves. The electrical cables would therefore remain in place on the supports even in the unlikely event that the cable trays disappeared.

The investigati the cable tray allegation was performed by two NRC RIII inspectors and one investigator with a total of 143 inspector hours being devoted to inspections at the Zimmer site and at the Burndy-Husky plant. The RIII inspection chronology is as follows:

8/31/78	Original allegation letter received in Region III office (forwarded by Michael Bancroft).
9/20-22/78	Investigation at Husky and Zimmer sites.

9/27-29/78	Investigation continued at Husky and tests of material and welds were witnessed.
12/21/78	NRC Region III issued the report (50-358/78-21) covering the results of the investigation, a copy of which is attached.

S&L Specification H-2199, indicates that welding performed during fabrication of cable trays was to be "in accordance with modern shop practice for welded construction". The vendor chose to include in his Quality Control Manual a requirement for procedures and welders to be qualified in accordance with the American Society of Mechanical Engineers (ASME) Section IX Code.

The ASME Section IX code requires, for MIG or TIG welding, that welders must demonstrate an ability to perform satisfactory welding in the welding process and positions that they will be utilizing when they perform manual welding. After these tests are satisfactorily passed the welders are then certified for the process and position used. There is no requirement that they must pass qualification for all processes in all positions before they become fully certified, and it is recognized that several attempts at qualifying may be required.

In the case of automatic resistance spot welding, while no welder qualifications are required, it must be demonstrated periodically through weld performance testing (tear test) that the welding procedure is adequate to produce sound welds.

The automatic resistance spot welding unit serial number 160396 manufactured by Precision Tooling, Cincinnati, that was used on the Zimmer vertical and horizontal straight cable trays is a completely automatic process which does not use weld filler material. The tray parts are automatically fed between two pairs of electrodes, these electrodes are mechanically controlled and synchronized with the feed mechanism to produce welds at pre-set intervals. The spot fusion is produced by passing current from the electrode through the two pieces to be joined. The flow of current causes the tray material to melt and fuse together. The electrode current and pressure are adjusted to provide an acceptable weld in accordance with a qualified procedure specification.

The NRC inspector reviewed Husky Products welding procedure specifications, welding procedures, procedure qualification records, welder performance qualifications along with other welding procedure related records. No concerns were identified as a result of this programmatic review. However, two items were identified during review of the manufacturer's welding activities and records.

1. It was learned that for a period of approximately two weeks in November 1974, the shielding gas mixture for the manual TIG welds was varied from 100% carbon dioxide to 75% argon and 25% carbon dioxide and also that the .035" filler material specified had been changed to .045" filler material. These are changes in essential variables established by the ASME Section IX code for which the code requires

procedure requalification. The NRC inspector determined that this had not been done. It was further learned by the inspector, during an inspection at the site on February 20-22, 1979, that the manufacturer has since performed a requalification of the weld procedure using the changed variables and that the results of qualification weld testing were signed by the testing laboratory as being acceptable by bend tests on January 18, 1979.

2. The NRC inspectors were informed by Husky Products personnel that two welders had performed welding on fourteen short radius three piece siderail channels for fittings, prior to qualification but that both welders successfully completed their qualification at a later date. The NRC verified that all welders had successfully completed qualification.

The above two items were cited as two examples of a single noncompliance to 10 CFR 50, Appendix B Criterion IX (Control of Special Processes) in an NRC letter to the licensee dated December 21, 1978 (See Appendix A of the attached report). The licensee's corrective action was reviewed and found acceptable by the NRC inspector during an inspection on February 20-22, 1979.

During the investigation, randomly selected samples of cable tray and fittings from the Zimmer site were destructively tested at the F&S Machining Company, Moscow, Ohio, on September 28, 1978. These tests were designed to pull resistance spot welds and Metal Inert Gas spot welds on straight tray and fittings apart to determine the quality of the welding. All of the

welds so tested were determined to be acceptable (See Section II paragraph 2.b of the attached report). Additionally, visual inspections were performed by NRC inspectors of TIG welds on three-piece siderails of fittings installed at the site. This visual inspection by the NRC inspectors indicated that these welds appeared sound and suitable for their function. Documents reviewed at the vendor plant verified that vendor QC personnel visually inspected such welds prior to the galvanizing of fittings installed at the site.

We concluded that the cable trays and fittings installed at the Zimmer facility are adequately fabricated and installed to provide assurance for the safe operation of the Zimmer facility.

Thomas E. Vandel

Thomas E. Vandel

Harvey M. Wescott

Harvey M. Wescott

Subscribed and Sworn to before
me this 4th day of June 1979.

Notary Public

My Commission expires: 1-8-80