Enclosure C-058

INCOMING TELEGRAM

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MR EDSON, CARE US ATOMIC ENERGY COMMISSION

WASHDC

ON JULY 21 AT 0652 THE GENERAL ELECTRIC TEST REACTOR SCRAMMED FROM A SPURIOUS INSTRUMENT TRIP EXPERIENCED DURING STARTUP.

THE REACTOR HAD BEEN SHUT DOWN SINCE 0142 TO CHECK ON THE PERFORMANCE OF THE PREASURIZED WATER LOOP.

WHEN THE REACTOR SCRAMMED THE SEATED LIGHT INDICATOR FOR CONTROL ROD NUMOER FIVE DID NOT ILLUMINATE. THE SEATED LIGHT IS ENERGIZED THRU A MICRO SWITCH ACTUATED BY THE CONTROL ROD SHOCK SECTION WHEN IT HAS TRAVELED THE FULL STROKE DOWNWARD IN THE CONTROL ROD GUIDE TUBE. MANUAL ACTUATION OF THE MICRO-SWITCH SHOWED THAT IT WAS FUNCTIONING NORMALLY. THREE SCRAM CHECKS WERE MADE WITH NUMBER FIVE ROD WITHDRAWN 32 INCHES, 15 INCHES, AND 10 INCHES AND WITH NORMAL PRIMARY SYSTEM FLOW. THE SEATED

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LIGHT DID NOT ILLUMINATE DURING THESE TESTS, NOR WAS THE MICRO-SWITCH ACTUATING ARM DISPLACED. A PREVIOUS INSTANCE OF A FOREIGN MATERIAL BECOMING LODGED IN THE DRIVE MECHANISM HADBEEN EXPERIENCED, AND IT WAS CONCLUDED THAT SUCH AN OBSTRUCTION HAD PREVENTED COMPLETE RUNDOWN OF THE DRIVE MECHANISM, THUS PREVENTING THE SHOCK SECTION FROM SEATING FULLY AND CONTACTING THE MICRO-SWITCH ACTUATING ARM. ACCORDINGLY, THE CONTROL ROD GUIDE TUBE CONTAINING THE POISON, FUEL, AND SHOCK SECTION WAS TRANSFERRED FROM THE CORE TO THE CANAL, AND THE ROD DRIVE MECHANISM WAS DISASSEMBLED AND INSPECTED. NO FOREIGN MATERIAL WAS FOUND DURING THE INSPECTION. THE MECHANISM WAS NEVERTHELESS THOROUGHLY CLEANED BEFORE REASSEMBLY AND REINSTALLATION.

THE EXISTING EMERGENCY PROCEEDURE FOR INSERTING THE CONTROL ROD FOLLOWING FAILURE TO SCRAM WAS NOT USED BECAUSE THE REACTOR [redacted] WAS COMPLETELY SHUT DOWN. THE REACTIVITY STATUS WAS KNOWN ACCURATELY FROM THE CRITICAL POSITION OF ABOUT 33 INCHES FOUND DURING THE START-UP IMMEDIATELY BEFORE, AND THE DISASSEMBLY AND INSPECTION DESCRIBED WAS PLANNED.

THE CONTROL ROD ASSEMBLY WAS REPLACED AND AN ATTEMPT WAS MADE TO RAISE THE ROD WITH THE DRIVE MECHANISM. THIS ACTION LIFTED THE GUIDE TUBE WHEN THE ROD POSITION INDICATOR SHOWED APPROXIMATELY 20 INCHES AND IT WAS THEN DETERMINED THAT THE GUIDE TUBE WAS BOUND TO ONE OR MORE OF THE THREE CONTROL ROD SECTIONS. THE CONTROL ROD WAS TRANSFERRED TO THE CANAL FOR INSPECTION. DURING TRANSFER, IT WAS NOTED THAT THE TOP OF THE POISON SECTION WAS ABOUT 18 INCHES BELOW THE TOP OF THE GUIDE TUBE. IN THE FULLY WITHDRAWN POSITION, THE TOP OF THE POISON SECTION IS AT APPROXIMATELY THE SAME HEIGHT AS THE TOP OF THE

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GUIDE TUBE. AT THE TIME OF THE ORIGINAL SCRAM, CRITICAL ROD POSITION WAS ABOUT 33 INCHES. ALL OF THESE DATA ARE CONSISTENT AND INDICATE THAT THE CONTROL ROD DROPPED ABOUT 12 INCHES BEFORE STICKING.

ON JULY 22, ABOUT 0100, THE POISON SECTION WAS UNLATCHED AND REMOVED FROM THE GUIDE TUBE WITH LITTLE DIFFICULTY. THE SHOCK SECTION WAS UNLATHED FROM THE FUEL SECTION AND WAS FOUND TO BE FREE; HOWEVER, ALL ATTEMPTS TO MOVE THE FUEL SECTION IN THE GUIDE TUBE WERE INEFFECTIVE.

A NEW CONTROL ROD ASSEMBLY WAS MADE UP FROM SPARE COMPONENTS AND INSTALLED IN THE REACTOR. OPERATION OF THE REPLACED CONTROL ROD WAS SATISFACTORY IN EVERY RESPECT.

THE GUIDE TUBE CONTAINING THE BOUND FUEL SECTION WAS CUT BEYOND BOTH ENDS OF THE FUEL SECTION FOR MORE DETAILED

EXAMINATIONS. THESE, AND PREVIOUS INSPECTIONS, FAILED TO DISCLOSE ANY REASONS WHY THE SECTION WAS STUCK. IT WAS APPARENT THAT THE GUIDE TUBE WOULD HAVE TO BE CAREFULLY CUT AWAY BEFORE ANY CAUSE OF THE MALFUNCTION COULD BE ESTABLISHED, AND THE HOT CELL FACILITIES WOULD BE REQUIRED TO CONDUCT SUCH AN EXAMINATION WITH THE NECESSARY CARE. PLANS WERE MADE TO TRANSFER THE UNIT TO THE RADIOACTIVE MATERIALS LABORATORY. THE PRINCIPAL SOURCE OF CONCERN IN THIS OPERATION, WAS THE DISSIPATION OF DECAY HEAT. IT WAS DETERMINED THAT THE SHIPMENT COULD BE SAFELY MADE IN AN AVAILABLE CASK PROVIDED THAT THE UNIT WAS IMMERSED IN WATER. DETAILED PROCEDURES WERE WRITTEN FOR CONTROLLING THE SHIPMENT, AND THE TRANSFER WAS EFFECTED AT 2100 ON JULY 25 WITHOUT INCIDENT.

ON JULY 26 THE GUIDE TUBE WAS CUT AWAY FROM THE FUEL

SECTION BY SLITTING THE TUBE DOWN OPPOSITE SIDES FACING THE SIDE PLATES. THIS AND SUBSEQUENT OPERATIONS WERE CONDUCTED IN A WATER-FILLED TRAY WHICH KEPT THE UNIT IMMERSED. UPON REMOVING THE GUIDE TUBE, TWO 6-32 SCREW-HEADS WERE FOUND LODGED BETWEEN A SIDE PLATE AND THE GUIDE TUBE. ONE OF THE TWO SCREW-HEADS WAS DEFORMED IN A WAY WHICH SUGGESTED THAT IT HAD BEEN ROLLED BETWEEN TWO FLAT PLATES. THE TWO SCREWS WERE BROKEN AT THE BASE OF THE HEAD WITH LITTLE OR NO THREADS ATTACHED.

IT SHOULD BE NOTED THAT A NUMBER OF 6-32 ALLEN-HEAD COUNTERSUNK SCREWS ARE USED IN THE ASSEMBLY OF THE FUEL SECTION. THE EIGHT SCREWS OF THIS TYPE WHICH ARE USED TO RETAIN THE TWO BOTTOM SPACER PLATES AT THE BOTTOM END OF THE SECTION ARE PARTICULARLY RELEVANT TO THIS INVESTIGATION. THE SCREWS ARE RETAINED BY A SINGLE STAKE. THE RECOVERED SCREW HEADS WERE IDENTICAL TO

[redacted]

THOSE USED FOR ATTACHING THE BOTTOM SPACER PLATES. TWO ADDITIONAL SCREWS WITH ABOUT 1/2 THE SHANK ATTACHED TO THE HEAD BECAME SEPARATED FROM THE FUEL UNIT IN THE COURSE OF HANDLING AND EXAMINATION IN THE HOT CELL. ALL SCREWS MISSING FROM THE FUEL SECTION AND THOSE RECOVERED CAN BE ACCOUNTED FOR.

EXAMINATION OF THE FUEL SECTION SHOWED THAT ONE OF THE INBOARD BOTTOM SPACER PLATE RETENTION SCREWS HAD BECOME UNFASTENED, AND THE SCREW SHANK, WITHOUT THE HEAD, HAD BEEN BENT OVER IN THE DIRECTION WHICH WOULD BE PRODUCED BY DOWNWARD MOTION OF THE FUEL SECTION. IMMEDIATELY FOLLOWING THE SCREW SHANK, IN A DIRECTION EXTENDING TOWARD THE CENTER OF THE ELEMENT AND ALONG THE EDGE OF THE SIDE PLATE, WAS A GOUGE APPROXIMATELY ONE INCH LONG. A GOUGE OF CORRESPONDING POSITION AND LENGTH WAS FOUND ON THE INNER WALL OF THE GUIDE TUBE.

ON THE BASIS OF THESE FINDINGS, IT IS FELT THAT THE AVAILABLE EVIDENCE SUPPORTS THE CONCLUSION THAT THE CONTROL ROD WAS STUCK BY THE WEDGING OF A NUMBER 8-32 SCREW BETWEEN THE FUEL SECTION AND THE GUIDE TUBE. IT I FURTHER CONCLUDED, THAT THE SCREW BECAME UNFASTENED BY FAILURE OF THE STAKING TO PREVENT ROTATION OF THE SCREW UNDER HANDLING OR HYDRAULIC VIBRATION CONDITIONS, AND THAT THE SCREWHEAD ENGAGED AND SUBSEQUENTLY GOUGED THE INNER GUIDE TUBE SURFACE. BENDING OF THE SCREW AND SUBSEQUENT SEPARATION OF THE SCREW HEAD FROM THE SHANK OCCURRED EITHER DURING THE SCRAM ACTION OR LATER ATTEMPTS TO FREE THE SECTION FROM THE GUIDE TUBE.

SINCE ABOUT SEVENTY FIVE FUEL SECTIONS HAVE BEEN USED IN THE PAST WITHOUT PREVIOUS TROUBLE OF THIS SORT, IT IS BELIEVED THAT THIS ONE FAILURE IN ABOUT 1000 INSTANCES DOES NOT INDICATE

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A CHRONIC PROBLEM AND THAT, IN THE ABSENCE OF OTHER LOOSE SCREWS, USE OF THE FUEL SECTIONS COULD CONTINUE.

ON THE BASIS OF THIS ANALYSIS, IT IS CONCLUDED THAT IMMEDIATE STEPS SHOULD BE TAKEN TO EXAMINE ALL SIX CONTROL RODS FOR LOOSE SCREWS IN ALL OF THE CONTROL ROD SECTIONS. AT THE SAME TIME, APPROPRIATE STEPS WILL BE TAKEN TO ASSURE THAT FUTURE SECTIONS HAVE SCREWS MORE SECURELY FASTENED. FURTHER OPERATION OF THE REACTOR WILL NOT TAKE PLACE UNTIL THE INSPECTION IS COMPLETED, THE RESULTS DISCUSSED WITH LOCAL AEC PERSONNEL, AND THE APPROVAL OF THE LOCAL AEC OFFICE OBTAINED. ALL SECTIONS WILL BE REINSPECTED WHENEVER REPLACEMENT OF CONTROL ROD FUEL ELEMENTS TAKES PLACE. THIS IS APPROXIMATELY EVERY TWO OR THREE CYCLES.

A LETTER CONFIRMING THIS MESSAGE WILL FOLLOW

LSTER KERNBLITH JR, MANAGER REACTOR TECHNICAL OPERATION VALLECITOS

ATOMIC LABORATORIES GENERAL ELECTRIC COMPANY PLEASANTON CALIF

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