Regulatory File Cy.

Consolidated Edison Company of New York, Inc.

Indian Point Station, Unit No. 2

Docket No. 50-247 Rec'd w/ ltr 3-19-71

Information Supplied in Response to Questions Asked by AEC Regulatory Staff at a Meeting on March 3, 1971 Concerning Fuel Loading and Sub-critical Testing

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Attachment A - is a brief description of what is intended to be done under a fuel loading authorization and a brief description of the radiological safety questions associated with fuel loading.

Attachment B - is a description of those systems, tests and operating procedures which must be completed prior to commencement of core loading, i.e., prior to moving fuel from the fuel storage building. While many other systems and tests are expected to be completed prior to core loading (see Attachment E), only those listed in Attachment B will be required.

Attachment C - is a list of plant status items. All items listed in Attachment C must be established in the status indicated prior to commencement of core loading and checked at the indicated frequency continually until either a plant operating license is granted or all fuel is removed from the reactor. All these items will be checked at the indicated frequencies by Con Edison personnel and the results of the checks logged. The General Watch Foreman will check and sign the log at the end of each shift.

The items listed in Attachment C insure the following:

1. Correct boron concentration is maintained in the reactor coolant system and connecting systems.

2. All possible paths for boron dilution are locked closed.

3. Power is available to required instrumentation.

4. At least one diesel generator is available for manual loading in the event of loss of offsite power.

5. Power to the control rod drives is disconnected except during testing of the control rods.

6. Status of the core and the reactor coolant system is monitored.

Attachment D - consists of approved core loading Procedures IPP-SU-5.0, 5.1, 5.2 and 5.4. These procedures have been modified to take into account the additional precautions that will be taken to allow core loading prior to completion of construction. All other tests will be performed under existing procedures. The system requirements listed in Attachment B and the plant status items listed in Attachment C will be required at all times subsequent to core loading.

Additional precautions and requirements for individual tests are listed in the procedures for those tests.

Attachment E - lists:

1. Construction planned before, during and after core loading.

2. Systems expected to be tested and functional prior to core loading.

3. Tests planned to be performed after core loading.

It should be noted that the lists in Attachment E are planned status at the time of fuel loading and not required status, except that Item I.A.1.a of Attachment E lists the construction which must be completed in order that the systems listed in Attachment B be functionally complete. Attachments B, C and D list all prerequisites to core loading. Subsequent to core loading, any construction and/or testing not required for core loading may be completed in any sequence as long as the approved test procedures are followed and the requirements of Attachments B and C are observed. Since these requirements eliminate the possibility of an accidental core criticality as a result of construction and testing activities, there will be no radiological hazard associated with any of these operations.

ATTACHMENT A

The following is a description of the activities to be conducted under a fuel loading authorization and a discussion of the radiological safety implications of these activities.

The proposed core loading and subcritical testing consists basically of the following:

(1) Loading fuel into the reactor vessel.

(2) Closing the reactor vessel and establishing temperature and pressure in the reactor coolant system by operating the reactor coolant pumps. This involves only heat from the pumps in order to allow testing of the control rods and instrumentation under realistic conditions.--No heat will be produced in the core at any time.

(3) Testing and calibrating some of the instrumentation in the core and the reactor coolant system.

(4) Performing various tests on the control rods and control rod drives.

Throughout these operations, the reactor will be maintained subcritical by a large margin. Since the reactor can produce no power in the subcritical condition, fission products or other radioactivity will not be produced.

Since no radioactivity is produced the loss-of-coolant accident and all other accidents analyzed in the FSAR would result in no release of radioactivity since none is available to be released. Containment and engineered safety features are not required to function to achieve this result.

Two neutron absorbers will be used to prevent criticality and thus to prevent the production of any fission products in the core. The two neutron absorbers are: (1) Boric acid dissolved in the water in the reactor coolant system; and (2) Control rods inserted in the reactor core.

Since the reactor remains subcritical, even with all control rods removed, no accident involving the control rods can cause criticality. In any case, the control rods will not be moved from the core except during testing. During testing, the core will be maintained subcritical due to the boric acid.

Dilution of boric acid in the core is prevented by isolating the reactor from any potential sources of unborated water. This will be accomplished by closing valves and locking them closed. As a backup, the following precautions will also be taken:

(1) A system to inject more boric acid into the reactor will always be available, if required. Boric acid concentration will be continually monitored.

(2) The neutron flux in the reactor core will be monitored at all times.

(3) Plant security measures will be established and an AEC licensed operator will be on watch at all times during core loading.

In summary, the proposed core loading and pre-critical testing activities represent no radiological hazard.

ATTACHMENT B

The following systems must be functionally complete and functionally tested prior to core loading.

- Reactor Coolant System
- Residual Heat Removal System
- Component Cooling System
- Essential Loop of Service Water System
- Emergency Diesel Generators
- Source Range Nuclear Instrumentation
- Primary Sampling System
- Fuel-Handling System
- All portions of the Chemical and Volume Control System shown in FSAR, Figure 9.2-1.
- Containment and Fuel Storage Building Area Radiation Monitors

A System is functionally complete if it is capable of performing its functions. Such things as pipe restraints and insulation are not required for functional completeness. Functional tests which must be performed prior to core loading are all Phase II tests in the currently approved startup test procedures which relate to the above systems and which are not set forth in the procedures as being performed after core loading. Subsequent to the commencement of core loading, all the above systems will be operated only by Con Edison personnel and under existing Con Edison Operating Procedures.

ATTACHMENT C

I. Items to be checked and logged monthly.

1. Start diesels and load manually with available plant loads.

2. Check station batteries and record voltage of each battery.

II. Items to be checked and logged daily.

1. Reactor Coolant System, Refueling Water Storage Tank and Four Accumulators boron concentration (must be at least 2000 ppm).

2. Boric acid tanks concentration (must be at least 12% boric acid).

3. Reactor Coolant System chemistry (must be within limits in the proposed technical specifications).

III. Items to be checked and logged once per watch.

1. Pressurizer level.
2. Reactor coolant system pressure
3. Reactor coolant system temperature
4. Source range neutron monitors
5. The following valves must be locked closed.

311A	385
311B	386
323A	393
323B	394A
340A	394B
340B	315
343A	994A
343B	1800
282	1841
376	1802A
1132	885A&B
285	845
317	1821
318	1831
326	350
330	841
339	1733
356	PW84
363	873A
365	1802B
378	
381	
383	

6. Power supplies to Control Rod Drives locked out, (except during control rod tests).

ATTACHMENT D

INDIAN POINT

NUCLEAR GENERATING STATION

UNIT NO. 2

NUCLEAR STEAM SUPPLY SYSTEMS (NSSS)

INITIAL CORE LOADING SUMMARY

COPY NUMBER 3

APPROVED FOR EXECUTION

BY

JOINT TEST GROUP

John M. Makepeace	3/18/71
CON. EDISON PRODUCTION	DATE
A. D. Kobler Jr.	3/18/71
CON. EDISON CONSTRUCTION	DATE
WEDCO OPERATIONS	DATE

PREPARED BY R. E. Barclay

APPROVED BY [illegible]

DATE August 28, 1970

IPP-T.P.-5.0

Revision 1 - 10/22/70

Revision 2 - 3/12/71

Revision 3 - 3/18/71

At all times during core loading, one licensed Senior Oper. will be available to monitor core loading operations. In addition, a licensed operator will be available in the control room to monitor the permanent nuclear instrumentation channels.

3.0.1 The following outline is a description of operating personnel and responsibilities: (See Figure 1)

CON EDISON

a. Station Manager - in charge of administering all phases of operation, training and maintenance for Unit I and Unit 2.

b. Unit No. 2 Startup Manager - Holds ultimate responsibility for on-site safety and direction of all Unit No. 2 Operations.

c. Unit No. 2 Operations Superintendent - licensed Senior Operator assists the Unit No. 2 Startup Manager.

d. Unit No. 2 Watch Foreman -licensed Senior Oper.-responsible for shift supervision of operators and licensed activities.

e. Operators - One licensed operator is responsible for monitoring the permanent nuclear instrumentation in the control room, and maintain 1/m plot and count rate data during core loading per attached Addendum I. Remaining operators to perform fuel loading

INITIAL CORE LOADING SUMMARY

1.0 REFERENCES

None

2.0 PURPOSE

The purpose of this outline is to summarize the general organization, responsibilities, authority, preparations and operations required to perform the initial core loading.

3.0 ORGANIZATION, RESPONSIBILITY AND AUTHORITY

Core loading activities will be conducted by Con Edison personnel under the technical ~~supervision~~ assistance of WEDCO. Con Edison will furnish licensed technical assistance, operators and other nuclear trained personnel to perform handling of fuel during core loading. Con Edison will also assist by regulating access to the controlled areas (See Figure 3), by placement of approved signs or barriers and establishment of detailed procedures as required and will provide security, radiation protection, chemistry, and cleanup services as needed including, but not limited to personnel monitoring and protective clothing during core loading operations.

e. ~~f.~~ (con'd) operations per attached Addendum I. Reports to and under direction of Unit No. 2 Watch Foreman.

f. ~~g.~~ Reactor Engineer - Licensed Senior Operator - responsible to the Station Manager for fuel accountability and reactor technology.

g. ~~h.~~ Supervisor of Radiation Protection - Responsible for radiation protection and routine monitoring.

h. ~~i.~~ Supervisor of Chemistry - Responsible for water treatment and conditioning, operation of laboratories and process chemistry.

Core Loading operations will be conducted on three 8-hour shifts or two 12-hour shifts depending upon the available qualified personnel.

WEDCO (See Figure 1)

a. Operations Manager - Responsible for the overall coordination and scheduling of all startup work and assignment of specific personnel to startup tasks.

b. Refueling Manager - Responsible for technical operations advice to Operations Manager in all aspects of fuel handling measurements and all direct support activities for core loading.

c. Shift Director - Responsible for detailed coordination of WEDCO technical support and technical supervision for core

loading. Resolve any difficulties which may arise during core loading and support operations.

d. Lead Fueling Engineer - Responsible for supervision and coordination of all fuel handling operations, necessary data acquisition and analysis related to core loading.

e. Specialists - Specialists may be assigned by WEDCO in the following areas to augment the plant operating staff to ensure a safe and efficient initial core loading operation:

1) Operations and Measurements
2) Fuel Handling Equipment
3) Physics
4) Chemistry
5) Instrumentation and Control
6) Radiation Protection
7) Electrical
8) Mechanical

3.0.2 CORE LOADING

Core loading will encompass transfer of new fuel assemblies from the spent fuel pit to the core. Detailed handling of fuel assemblies and insert devices will be in accordance with steps outlined in Core Loading Procedures 5.1 through 5.5, in Operating Instruction F 1 through F 7, and in vendor's instructions for fuel handling tools and equipment. All operating personnel will have been thoroughly instructed in all aspects and will have participated in a dress rehearsal. All handling of fuel assemblies and/or insert components will be verified and recorded as specified by detailed instructions. Prior to core loading the location, serial number of the fuel assembly and serial number of

the insert will be verified and recorded on a Spent Fuel Pit Diagram. During core loading, data will be kept as a running inventory of the location and identifying number of each assembly and insert in accordance with the step-by-step procedure for core loading described in IPP-TP-5.1 - Initial Core Loading Sequence.

Proper orientation of elements in the core is shown in the attached Figure 2. The reference for all loading is W drawing 685J178, revision (2). Prior to installation of the upper internals and control rod drive shafts, WEDCO and Con Edison shall agree on a detailed map of the core as loaded, on conformance to the general requirements of 685J178, revision (2), and on the absence of foreign objects or unexplained indications in the core.

3.0.3 VISITORS

Personnel not directly associated with any of the groups participating in core loading will be classified as visitors. Visitors desiring entrance to controlled areas during core loading must have prior clearance by the Station Manager or the Unit 2 Startup Manager. ~~through WEDCO and/or Con Edison management.~~ Visitor entry will be coordinated through the Con Edison management who in turn will contact and inform the Unit No. 2 Watch Forman who the visitors will be.

Visitor hours will be limited to a specific time of day so that loading operations can be performed as efficiently as possible. All visitors must be escorted by someone on the approved access list, obey all signs and

stay behind barriers. Visitors must sign a log book at the controlled area entrance; obtain a dosimeter and record their time in and out of the controlled areas. Visitors will record their dosimeter readings on entry into the area and upon leaving the area.

3.0.4 ACCESS CONTROL

Access to controlled areas will be limited to personnel on the access list or approved visitors as noted in Section 3.0.3. Controlled areas are the fuel storage bldg. and the containment bldg. (Elev. 95' and above). Access to the fuel storage bldg. or the containment bldg. will be administered through the Unit 2 security room which will be established in the drumming station (PAB). The security room will be manned on an around the clock basis by a health physics technician who will issue dosimeters and film badges and numbered colored badges in accordance with approved access lists (film badges and dosimeters will be required only when handling fuel).

No construction activities will be permitted in the fuel storage bldg. or in the containment bldg. during the intervals between the start of installation of the lower internals package and final placement of the reactor vessel head on the reactor vessel without prior review and approval by the Nuclear Facilities Safety Committee of Con Edison. At present, no construction activities

have been approved by the Nuclear Facilities Safety Committee for this period. Maintenance activities in the fuel storage bldg. and containment bldg. which are directly related to fuel loading operations will be permitted provided such personnel engaged in these activities are on the approved access list and are logged in and out at the security room. During work of this nature additional measures will be taken as necessary to protect the cleanliness and structural integrity of the reactor internals and core. For example when the temporary support stand for the lower internals package is dismantled, the reactor vessel head or other suitable cover will be placed on the reactor vessel to preclude any possible damage to the vessel internals and core.

A guard will be posted in the containment bldg. at the personnel air lock on the 79' elev. to monitor all persons entering containment. Those persons approved for access to the controlled areas in the containment bldg. will be identified by a numbered badge (Red) and will be checked by the guard to see that he has in his possession a dosimeter and film badge. Persons whose mission does not require access to the controlled area will be identified by numbered green badges.

Entry procedures for the fuel storage bldg. will essentially be the same as that for the containment bldg. except that a guard will not be required as the normal access door to this building will be kept locked and entry will be supervised by Con Edison personnel stationed in the building.

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Requirements for access are:

a) Persons on the access list entering the controlled area of the nuclear plant will be logged in and out at the security room. Assigned film badges and dosimeters will be picked up before entering and left at the end of the working day.

b) Personnel participating in fuel loading in and around the refueling canal and reactor vessel area will be clothed in coveralls, caps, gloves and shoe covers. Film badges and dosimeters will be secured with tape. Eyeglasses will either be taped or strapped in place.

c. Personnel visiting the vapor container and remaining outside of the roped off area shown in Fig. 3 are required to wear lab coats.

d. Personnel handling fuel in spent fuel building will wear lab coats and gloves. Personnel working in the spent fuel pit will be clothed in coveralls, caps, gloves and shoe covers.

e. There will be no eating, drinking or smoking in the controlled areas at any time.

f. All precautions will be taken to prevent loose or foreign objects from falling into the core or core area.

g. All signs and barriers will be strictly observed by all personnel.

3.0.5 RADIATION PROTECTION

a. All radiation monitors in controlled areas will be operational, calibrated, and monitored in the control room Audible alarms will be operational in fuel handling areas.

b. Radiation surveys, protective clothing, access and cleanliness control will be provided by the plant radiation protection, chemistry, maintenance and security staff under the general direction of Con Edison plant operating management.

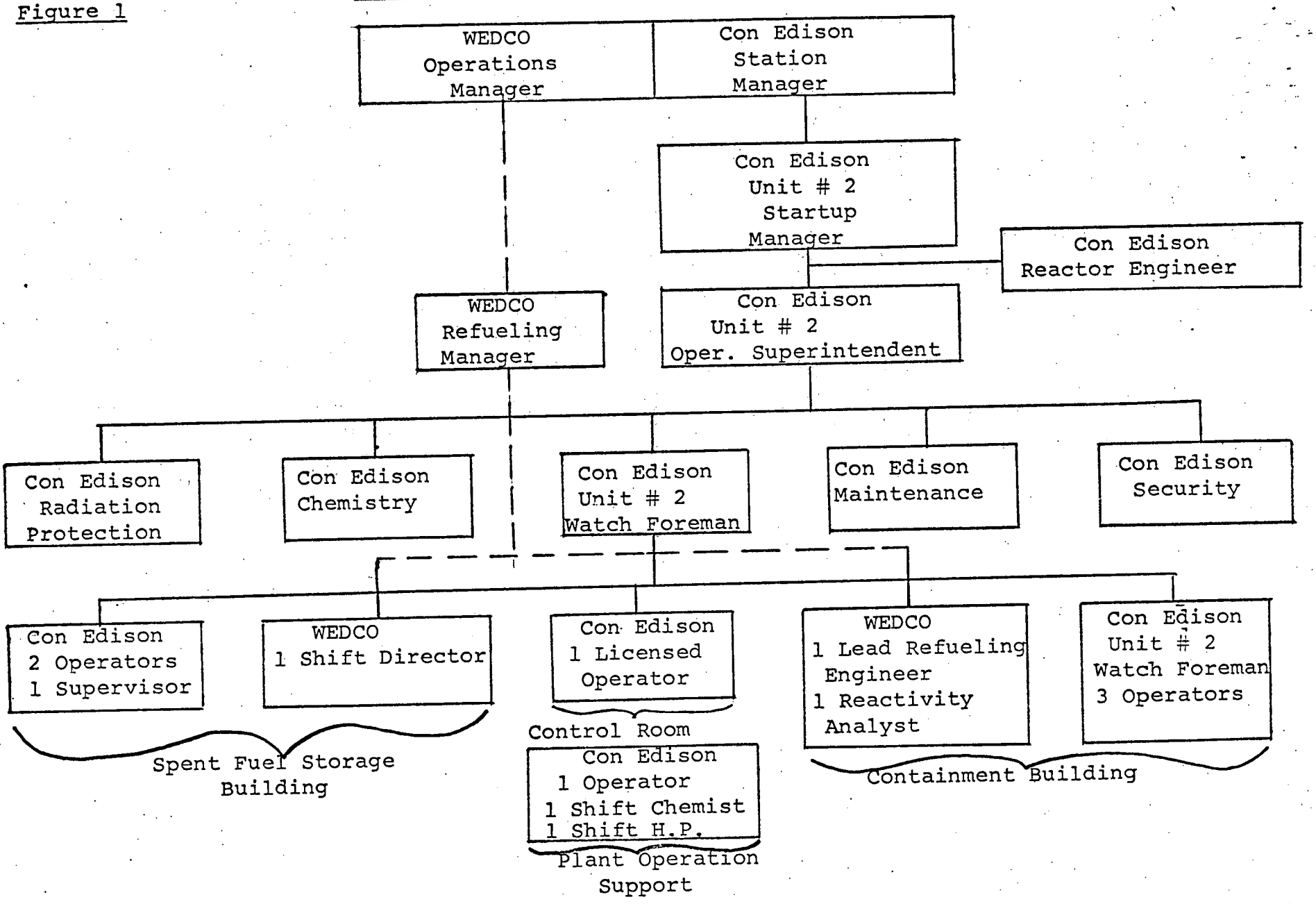
c. Portable radiation survey instruments will be operational and calibrated. Proper knowledge of use by the Radiation Protection Staff will be verified.

3.0.6 FUEL LOADING JOB DESCRIPTION

a. The job description for the various fuel loading work stations is described in the attached Addendum 1.

Figure 1

SHIFT ORGANIZATION FOR IPP #2 CORE LOADING



NOTE: One licensed operator will be in the control room to monitor the permanent nuclear instrumentation and - one licensed senior operator will be in the vapor containment building to monitor the core loading operations and temporary nuclear instrumentation.

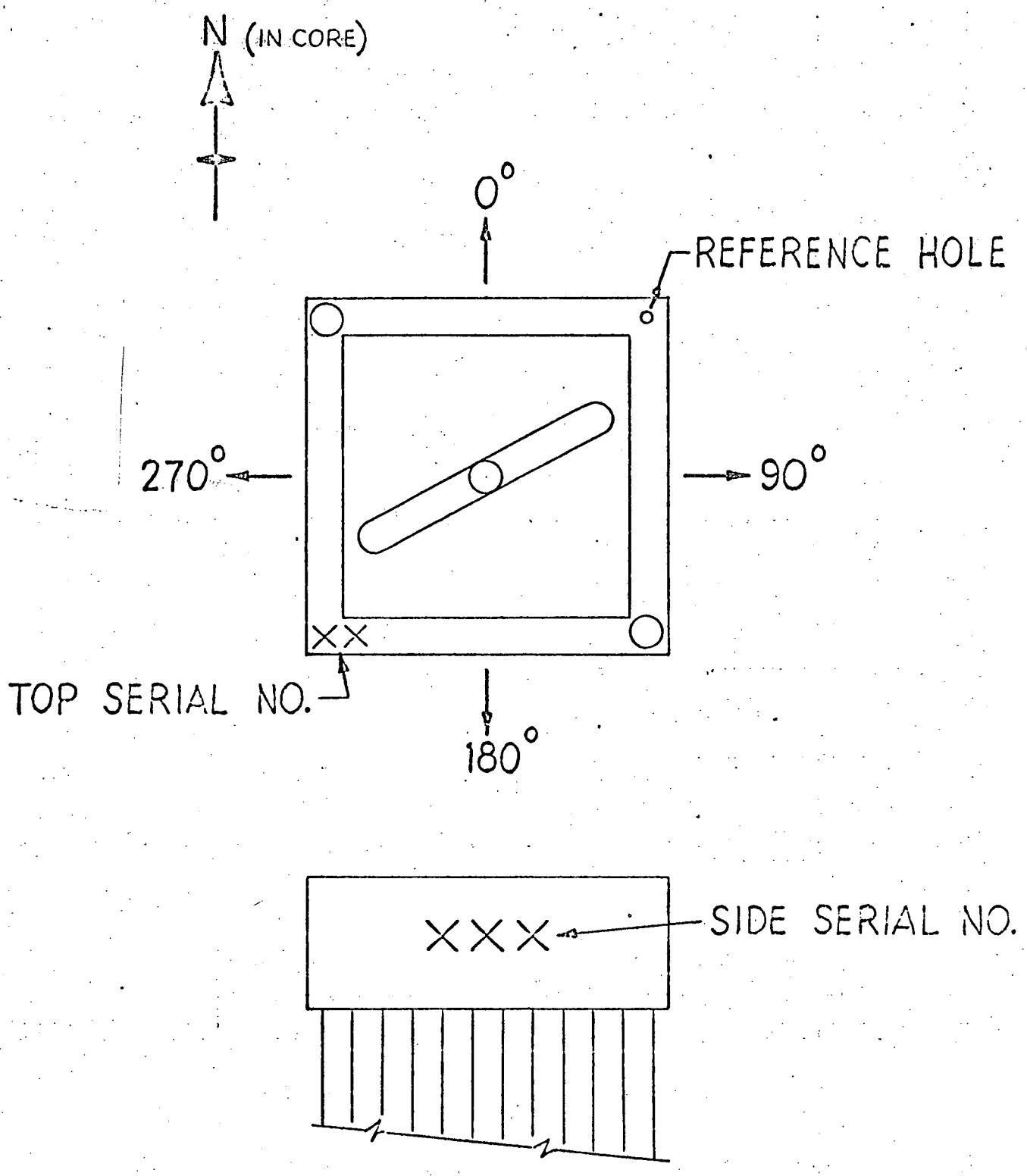


FIG. 2

FUEL & IDENTIFICATION NO. ORIENTATION IN CORE

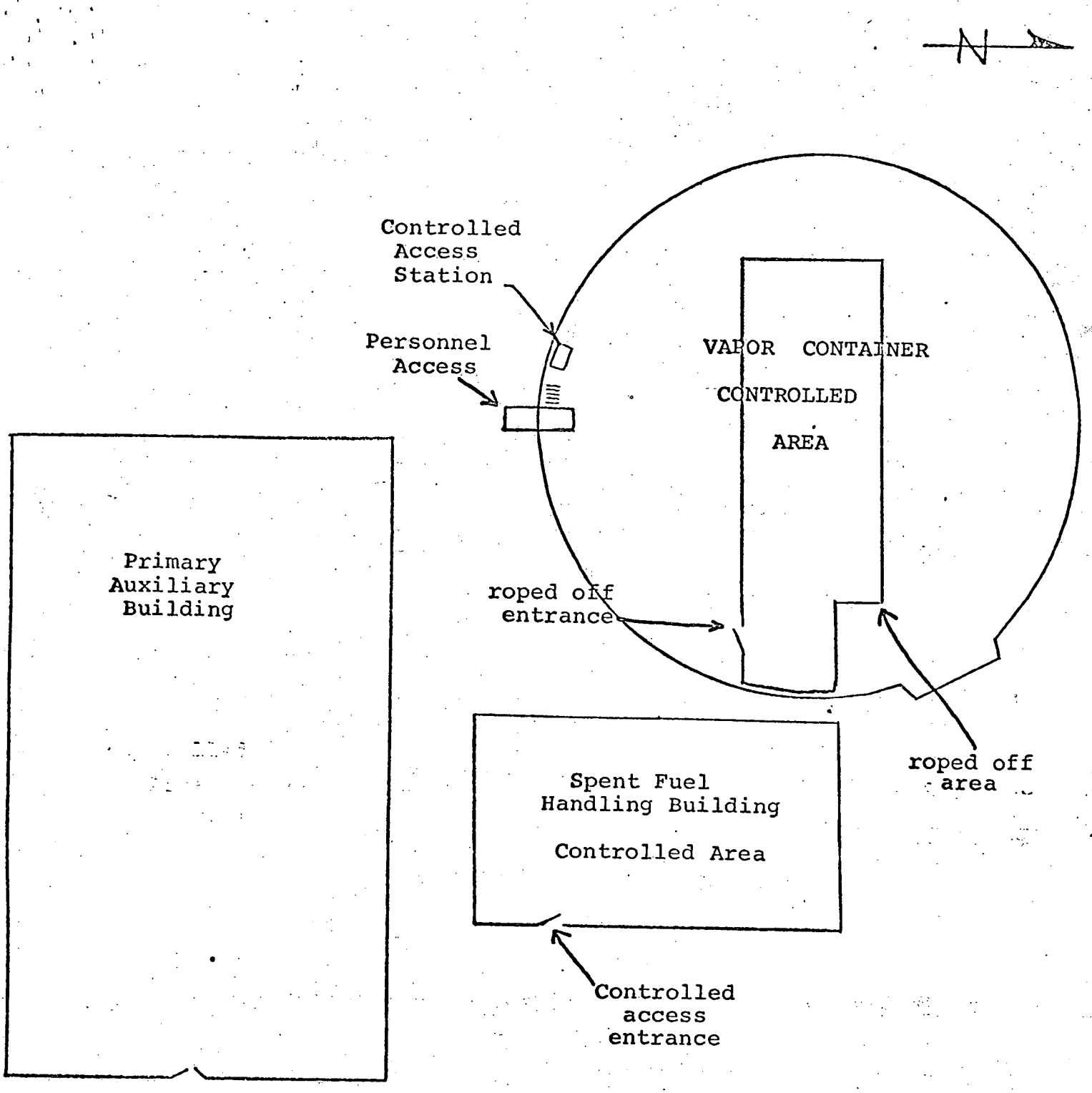


Figure 3

CONTROLLED AREAS FOR FUEL HANDLING

DATA SHEET

1. Verify the core is loaded in accordance with Drawing 685J178, Rev. 2, and the absence of foreign objects in the core.

WEDCO Observer _____ Date _____

Con Edison Observer _____ Date _____

ADDENDUM 1

FUEL LOADING WORK STATION JOB DESCRIPTION

A. SPENT FUEL PIT RACK - (1 Con Edison Operator)

1. Identify element and insert; verify proper sequence and initial data sheet in core loading procedure.
2. Verify spent fuel handling tool is properly latched.
3. As fuel element is being raised, remove protective covering and carefully perform final inspection for any damage and/or debris.
4. Remove any debris and record in "remarks" column.
5. If any damage is observed, notify shift supervisors(Con Edison and WEDCO) before proceeding with loading operation.
6. Direct SFP bridge operator in movement of fuel from spent fuel pit area.
7. Notify upender operator identifying element and insert for status display.

B. SPENT FUEL PIT BRIDGE - (1 Con Edison Operator)

1. Attach spent fuel handling tool to SFP bridge monorail crane and verify tool operation.
2. Position bridge and tool over proper element in rack as directed by man in pit.
3. Position tool in proper orientation to engage element nozzle.
4. Latch handling tool to element nozzle.
5. Upon direction of SFP rack personnel, raise element to full up position.
6. Move element to position over transfer basket in upender frame.

7. Verify proper orientation of element and lower into transfer basket.

8. Disconnect tool, raise clear of element and sluice gate and reposition bridge and crane over next assembly.

C. SPENT FUEL PIT UPENDER - (1 Con Edison Supervisor)

1. Maintain communications with other fuel loading stations.

2. Verify proper orientation of element in transfer basket.

3. Open fuel transfer gate valve.

4. Lower element to horizontal position on conveyor car.

5. Notify V.C. upender operator that element is ready for transfer.

6. Maintain status identifying element and insert.

7. Upon receipt of conveyor car raise basket to vertical position in preparation for next fuel element.

D. VAPOR CONTAINER UPENDER - (1 Con Edison Operator)

1. Maintain communications with other fuel loading stations.

2. Transfer conveyor car to V.C.

3. Raise basket to vertical position and maintain close surveillance of operation.

4. Verify element number, insert and proper orientation with binoculars and inform manipulator crane operator.

5. Initial data sheet in core loading procedure.

6. Observe manipulator gripper latching operations and subsequent removal of element from basket.

7. Lower empty basket to horizontal position and return conveyor car to SFP in coordination with SFP operator.

E. MANIPULATOR CRANE - (1 Con Edison Operator, 1 WEDCO Lead Refueling Engineer)

1. Maintain communications with other fuel loading stations.
2. Perform operational checkout of manipulator crane.
3. Position manipulator crane over element in transfer basket.
4. Lower manipulator gripper into element nozzle.

   CAUTION: Entry into element nozzle is to be done only in slow speed.
5. Engage gripper and raise to full up position.
6. Move crane over core to proper fuel element position.
7. Lower element to full down position and disengage upon approval from reactivity analysts.
8. Initial data sheet in core loading procedure.
9. Reposition manipulator crane over transfer basket in preparation for next element.

F. CAVITY FLOOR - (1 Con Edison Operator)

1. Final verification of fuel element number, orientation and core location.
2. Initial data sheet in core loading procedure.
3. Assist in relocation of in-core temporary instrumentation and/or underwater lighting.

G. REACTIVITY ANALYST IN VAPOR CONTAINMENT - (1 WEDCO)

1. Take count rate after each element insertion.
2. Mark count rate recorder chart with element number.
3. Maintain and evaluate 1/M plot, count rate data, RCS temperature and boron concentration.

4. Notify manipulator crane operator to disengage gripper from element when count rate is stable.

5. Maintain communications with control room.

6. Maintain core loading status.

H. CONTROL ROOM - (1 Licensed Plant Operator)

1. Maintain normal plant operations and conduct periodic checkoff.

2. Monitor and take count rate from plant source range channels after each element insertion.

3. Maintain communications with V. C.

4. Maintain core loading status.

5. Maintain 1/M plots for plant source range channels.

6. Enter element number, core position and time in plant log.

I. PLANT OPERATION SUPPORT - (1 Con Edison Shift Chemist)

1. Obtain borated water samples at the locations specified in procedure IPP-SU-5.2, Section C.

J. PLANT OPERATION SUPPORT - (1 Con Edison Operator)

1. Verify plant status, as specified in procedure IPP-SU-5.2, Section B, once every 12 hours and report findings to Licensed Senior Reactor Operator.

K. SHIFT SUPERVISOR - (1 Licensed Senior Operator, 1 WEDCO Supervisor)

1. Maintain overall supervision and coordination of all fuel loading and support operations.

2. Resolve any anomalous conditions that may arise. Concurrence of Con Edison and WEDCO supervision required for all operations.

INDIAN POINT

NUCLEAR GENERATING STATION

UNIT NO. 2

NUCLEAR STEAM SUPPLY SYSTEMS (NSSS)

INITIAL CORE LOADING

COPY NUMBER 1

APPROVED FOR EXECUTION

BY

JOINT TEST GROUP

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WEDCO OPERATIONS

PREPARED BY F. J. Frank

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DATE 9/25/70

IPP-SU-5.1

12/9/70 - Rev. 1

3/12/71 - Rev. 2

3/18/71 - Rev. 3

IPP-SU-5.1

INITIAL CORE LOADING

1.0 REFERENCE

1.1 IPP Core Loading Drawing W No. 685-J-178.

1.2 IPP-SU-5.0, Core Loading Summary.

1.3 Pre-Requisite and Periodic Checkoff List, IPP-SU-5.2.

1.4 Sampling of Reactor Vessel Prior to Core Loading, IPP-SU-5.4.

1.5 Primary Source Installation Procedure. Volume II Plant Manual Instruction No. F-7.10.

2.0 PURPOSE

To establish the conditions under which installation of the initial nuclear fuel charge is to be accomplished and to specify the sequence of events which constitutes the Initial Core Loading Program.

3.0 CONDITIONS

The following conditions are to be established prior to the start of core loading operations.

3.1 A core loading control station has been established on the loading deck and has been provided with the following facilities:

3.1.1 Visual displays (in the form of count rate meters and/or count scalers) of the response of at least two of the three Westinghouse supplied temporary in-core nuclear channels.

3.1.2 Visual display (in the form of a strip chart recorder) of the response of at least one of the three temporary in-core nuclear channels.

3.1.3 Audible indication of the response of one of the temporary in-core nuclear channels.

3.1.4 Voice communication links connecting the control station on the loading deck with all fuel handling stations.

3.2 Provision has been made for monitoring the plant source range nuclear channels by means of a voice communication link

between the control station and the control room.

3.3 The following system conditions have been established:

3.3.1 The appropriate internal structures for fuel assembly placement have been installed in the reactor vessel and the necessary handling tools are available for immediate use.

3.3.2 Proper cleanliness of the reactor vessel, the internal support structure, the Reactor Coolant System, all components to be loaded into the reactor vessel and all tools to be used in loading has been obtained.

3.3.3 The water in the reactor vessel and reactor coolant loops has been borated to a boron concentration of 2000 parts per million or greater. The water level shall be maintained above the center line of the reactor vessel nozzle.

3.3.4 The residual heat removal loop is in service with one pump in continuous operation.

3.3.5 The Reactor Coolant System has been isolated from potential sources of unborated water by locking the valves listed in IPP-SU-5.2 Part B.1.d.

3.3.6 Normal plant source range nuclear instrumentation and two special in-core source range channels (designated below as Channels A and B) are calibrated and are operational.

A third special in-core source range channel (designated below as Channel C) is calibrated and operational and is available for supplementary service and/or backup in the event of failure of Channel A or B. All channels shall be calibrated in accordance with vendor's technical manual.

3.3.7 Suitable weighted in-core detectors for each of the three temporary in-core channels are available for insertion in the core.

3.3.8 The equipment door and one door in each of the personnel air locks are closed during actual fuel transfer and up to emplacement of the reactor head.

3.3.9 At least one flow path for boric acid addition is operable.

3.4 All required preloading tests have been satisfactorily completed.

3.5 A detailed pre-loading checkoff list indicating the required status of all systems and auxiliary equipment affecting the core loading operation has been prepared. The pre-loading checkoff list shall include, but should not be limited to, provisions for verification and certification of all items specified in conditions 3.3 and 3.4 above. See reference 1.3.

3.6 A detailed periodic checkoff list indicating the current status of critical systems and auxiliary equipment affecting the core loading operation has been prepared. The periodic checkoff list shall include, but should not be limited to, the following items:

3.6.1 Verification by visual examination that all locked and/or tagged valves are in the appropriate status to prevent an unauthorized change in boron concentration in the reactor vessel.

3.6.2 Verification by direct test of the operational reliability of the communications systems linking the control station on the loading deck with the fuel handling stations and the control room. See reference 1.3.

3.7 This procedure has been thoroughly discussed and is understood by fuel handling and data analysis personnel.

4.0 PRECAUTIONS

4.1 All water in the Reactor Coolant System shall be borated to a concentration of at least 2000 parts per million natural boron during the loading of the initial core.

4.2 Prior to the start of fuel loading, the normal plant source

range nuclear detectors shall be located in the appropriate thimbles and fixed at axial location corresponding to the lower quarter plane of the core.

4.3 At appropriate points during core loading four primary plutonium 238-beryllium neutrom sources one rated at approximately 100 curies (core location K-3) and three rated at approx. 50 curies (core location F-3, F-13 & K-13) at the time of core loading shall be inserted in the core.

4.4 Burnable poison assemblies or rod cluster control assemblies, as appropriate, shall be inserted in fuel assemblies so designated in the core loading sequence prior to the loading of such fuel assemblies into the core.

4.5 After loading the initial nucleus of eight fuel assemblies (completion of loading Step 12e), minimum count rates of two counts per second, attributable to core neutrons, are required on at least two of the available nuclear channels at all times during subsequent core loading.

4.6 Source range detector count rates shall be monitored during all operations involving loading fuel into the core. Inverse count rate monitoring shall be conducted subsequent to each fuel addition after the loading of the initial nucleus of eight fuel assemblies, as shown in the Core Loading Sequence and Core Loading Diagrams.

4.7 If, at any point in core loading after loading the initial nucleus of eight fuel assemblies, an unexpected increase in count rate by a factor of five occurs on any one responding nuclear channel, or if an unexpected count rate by a factor of two occurs simultaneously on all responding channels, the loading procedure will be suspended pending evaluation by the responsible IPP Operations Supervisor and by the assigned reactivity analyst. If in the judgement of the operating supervisor and reactivity analyst, the core is in an unsafe condition, ~~or technical specifications are approached~~, the last assembly loaded will be removed for further evaluation of the situation. Loading operations will not be resumed without specific authorization by the responsible IPP Operations Supervisor.

4.8 Should the loading operation be interrupted for a period exceeding four hours, new normalized baseline data shall be secured before loading is resumed. If the more recent data indicates an unexplained excessive deviation from the corresponding earlier data, the situation will be appraised by the IPP Operations Supervisor and by assigned reactivity analyst before loading is resumed. If deemed necessary the last previous loading step shall be repeated.

4.9 If the loading operation is suspended, source range detector count rates shall be monitored on an hourly basis.

4.10 A new baseline will be established for the inverse count rate any time a detector or primary source assembly is repositioned after the initial nucleus has been established.

4.11 An evacuation alarm is coupled to the plant source range channels with a setpoint of five times the current count rate to provide automatic indication of high count rate during fuel addition. The initial setting for the evacuation alarm shall be set at five times the count rate which exists after the first source bearing assembly has been fully inserted into the core.

4.12 If an evacuation alarm occurs before both plant source range channels are providing an adequate response, the reactivity analyst shall remain at his post if in his judgment the situation does not constitute an unsafe condition.

5.0 INSTRUCTIONS

5.1 Ascertain that all specified conditions have been satisfied and that the preloading checkoff list has been signed by the responsible IPP operations personnel. Reference 1.3.

5.2 Load the initial fuel and source assemblies as specified in the Core Loading Sequence. Monitor count rates during fuel loading. Each fuel assembly installed in the reactor vessel will not be disengaged from the manipulator crane until the reactivity analyst has evaluated the response on the available nuclear instrumentation channels.

5.3 Continue to load fuel assemblies, with a preloaded Rod Cluster Control spider, burnable poison assembly, thimble plug device

or secondary source spider, as appropriate, in the order dictated by the Core Loading Sequence. Conduct inverse count rate monitoring after each fuel addition.

At any time, if the IPP Operations Supervisor or the assigned reactivity analyst suspects that continued operation will involve undue risk to personnel or equipment ~~could compromise the Technical Specifications or license provisions~~, operations will be suspended pending resolution.

5.4 At least once during each shift, verify that all conditions itemized on the periodic checkoff list are as specified. Every four hours, sample the water from the residual heat removal pump sample point for boron concentration.

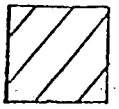
5.5 If after loading the initial nucleus of eight fuel assemblies (after loading step 12e) fewer than 1 count per second is obtained on the plant source range detector nearest the nucleus and if all checks and precautions have been examined, attempt to increase channel count rate by;

5.5.1 Replacement of plant source range detectors with high sensitivity detectors.

5.5.2 Dilution of the reactor coolant boron concentration to 2000 ppm natural boron if the boron concentration at the start of loading is significantly higher than this concentration. If dilution is necessary, all fuel shall be removed from the core before dilution is initiated.

NOTE: Alternative 5.5.1 may be pursued while core loading proceeds provided at least two of the temporary detectors are in service. Alternative 5.5.2 requires temporary suspension of loading operations.

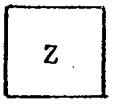
CORE LOADING LEGEND



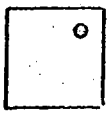
Assembly loaded in permanent position in previous step.

Assembly loaded in temporary position in previous step.

Not as yet loaded.



Assembly loaded into position during loading step number Z.



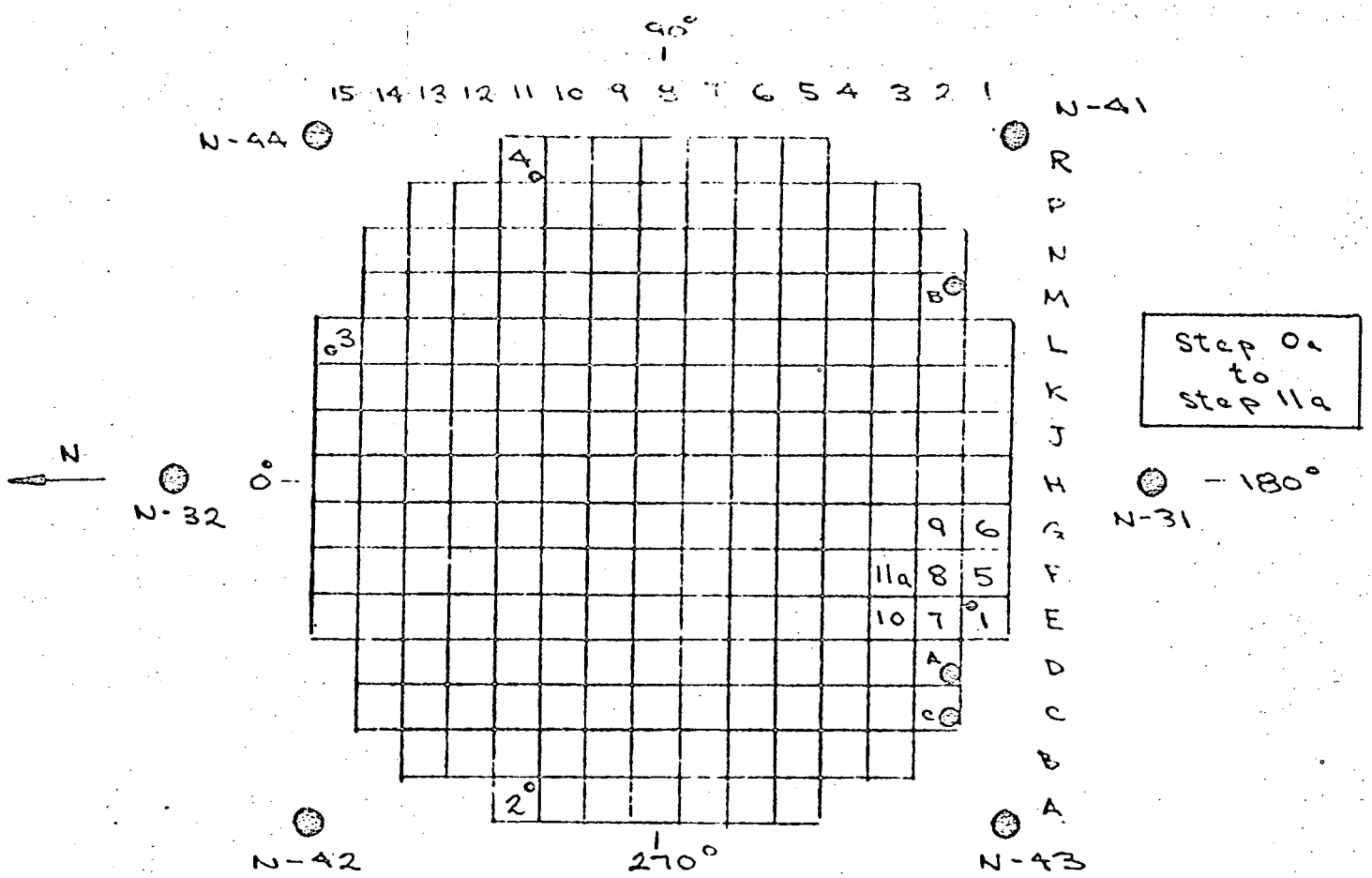
Assembly with a primary source insert.

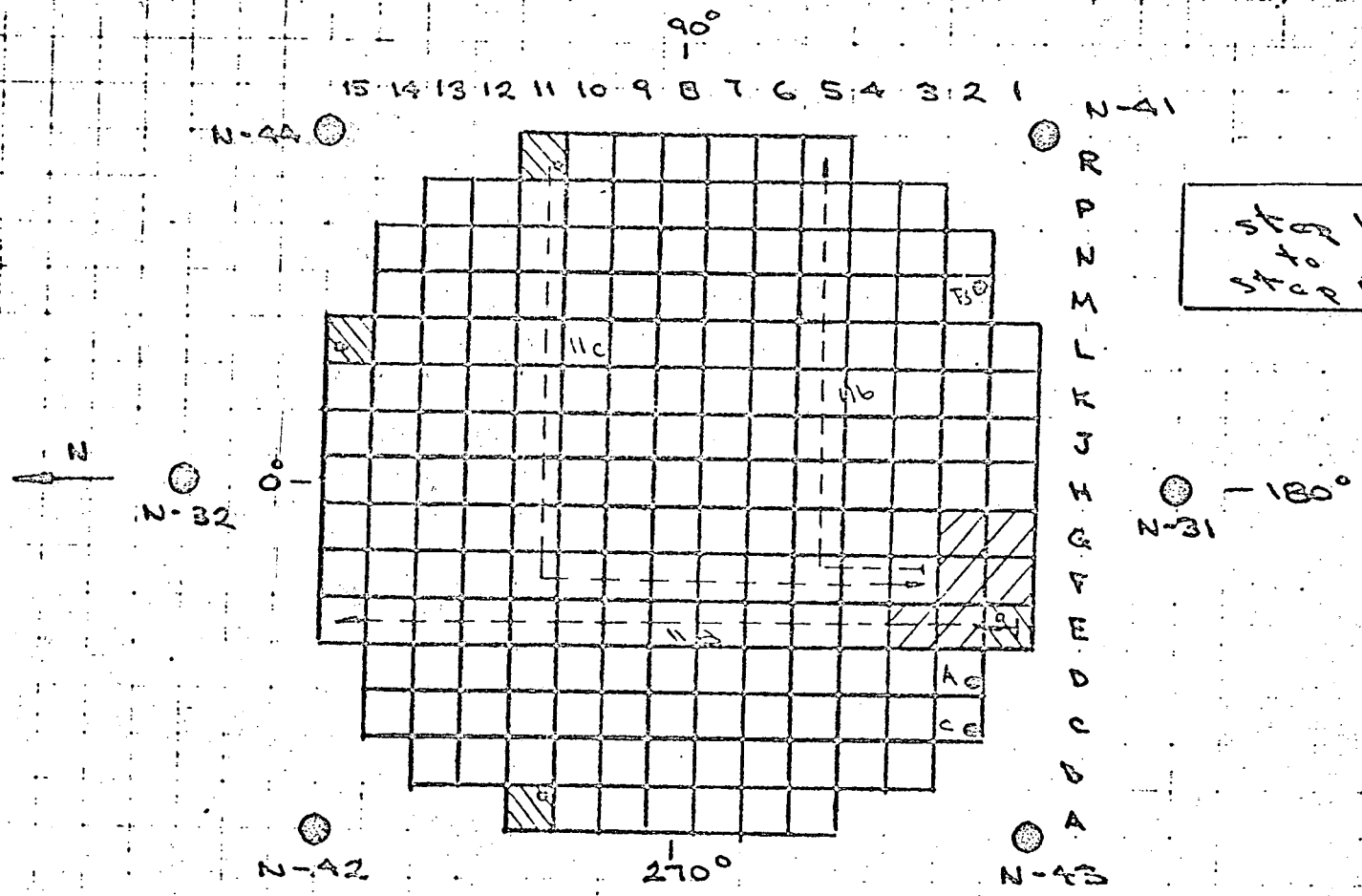
Assembly Enrichment

I = 2.2 w/o

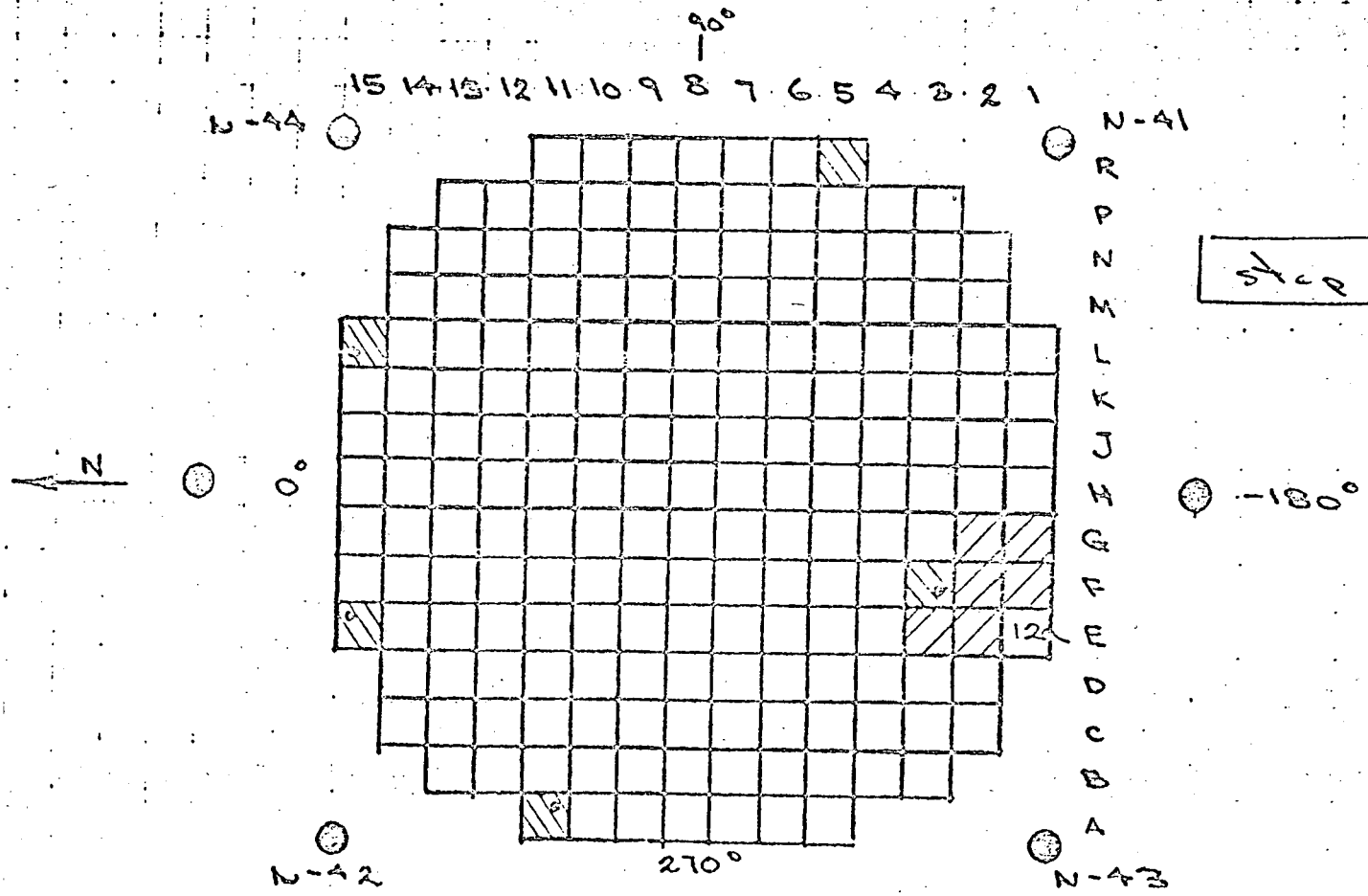
II = 2.7 w/o

III = 3.2 w/o

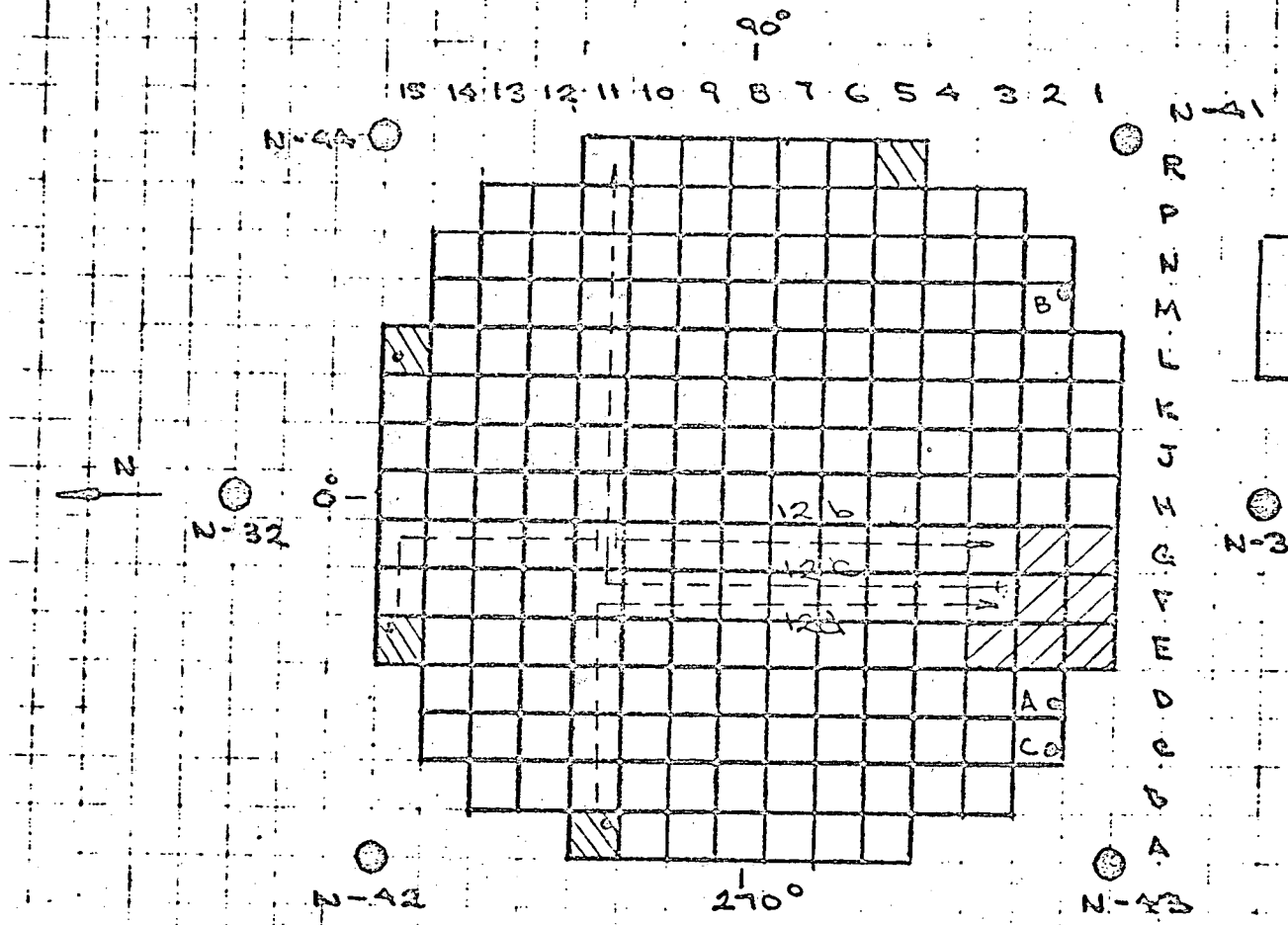

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-41
N-44
R
P
N
M
L
K
J
H
G
F
E
D
C
B
A
N
0°
N-32
N-31
180°
N-42
270°
N-43
4
3
2
B
A
C
9
6
11a
8
5
10
7
1
Step 0a
to
Step 11a



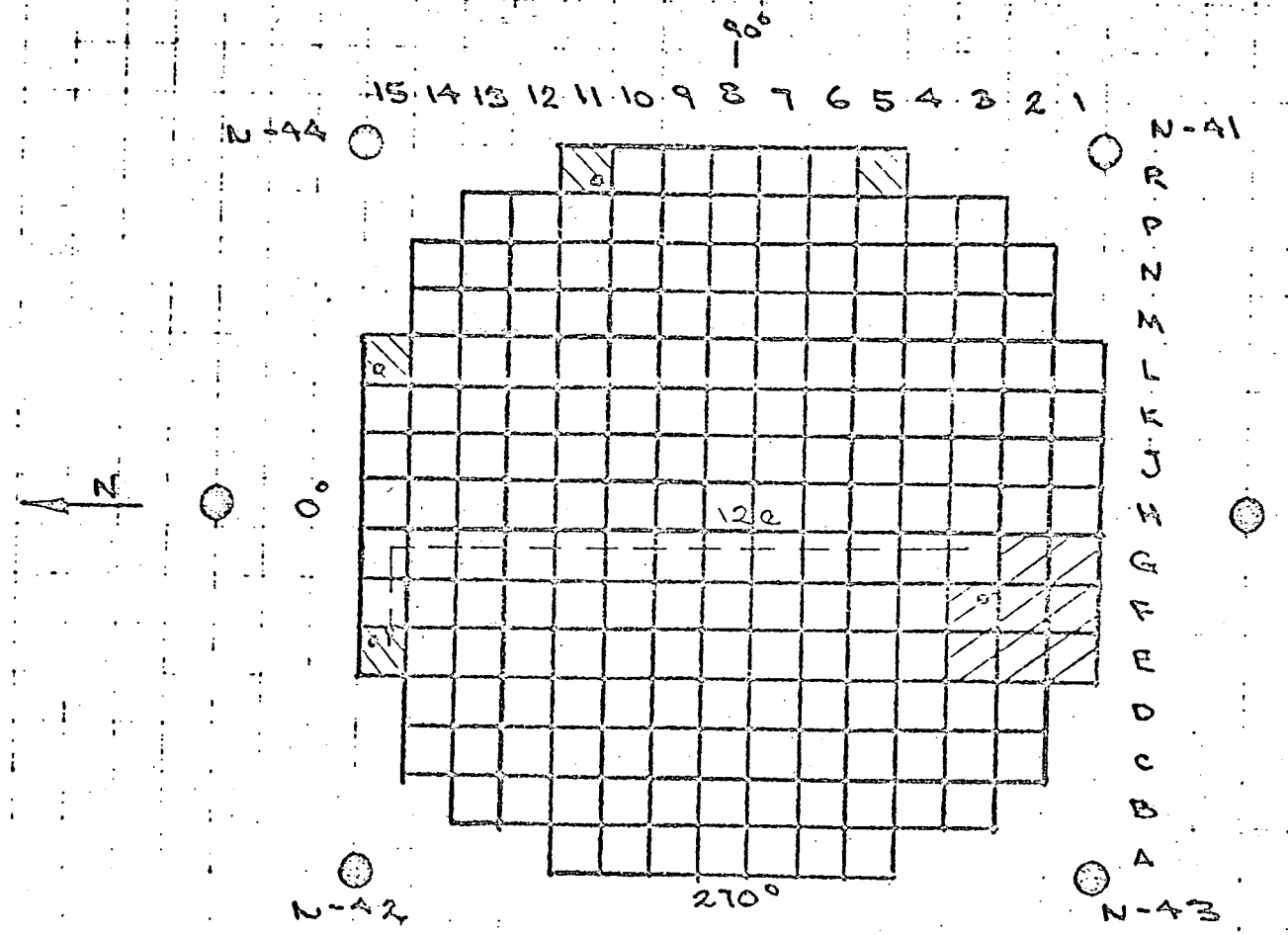
stop 11b to stop 11d



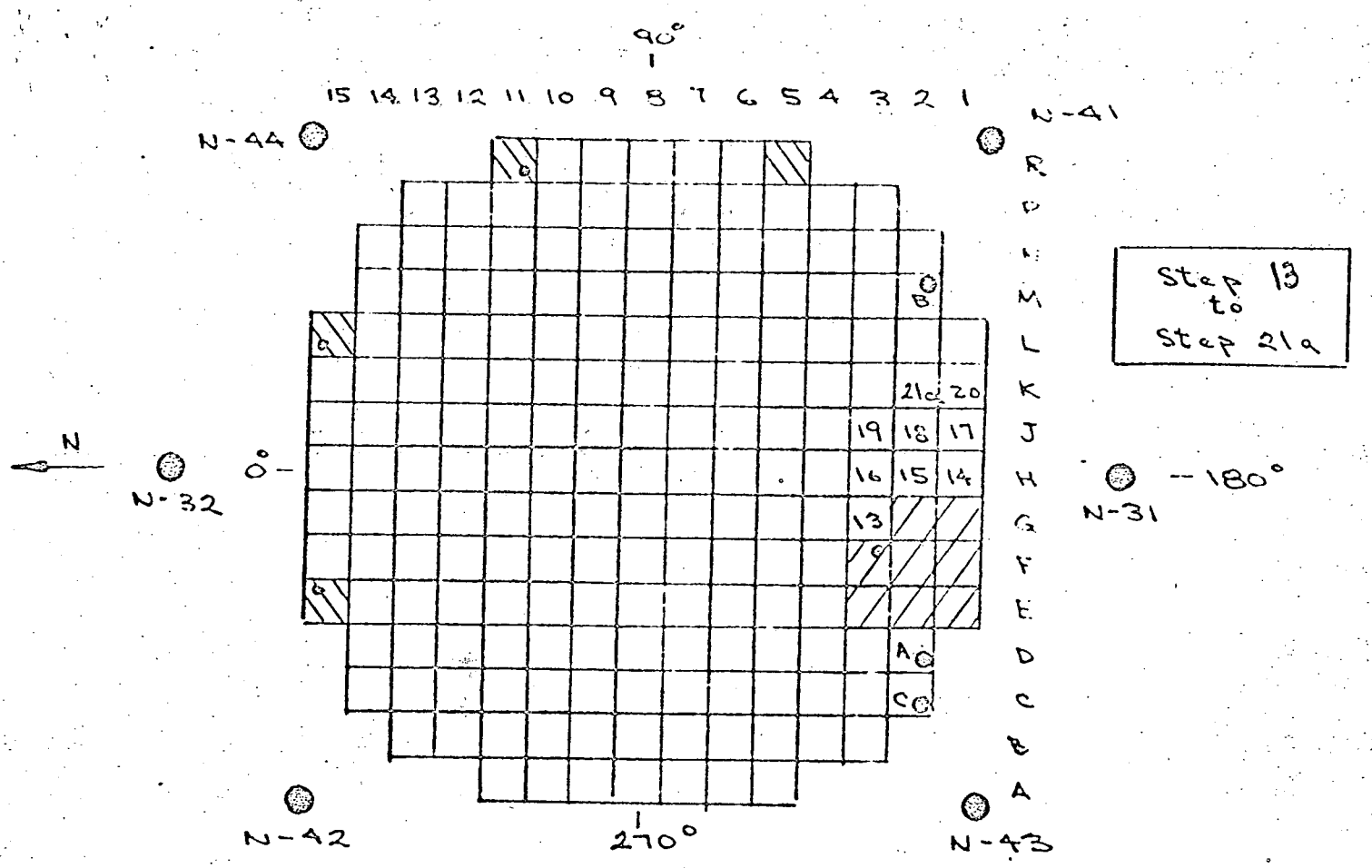
stop 12a

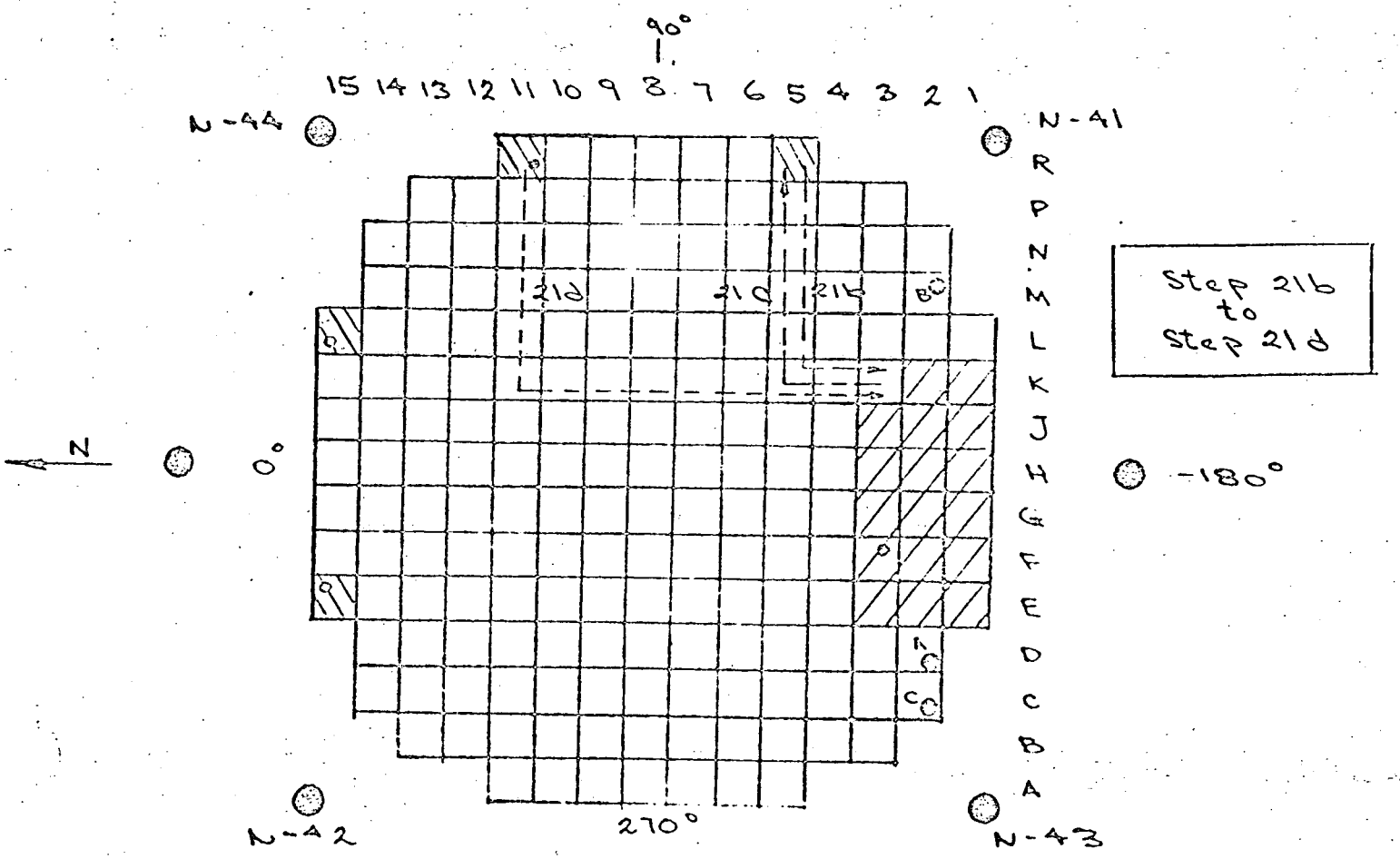


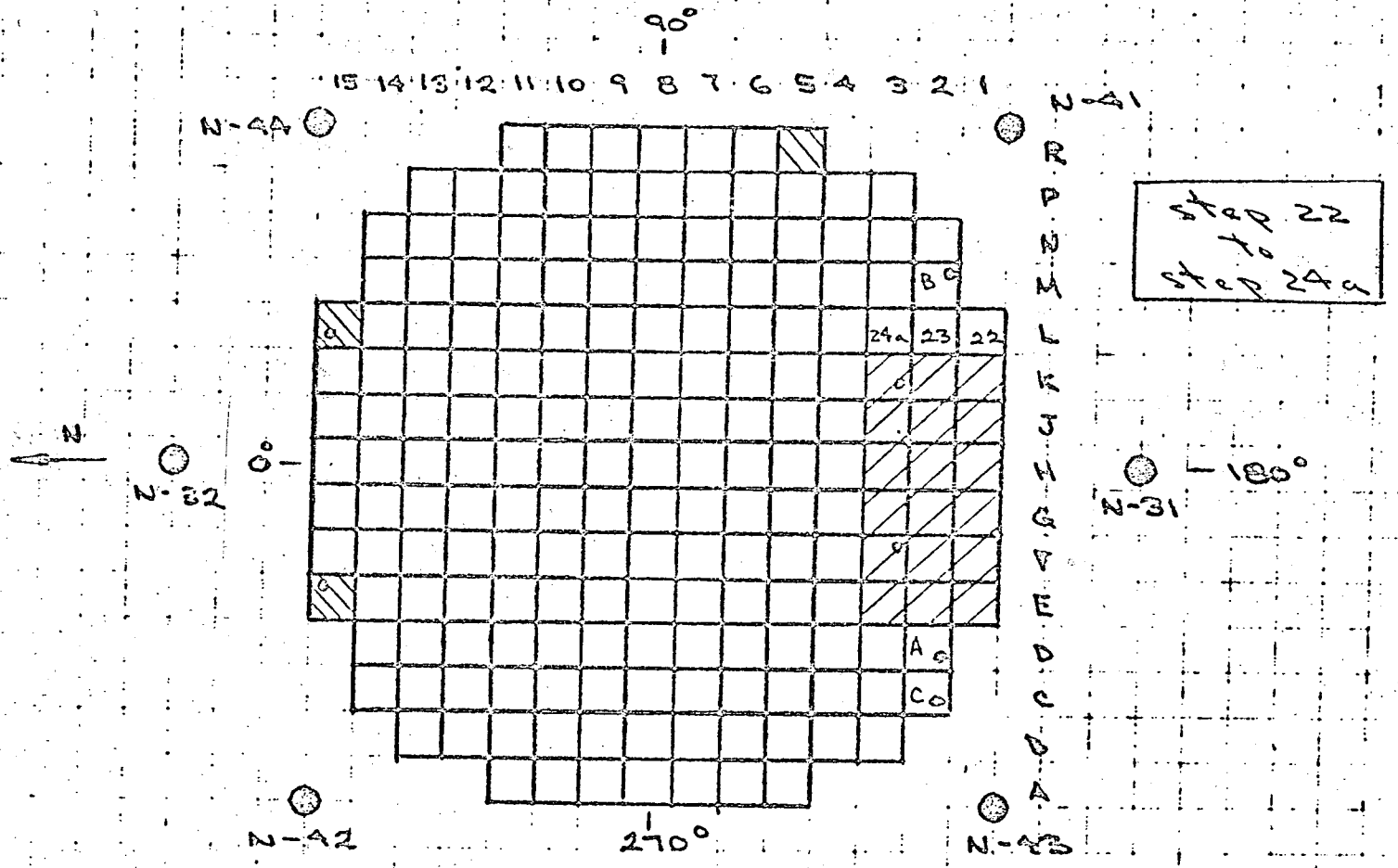
step 12b
to
step 12d

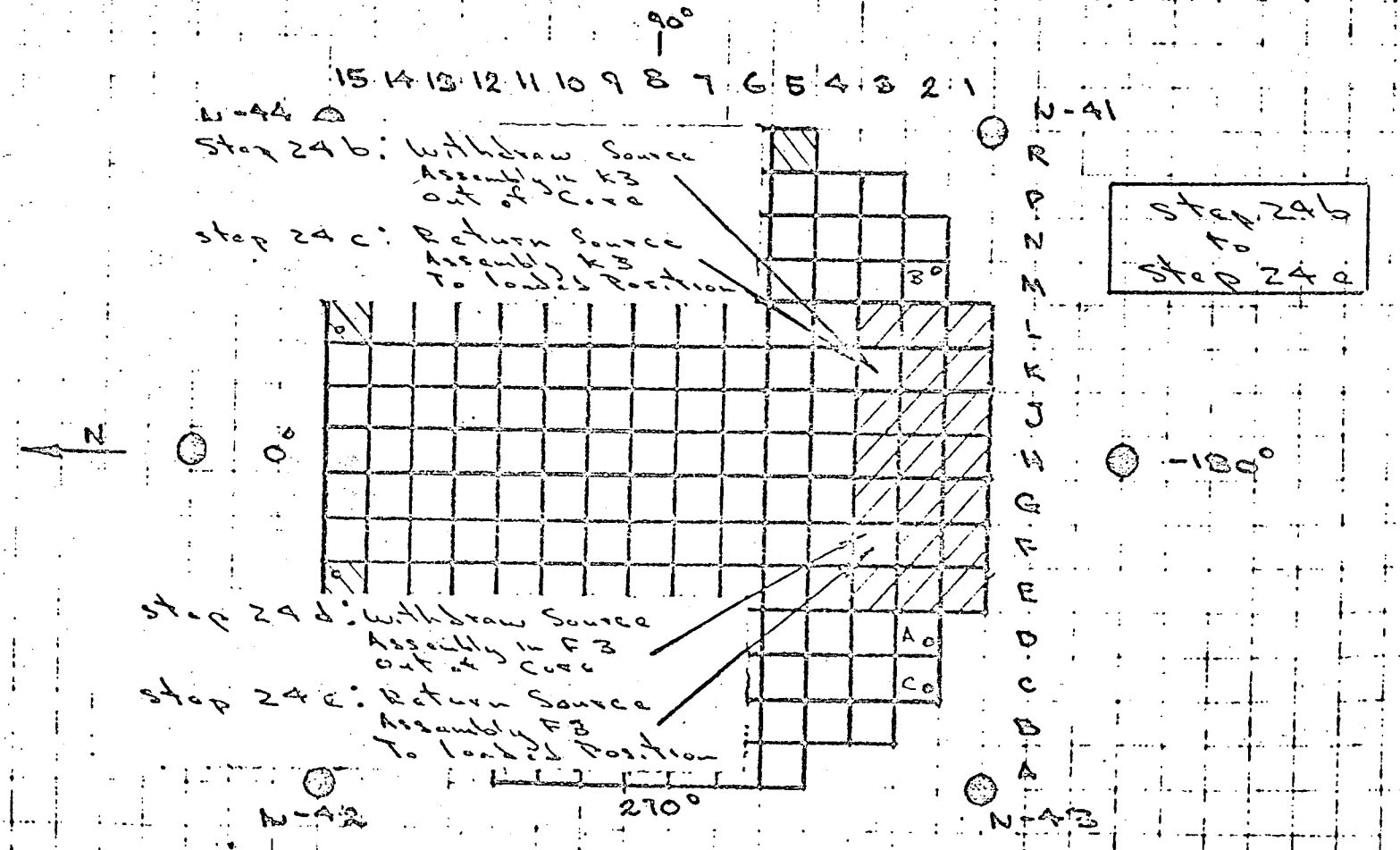


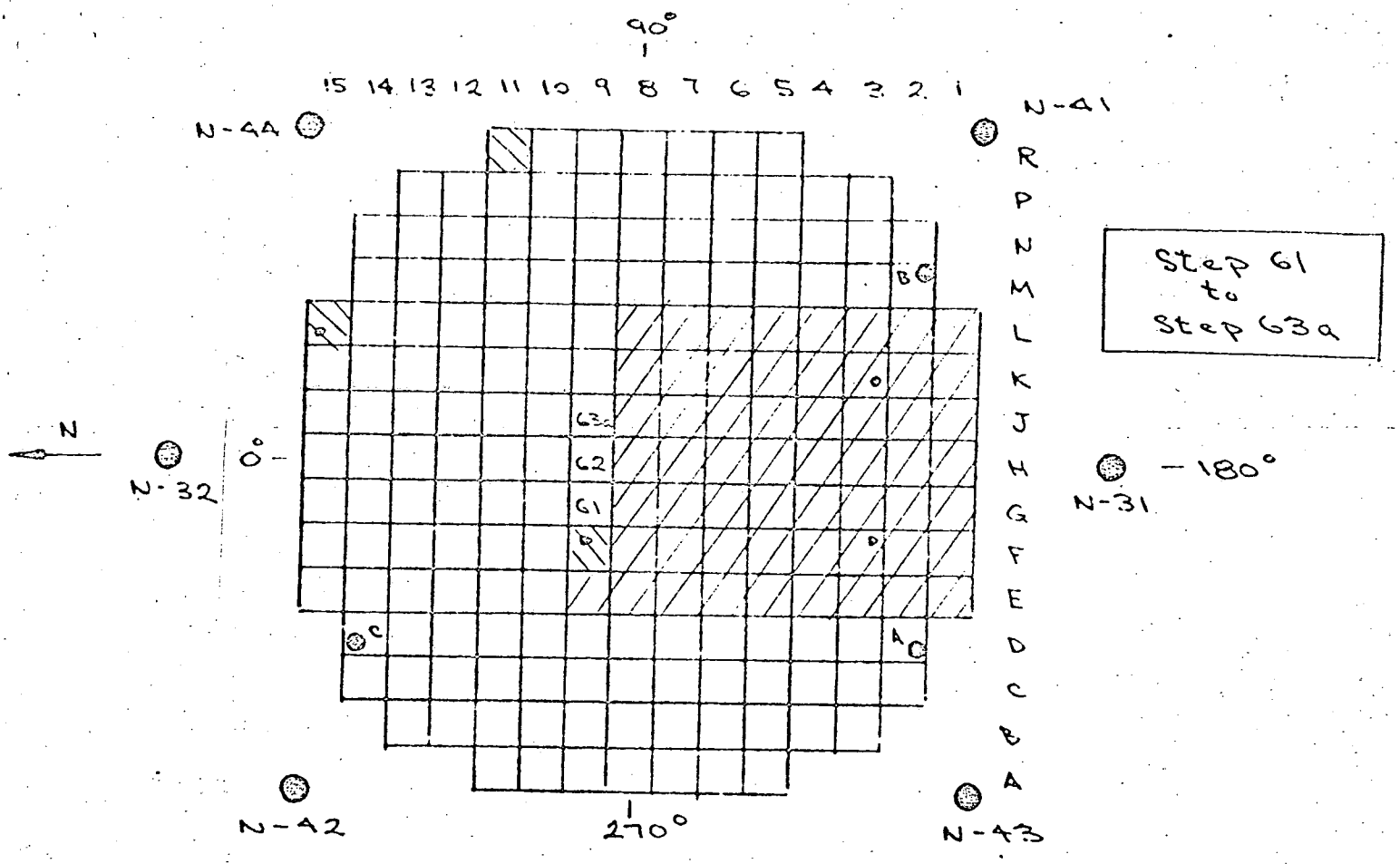
step 12e

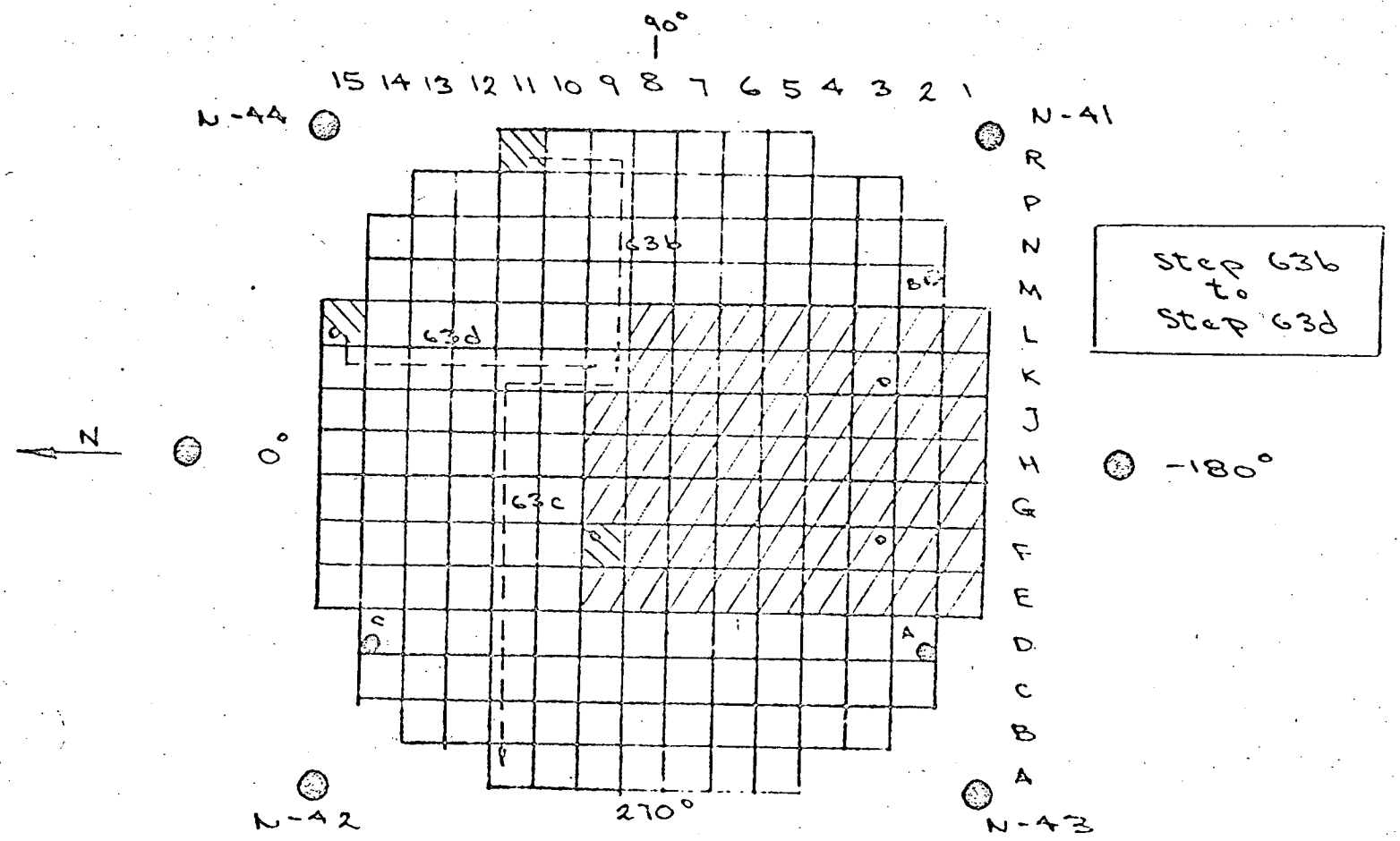

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R
P
N
M
L
K
J
H
G
F
E
D
C
B
A
B
21a 20
19 18 17
16 15 14
13
A
C
N
0°
N-32
-180°
N-31
N-42
270°
N-43
Step 13
to
Step 21a

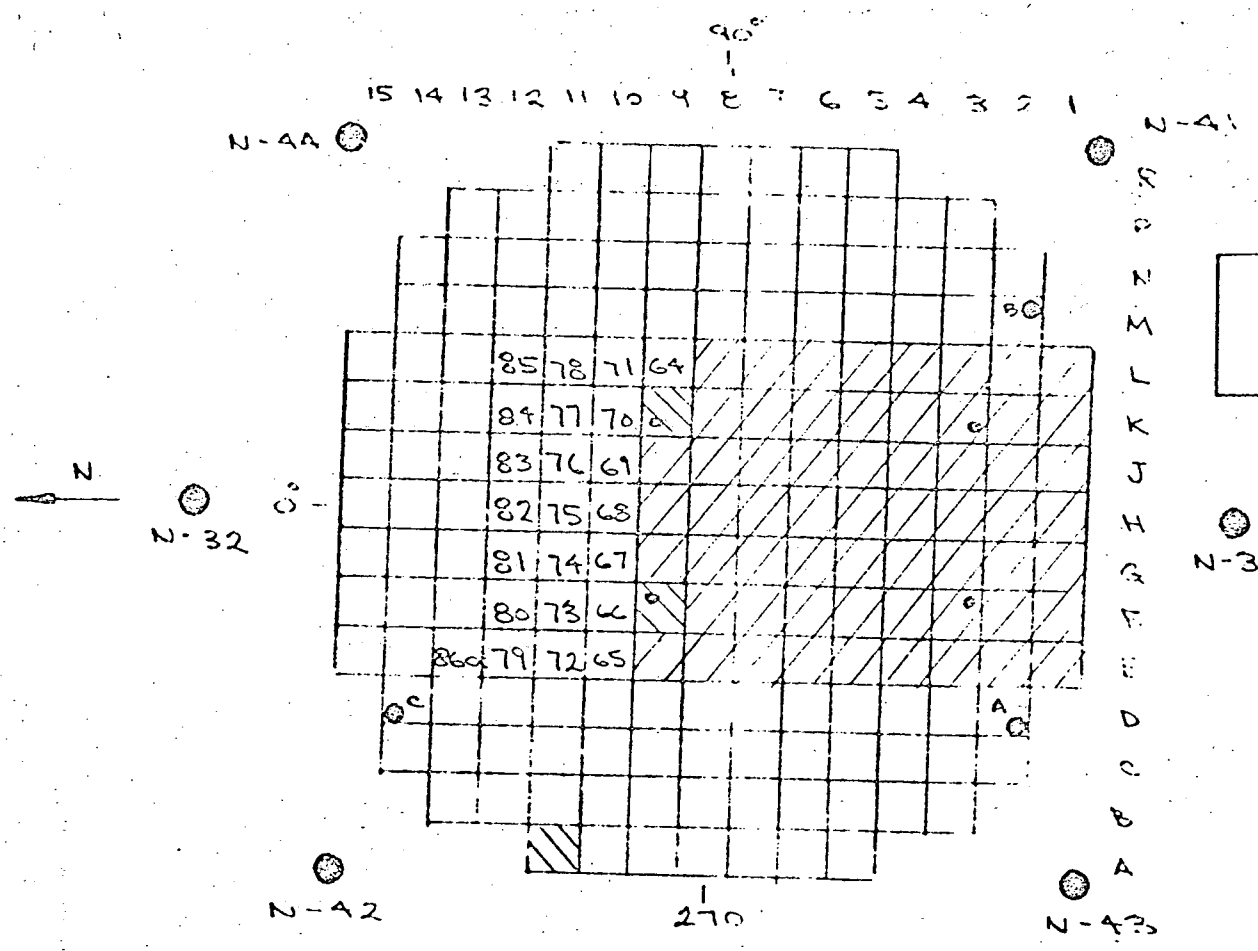

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R
P
N
M
L
K
J
H
G
F
E
D
C
B
A
21d
21c
21b
B
A
C
N
0°
-180°
N-42
270°
N-43
Step 21b
to
Step 21d

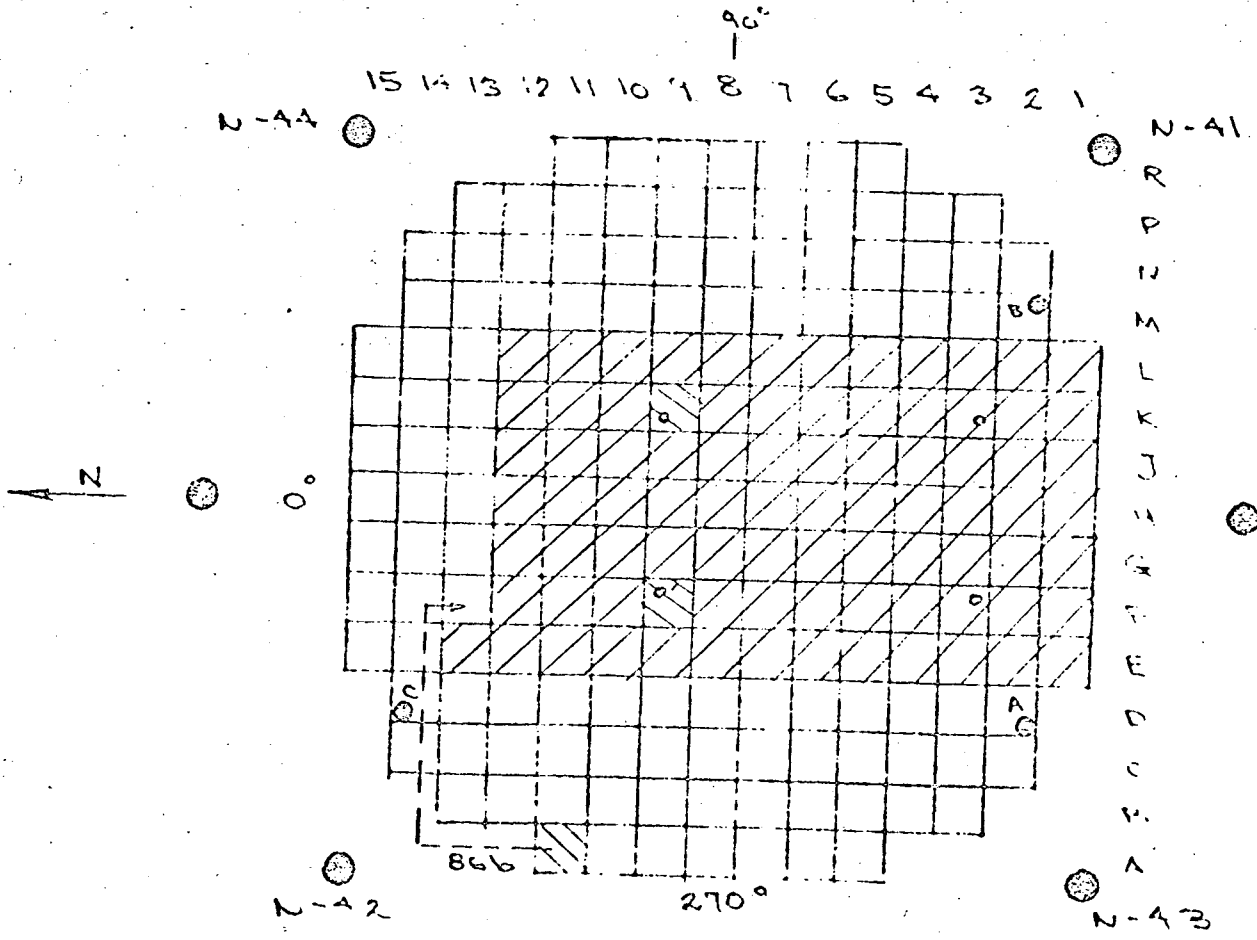

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-41
N-44
R P N M L K J H G F E D C B A
Step 22 to Step 24a
B
24a 23 22
N
0°
N-32
-180°
N-31
A
C
N-42
270°
N-43

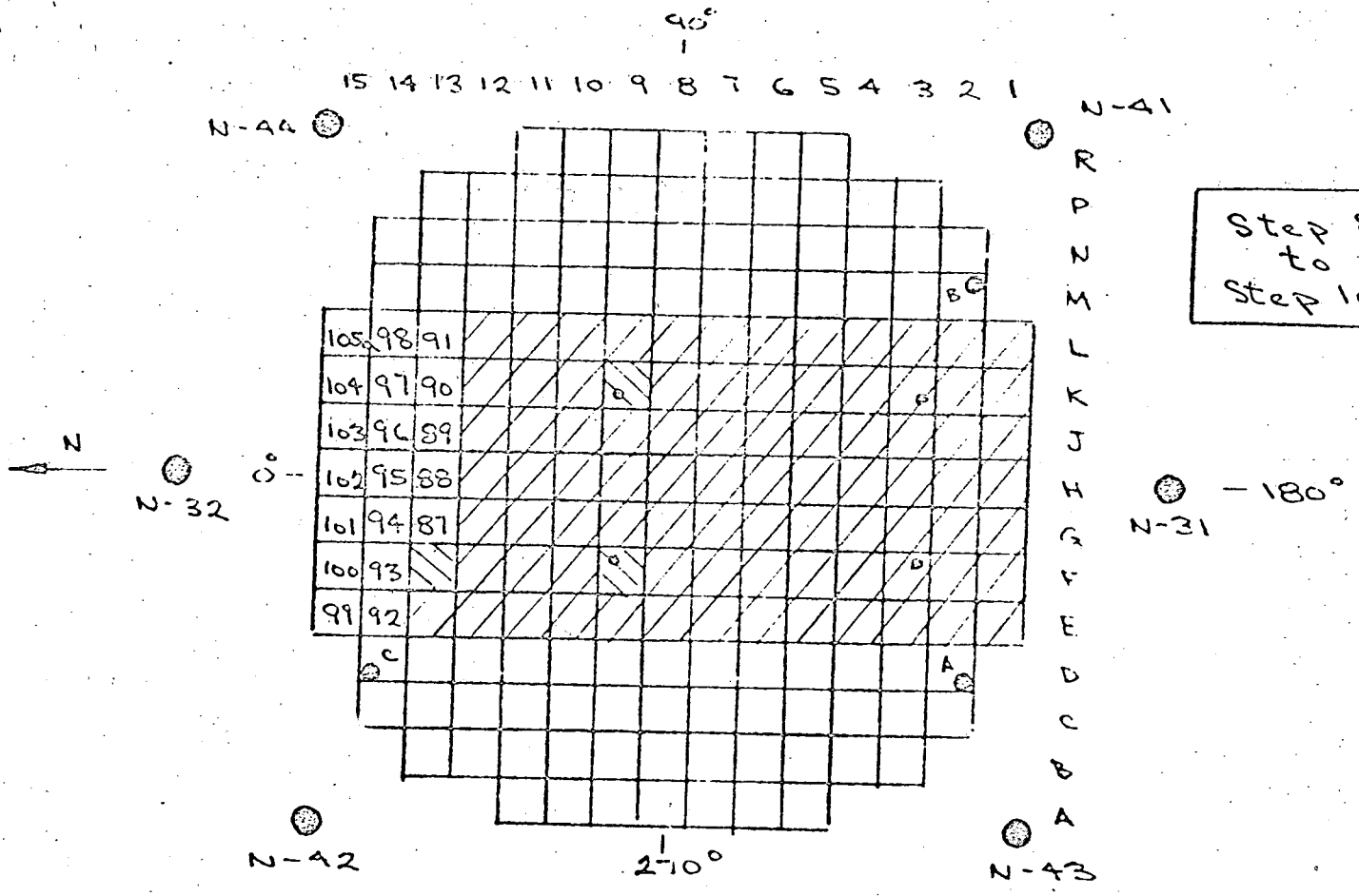

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
Step 24b: Withdraw Source Assembly in K3 out of Core
Step 24c: Return Source Assembly K3 To loaded Position
R P N M L K J H G F E D C B A
Step 24b to Step 24a
B
N
0°
-180°
Step 24d: Withdraw Source Assembly in F3 out of Core
Step 24e: Return Source Assembly F3 To loaded Position
A
C
N-42
270°
N-43

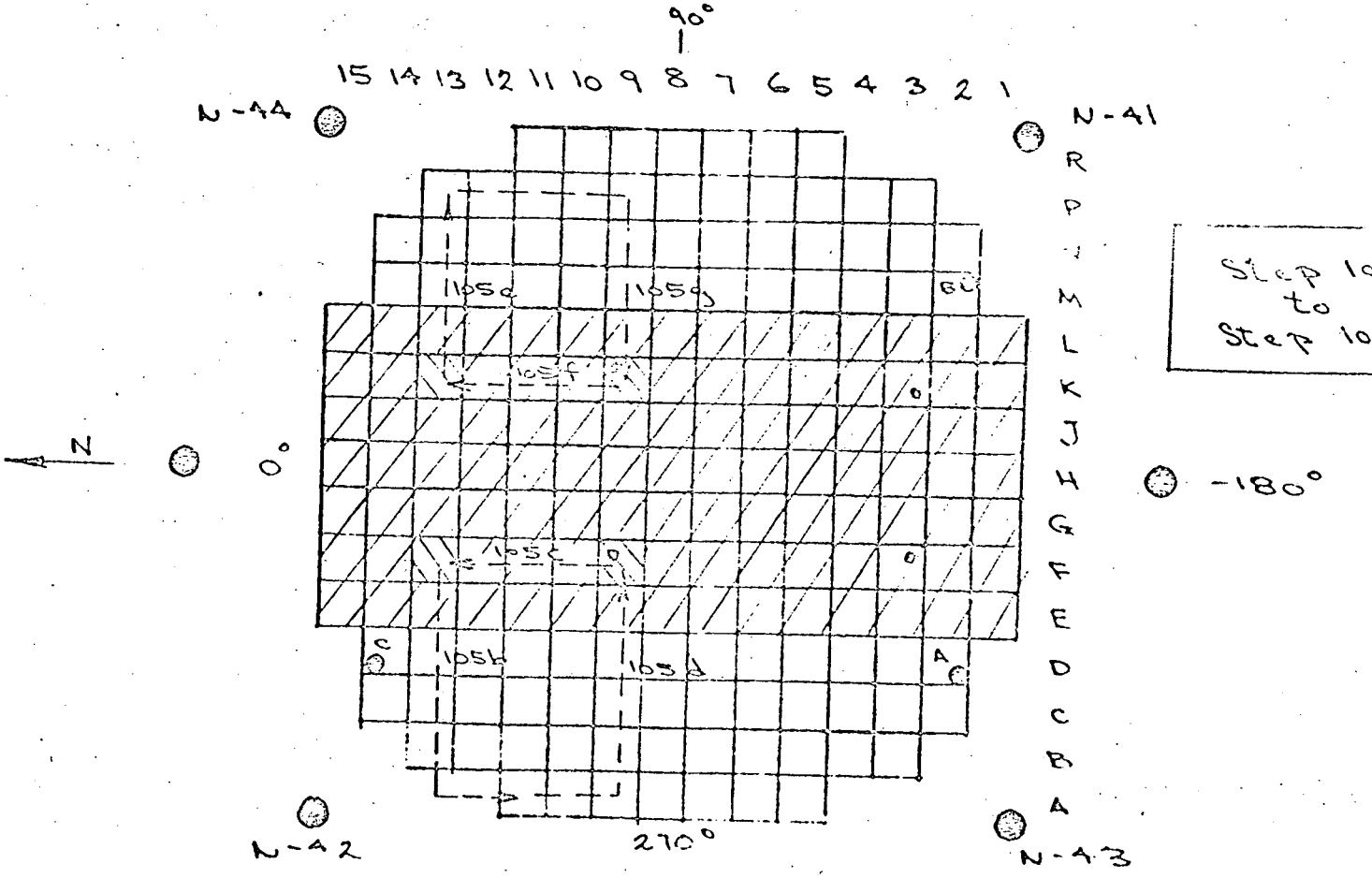

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R P N M L K J H G F E D C B A
Step 61
to
Step 63a
N
0°
N-32
-180°
N-31
63a
62
61
B
A
C
N-42
270°
N-43

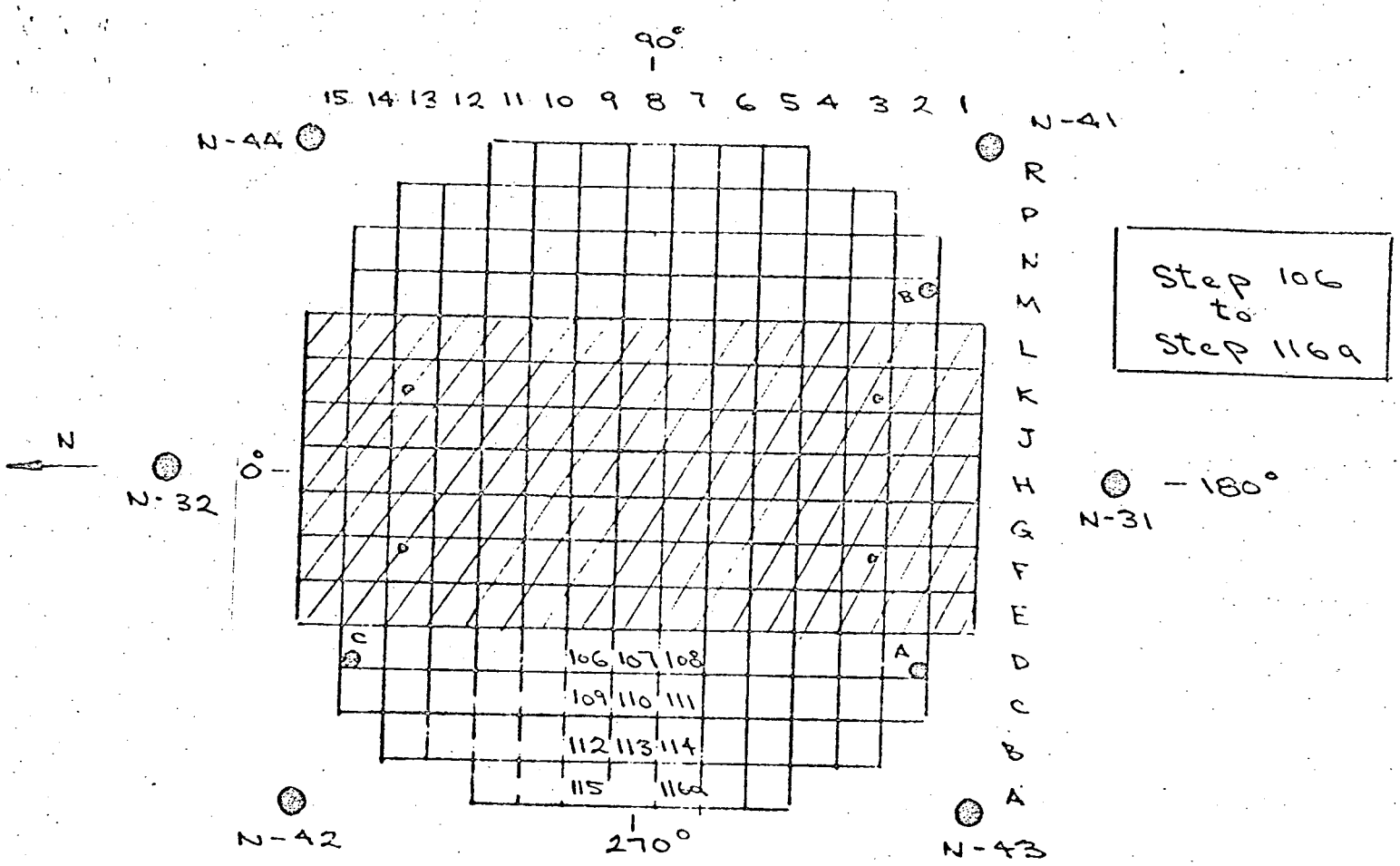

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R P N M L K J H G F E D C B A
Step 63b
to
Step 63d
63b
63d
63c
B
A
C
N
0°
-180°
N-42
270°
N-43

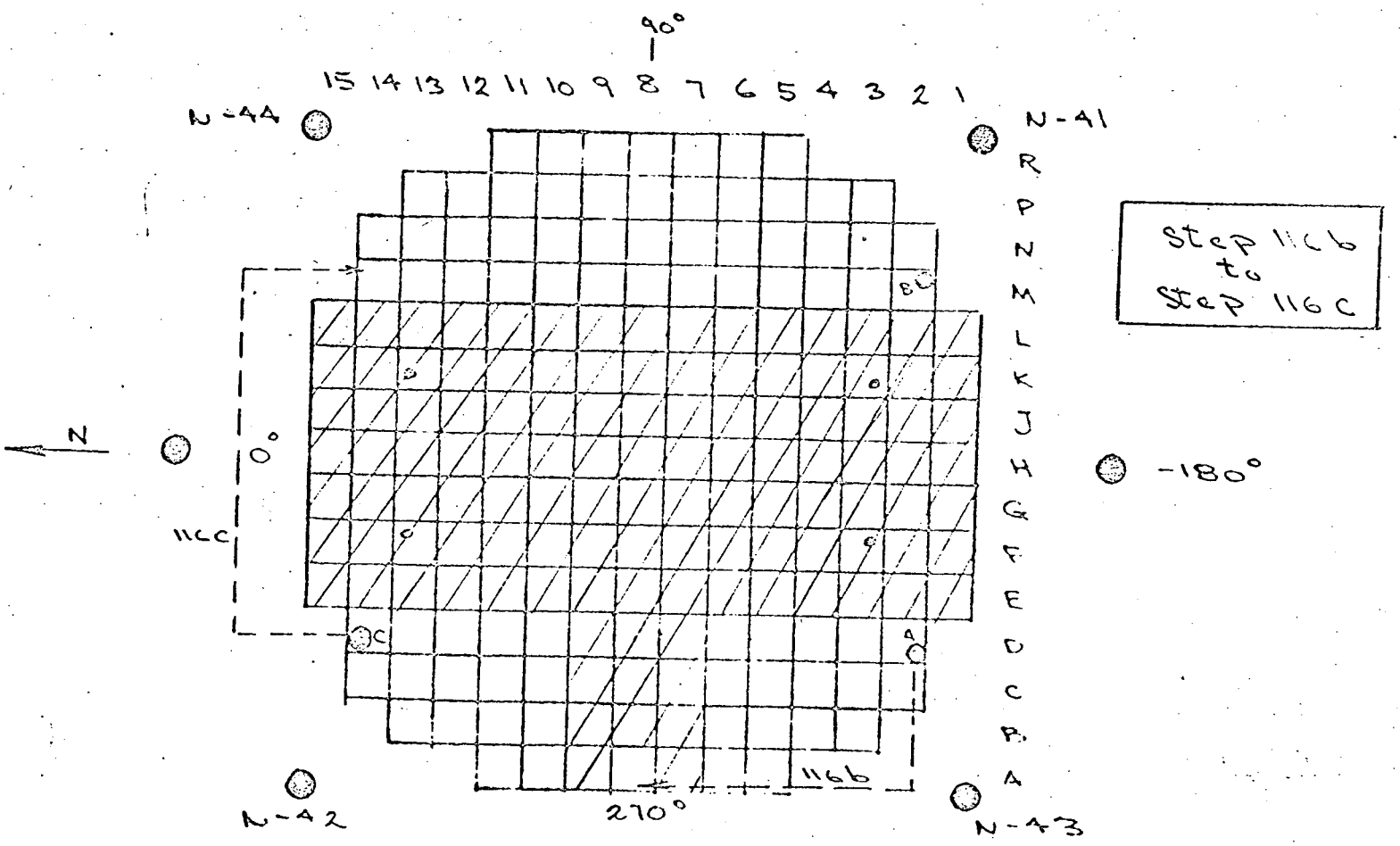

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R Q P N M L K J H G F E D C B A
Step 64
to
Step 86a
85 78 71 64
84 77 70
83 76 69
82 75 68
81 74 67
80 73 66
86a 79 72 65
N
0°
N-32
-180°
N-31
N-42
270
N-43

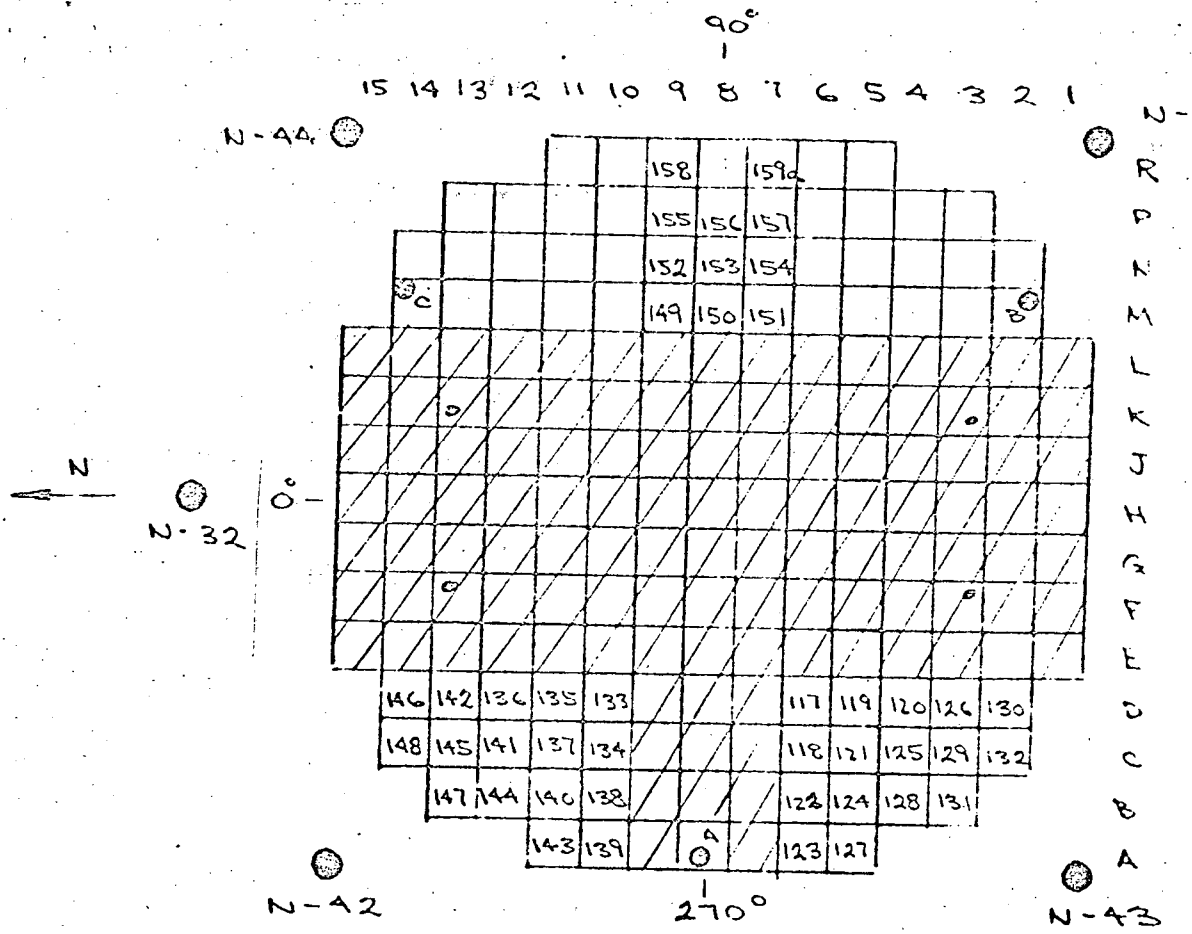

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R P N M L K J H G F E D C B A
Step 86b
N
0°
-180°
86b
N-42
270°
N-43


90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R P N M L K J H G F E D C B A
Step 87
to
Step 105a
105 98 91
104 97 90
103 96 89
102 95 88
101 94 87
100 93
99 92
N
0°
N-32
N-31
-180°
N-42
270°
N-43

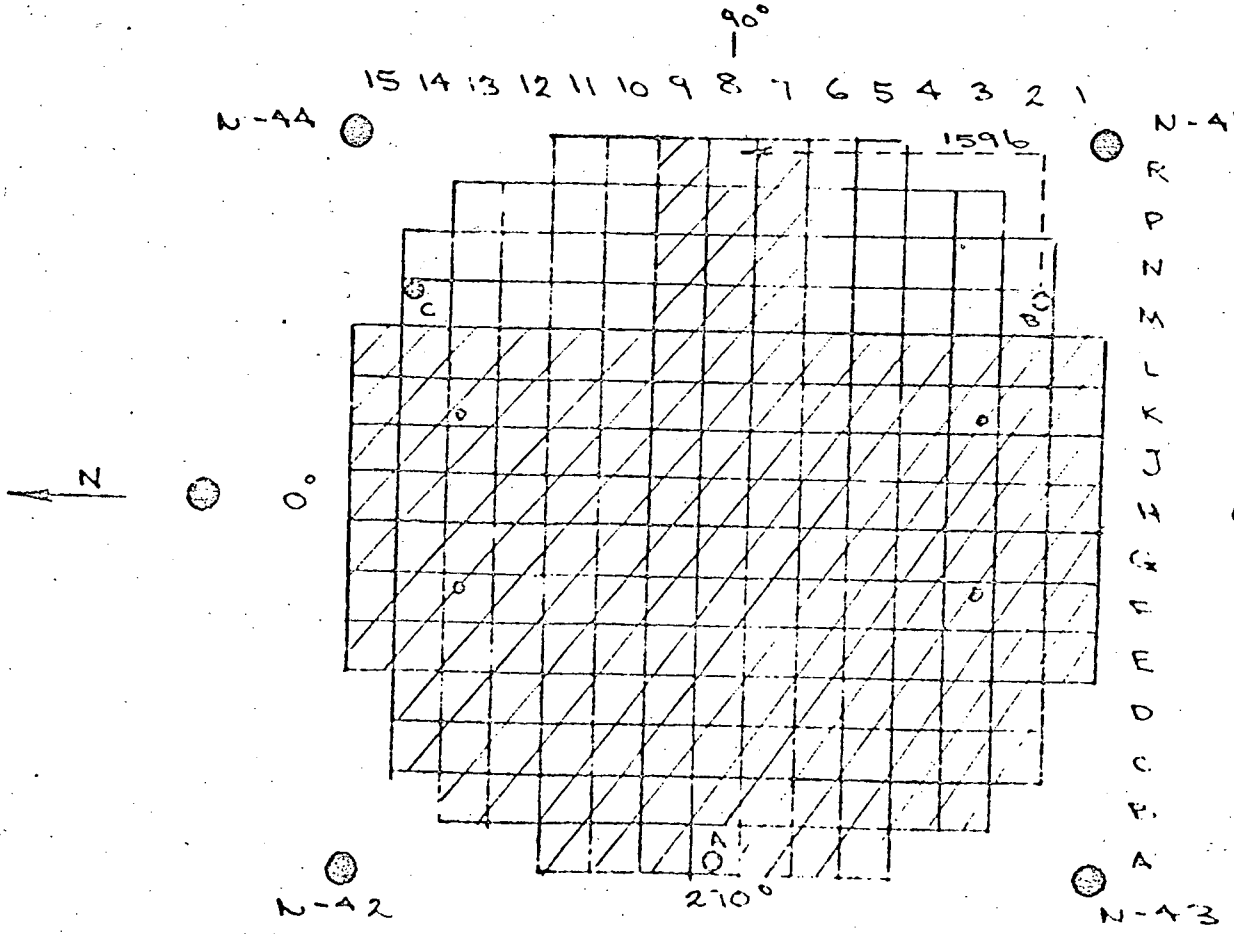

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R P N M L K J H G F E D C B A
Step 105b
to
Step 105g
105a
105g
105f
105c
105h
105d
N
0°
-180°
N-42
270°
N-43


90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R P N M L K J H G F E D C B A
Step 106 to Step 116a
N
0°
N-32
-180°
N-31
B
C
A
106 107 108
109 110 111
112 113 114
115 116a
N-42
270°
N-43

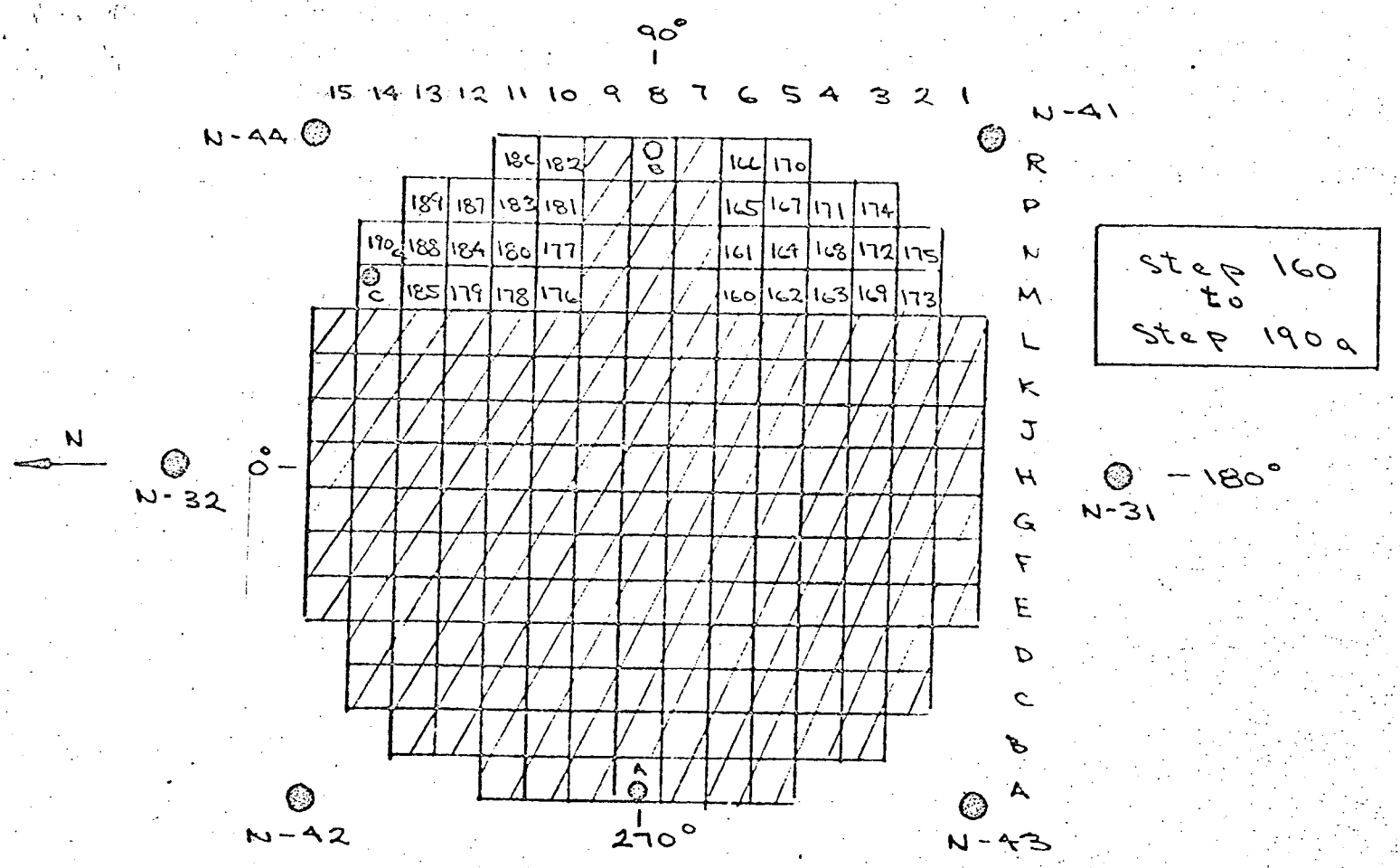

90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R P N M L K J H G F E D C B A
Step 116b to Step 116c
N
0°
-180°
116c
B
C
A
116b
N-42
270°
N-43

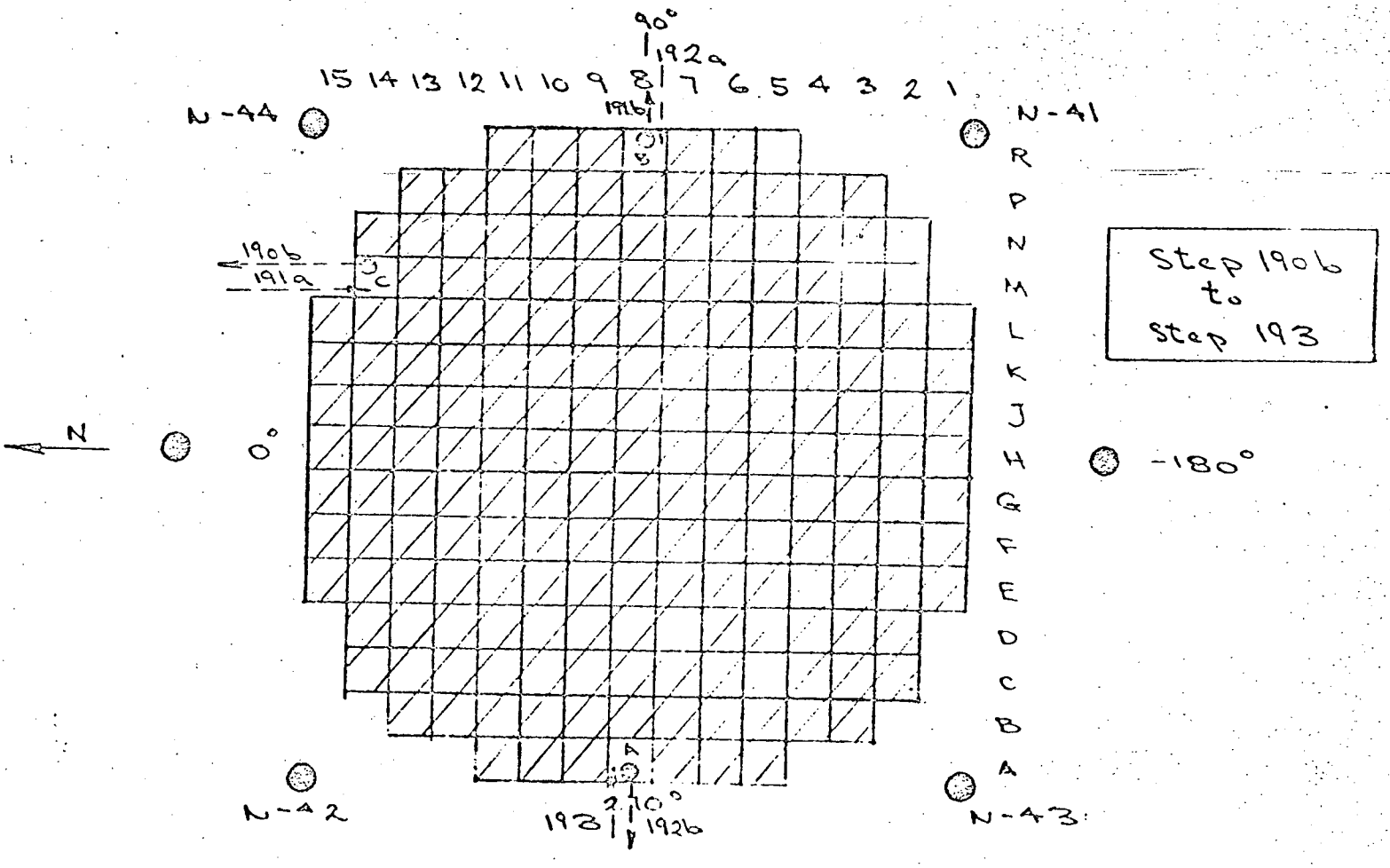


Step 117
to
Step 159a



Step 159b


90°
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R P N M L K J H G F E D C B A
N
0°
N-32
-180°
N-31
N-42
270°
N-43
Step 160
to
Step 190a


90°
192a
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
N-44
N-41
R P N M L K J H G F E D C B A
190b
191a
N
0°
-180°
N-42
270°
193
192b
N-43
Step 190b
to
Step 193

Date	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Rema
	0a	--	--	--	Install temporary Detector A	--	--		D-2			
	0b	--	--	--	Install temporary Detector B	--	--		M-2			
	0c	--	--	--	Install temporary Detector C	--	--		C-2			
	1	B54	BPS-2	II	Load P.S. Asy.	C-11	--		E-1			Tempora Locati
	2	B60	APS-1	II	" " "	F-11	--		A-11			"
	3	B64	APS-2	II	" " "	J-8	--		L-15			"
	4	B57	BPS-1	II	" " "	D-12	--		R-11			"
	5	C33	B6P-1	III	Load Fuel	K-6	--		F-1			
	6	C55	83	III	" "	M-3	--		G-1			
	7	C24	12P-8	III	" "	O-7	--		E-2			
	8	A30	R45	I	" "	N-12	--		F-2			
	9	C04	16P-26	III	" "	P-11	--		G-2			
	10	A28	R41	I	" "	M-14	--		E-3			
	11a	B19	12P-19	II	" "	L-2	--		F-3			Tempo Locat
	11b	B19	12P-19	II	Relocate Fuel	--	F-3		R-5			"
	11c	B57	BPS-1	II	Relocate P.S. Asy.	--	R-11		F-3			"
	11d	B54	BPS-2	II	" " "	--	E-1		E-15			Tempor Locati
	12a	C62	77	III	Load Fuel	M-4	--		E-1			
	12b	B54	BPS-2	II	Relocate P.S.Asy.	--	E-15		G-3			Tempor Locati
	12c	B57	BPS-1	II	" " "	--	F-3		R-11			"

Date	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Remark
	12d	B60	APS-1	II	Relocate P.S.Asy.	--	A-11		F-3			
	12e	B54	BPS-2	II	" " "	--	G-3		E-15			Temporar Location
	13	A41	R-13	I	Load Fuel	L-14	--		G-3			
	14	C35	B6P-2	III	Load Fuel	0-6	--		H-1			
	15	A48	R24	I	" "	K-14	--		H-2			
	16	B24	12P-25	II	" "	B-7	--		H-3			
	17	C54	72	III	" "	L-3	--		J-1			
	18	C07	16P-28	III	" "	0-10	--		J-2			
	19	A45	R30	I	" "	J-14	--		J-3			
	20	C09	B6P-3	III	" "	N-6	--		K-1			
	21a	A34	R48	I	" "	H-14	--		K-2			
	21b	B19	12P-19	II	Relocate Fuel	--	R-5		K-3			Tempora Locatio
	21c	B19	12P-19	II	" "	--	K-3		R-5			"
	21d	B57	BPS-1	II	Relocate P.S. Asy.	--	R-11		K-3			
	22	C63	80	III	Load Fuel	L-4	--		L-1			
	23	C18	12P-10	III	" "	N-7	--		L-2			
	24a	A14	R20	I	" "	G-14	--		L-3			
	24b	B57	BPS-1	II	Remove P.S. Asy.	--	K-3		--			
	24c	B57	BPS-1	II	Return P.S. Asy.	--	--		K-3			
	24d	B60	APS-1	II	Remove P.S. Asy.	--	F-3		--			

ate	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Remark
	25	B51	16P-17	II	Load Fuel	K-7	--		E-4			
	26	A55	RS-1	I	" "	M-2	--		F-4			
	27	B07	12P-35	II	" "	A-7	--		G-4			
	28	A04	R31	I	" "	F-14	--		H-4			
	29	B03	12P-24	II	" "	K-8	--		J-4			
	30	A51	RS-8	I	Load Fuel	P-12	--		K-4			
	31	B43	16P-1	II	" "	H-7	--		L-4			
	32	A52	120	I	" "	0-12	--		E-5			
	33	B33	12P-31	II	" "	H-8	--		F-5			
	34	A38	R50	I	" "	P-15	--		G-5			
	35	B50	16P-2	II	" "	G-7	--		H-5			
	36	A61	21	I	" "	P-13	--		J-5			
	37	B30	12P-30	II	" "	F-8	--		K-5			
	38	A62	34	I	" "	0-13	--		L-5			
	39	B34	12P-4	II	" "	D-8	--		E-6			
	40	A36	R44	I	" "	0-15	--		F-6			
	41	B13	12P-13	II	" "	K-9	--		G-6			
	42	A05	R06	I	" "	N-15	--		H-6			
	43	B37	12P-33	II	" "	J-9	--		J-6			
	44	A19	R19	I	" "	M-15	--		K-6			

Date	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Rema
	45	B05	12P-27	II	Load Fuel	H-9	--		L-6			
	46	A58	38	I	" "	N-13	--		E-7			
	47	B04	12P-26	II	" "	G-9	--		F-7			
	48	A59	56	I	" "	M-13	--		G-7			
	49	B39	16P-5	II	Load Fuel	F-7	--		H-7			
	50	A60	103	I	" "	P-14	--		J-7			
	51	B08	12P-21	II	" "	F-9	--		K-7			
	52	A15	R15	I	" "	L-15	--		L-7			
	53	B45	16P-11	II	" "	E-7	--		E-8			
	54	A29	R23	I	" "	K-15	--		F-8			
	55	B42	16P-9	II	" "	D-7	--		G-8			
	56	A44	R09	I	" "	H-15	--		H-8			
	57	B56	16P-24	II	" "	G-8	--		J-8			
	58	A27	R51	I	" "	G-15	--		K-8			
	59	B59	16P-25	II	" "	E-8	--		L-8			
	60a	A31	R53	I	" "	F-15	--		E-9			
	60b	B19	12P-19	II	Relocate fuel	--	R-5		F-9			Tempor Locati
	60c	B19	12P-19	II	" "	--	F-9		R-11			"
	60d	B54	BPS-2	II	Relocate P.S. Asy	--	E-15		F-9			"

Date	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Remar
	60e	--	--	--	Relocate temp. det. C	--	C-2		D-14			
	61	A63	102	I	Load fuel	O-14	--		G-9			
	62	B63	16P-21	II	" "	C-8	--		H-9			
	63a	A57	109	I	" "	E-14	--		J-9			
	63b	B19	12P-19	II	Relocate fuel	--	R-11		K-9			Tempor Locati
	63c	B19	12P-19	II	" "	--	K-9		A-11			"
	63d	B64	APS-2	II	Relocate P.S. Asy	--	L-15		K-9			"
	64	A56	118	I	Load Fuel	D-14	--		L-9			
	65	B11	12P-15	II	" "	E-9	--		E-10			
	66	A13	R07	I	" "	P-16	--		F-10			
	67	B10	12P-38	II	" "	D-9	--		G-10			
	68	A25	R11	I	" "	O-16	--		H-10			
	69	B09	12P-39	II	" "	C-9	--		J-10			
	70	A40	R04	I	" "	N-16	--		K-10			
	71	B20	12P-37	II	" "	F-10	--		L-10			
	72	A64	111	I	" "	C-14	--		E-11			
	73	B29	12P-28	II	" "	E-10	--		F-11			
	74	A65	119	I	" "	B-14	--		G-11			
	75	B55	16P-20	II	" "	B-8	--		H-11			
	76	A03	R03	I	" "	M-16	--		J-11			

Date	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Rema
	77	B25	12P-32	II	Load Fuel	D-10	--		K-11			
	78	A53	126	I	" "	A-14	--		L-11			
	79	B47	16P-13	II	" "	K-10	--		E-12			
	80	A11	RS3	I	Load Fuel	M-12	--		F-12			
	81	B38	12P-11	II	" "	C-10	--		G-12			
	82	A16	R16	I	" "	L-16	--		H-12			
	83	B15	12P-17	II	" "	B-10	--		J-12			
	84	A50	RS7	I	" "	L-13	--		K-12			
	85	B44	16P-8	II	" "	J-10	--		L-12			
	86a	A35	R40	I	" "	K-16	--		E-13			
	86b	B19	12P-19	II	Relocate Fuel	--	A11		F-13			Tempo Locat
	87	A06	R05	I	Load Fuel	J-16	--		G-13			
	88	B02	12P-3	II	" "	E-11	--		H-13			
	89	A32	R43	I	" "	H-16	--		J-13			
	90	B26	12P-22	II	" "	J-12	--		K-13			Tempo Locat
	91	A23	R38	I	" "	F-16	--		L-13			
	92	C16	12P-14	III	" "	P-8	--		E-14			
	93	A39	R52	I	" "	P-17	--		F-14			
	94	C02	16P-32	III	" "	N-10	--		G-14			

te	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Remark
	95	A07	R32	I	Load Fuel	0-17	--		H-14			
	96	C08	16P-27	III	" "	M-10	--		J-14			
	97	A10	R47	I	" "	N-17	--		K-14			
	98	C15	12P-20	III	Load fuel	O-8	--		L-14			
	99	C58	86	III	" "	K-3	--		E-15			
	100	C37	B6P-4	III	" "	P-6	--		F-15			
	101	C59	78	III	" "	J-3	--		G-15			
	102	C29	B6P-8	III	" "	M-6	--		H-15			
	103	C60	84	III	" "	H-3	--		J-15			
	104	C32	B6P-9	III	" "	L-6	--		K-15			
	105a	C61	87	III	" "	G-3	--		L-15			
	105b	B19	12P-19	II	Relocate fuel	--	F-13		A-11			Tempora Locatio
	105c	B54	BPS-2	II	Relocate P.S. Asy	--	F-9		F-13			
	105d	B19	12P-19	II	Relocate Fuel	--	A-11		F-9			
	105e	B26	12P-22	II	" "	--	K-13		P-13			Tempora Locatio
	105f	B64	APS-2	II	Relocate P.S. Asy	--	K-9		K-13			
	105g	B26	12P-22	II	Relocate fuel	--	P-13		K-9			
	106	B-28	12P-23	II	Load Fuel	H-12	--		D-9			
	107	A02	R02	I	" "	M-17	--		D-8			

IPP - 2 Core Loading Sequence

Date	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Rema
	108	B06	12P-29	II	Load Fuel	G-12	--		D-7			
	109	A01	R01	I	" "	L-17	--		C-9			
	110	B21	12P-16	II	" "	K-13	--		C-8			
	111	A37	R35	I	Load Fuel	K-17	--		C-7			
	112	C12	16P-29	III	" "	N-11	--		B-9			
	113	A22	R42	I	" "	J-17	--		B-8			
	114	C10	16P-31	III	" "	M-11	--		B-7			
	115	C51	101	III	" "	K-4	--		A-9			
	116a	C45	95	III	" "	G-4	--		A-7			
	116b	--	--	--	Relocate temp. det. A	--	D-2		A-8			
	116c	--	--	--	" temp. det. C	--	D-14		M-14			
	117	A54	RS4	I	Load Fuel	N-14	--		D-6			
	118	B27	12P-34	II	" "	J-13	--		C-6			
	119	B35	16P-18	II	" "	H-10	--		D-5			
	120	B16	R22	II	" "	J-7	--		D-4			
	121	A43	R36	I	" "	H-17	--		C-5			
	122	A17	R17	I	" "	F-17	--		B-6			
	123	C31	A6P-5	III	" "	E-6	--		A-6			
	124	C17	12P-7	III	" "	L-8	--		B-5			

ate	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Remark
	125	B41	16P-10	II	Load Fuel	G-10	--		C-4			
	126	B53	16P-4	II	" "	K-11	--		D-3			
	127	C47	113	III	" "	F-4	--		A-5			
	128	C53	107	III	Load Fuel	P-5	--		B-4			
	129	C23	R27	III	" "	L-5	--		C-3			
	130	C56	114	III	" "	O-5	--		D-2			
	131	C26	A6P-6	III	" "	P-7	--		B-3			
	132	C34	B6P-7	III	" "	J-6	--		C-2			
	133	A47	RS2	I	" "	J-15	--		D-10			
	134	B18	12P-18	II	" "	H-13	--		C-10			
	135	B61	16P-22	II	" "	J-11	--		D-11			
	136	B12	R25	II	" "	B-9	--		D-12			
	137	A42	R37	I	" "	P-18	--		C-11			
	138	A09	R10	I	" "	O-18	--		B-10			
	139	C27	A6P-2	III	" "	M-7	--		A-10			
	140	C21	12P-9	III	" "	M-9	--		B-11			
	141	B58	16P-23	II	" "	H-11	--		C-12			
	142	B62	16P-19	II	" "	G-11	--		D-13			
	143	C57	130	III	" "	N-5	--		A-11			

IPP - 2 Core Loading Sequence

Date	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Rema
	144	C64	88	III	Load Fuel	M-5	--		B-12			
	145	C01	R49	III	" "	P-9	--		C-13			
	146	C49	98	III	" "	K-5	--		D-14			
	147	C28	A6P-4	III	Load Fuel	L-7	--		B-13			
	148	C38	B6P-10	III	" "	G-6	--		C-14			
	149	B22	12P-40	II	" "	G-13	--		M-9			
	150	A08	R08	I	" "	N-18	--		M-8			
	151	B14	12P-12	II	" "	F-13	--		M-7			
	152	A12	R12	I	" "	M-18	--		N-9			
	153	B32	12P-1	II	" "	D-13	--		N-8			
	154	A18	R18	I	" "	L-18	--		N-7			
	155	C03	16P-6	III	" "	L-11	--		P-9			
	156	A20	R33	I	" "	K-18	--		P-8			
	157	C11	16P-30	III	" "	L-12	--		P-7			
	158	C40	110	III	" "	J-5	--		R-9			
	159a	C42	106	III	" "	H-5	--		R-7			
	159b	--	--	--	Relocate temp. det. B	--	M-2		R-8			
	160	A24	RS6	I	Load Fuel	G-16	--		M-6			
	161	B23	12P-36	II	" "	C-13	--		N-6			

Date	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Remar
	162	B36	16P-7	II	Load Fuel	D-11	--		M-5			
	163	B40	R34	II	" "	F-12	--		M-4			
	164	A46	R14	I	" "	J-18	--		N-5			
	165	A26	R28	I	Load Fuel	H-18	--		P-6			
	166	C19	A6P-7	III	" "	N-8	--		R-6			
	167	C20	12P-6	III	" "	L-9	--		P-5			
	168	B46	16P-12	II	" "	B-11	--		N-4			
	169	B49	16P-16	II	" "	K-12	--		M-3			
	170	C50	112	III	" "	G-5	--		R-5			
	171	C48	99	III	" "	F-5	--		P-4			
	172	C05	R26	III	" "	P-10	--		N-3			
	173	C39	96	III	" "	H-6	--		M-2			
	174	C22	A6P-8	III	" "	M-8	--		P-3			
	175	C30	B6P-6	III	" "	F-6	--		N-2			
	176	A49	RS5	I	" "	G-17	--		M-10			
	177	B01	12P-2	II	" "	B-13	--		N-10			
	178	B31	16P-15	II	" "	E-12	--		M-11			
	179	B17	R46	II	" "	E-13	--		M-12			
	180	A21	R21	I	" "	G-18	--		N-11			
	181	A33	R39	I	" "	F-18	--		P-10			

Date	Step No.	Fuel Ass'y Ident. No.	Insert Iden.#	Enrich-ment	Operation	From SFP	From Core	From Time	To Core	To Time	Initials	Remar
	182	C-14	A6P-1	III	Load Fuel	O-9	--		R-10			
	183	C13	12P-5	III	" "	O-11	--		P-11			
	184	B48	16P-3	II	Load Fuel	C-12	-		N-12			
	185	B52	16P-14	II	" "	B-12	--		M-13			
	186	C43	100	III	" "	D-6	--		R-11			
	187	C44	104	III	" "	C-6	--		P-12			
	188	C06	R29	III	" "	L-10	--		N-13			
	189	C25	A6P-3	III	" "	N-9	--		P-13			
	190a	C36	B6P-5	III	" "	C-7	--		N-14			
	190b	--	--	--	Remove Temp.det.C	--	M-14		--			
	191a	C52	105	III	Load Fuel	B-6	--		M-14			
	191b	--	--	--	Remove Temp.det.B	--	R-8		--			
	192a	C46	SS1	III	Load Fuel	J-4	--		R-8			
	192b	--	--	--	Remove Temp.det.A	--	A-8		--			
	193	C41	SS2	III	Load Fuel	H-4	--		A-8			

INDIAN POINT

NUCLEAR GENERATING STATION

UNIT NO. 2

PREREQUISITE AND CHECKOFFS

FOR CORE LOADING

COPY NUMBER 1

APPROVED FOR EXECUTION

BY

JOINT TEST GROUP

John M. Makepeace	3/18/71
CON. EDISON PRODUCTION	DATE
A. D. Kohler Jr.	3/18/71
CON. EDISON CONSTRUCTION	DATE
R E Barclay	3/18/71
WEDCO OPERATIONS	DATE

PREPARED BY R. E. Barclay

APPROVED BY R. E. Barclay

DATE August 28, 1970

IPP-S.U-5.2

3/12/71 - Revision 1

3/18/71 - Revision 2

IPP-S.U.-5.2

PREREQUISITE AND CHECKOFFS

FORE CORE LOADING

1.0 REFERENCES

Core Loading Procedure "Initial Core Loading" (IPP-S.U.-5.1).

2.0 PURPOSE

The attached checkoff lists are intended to summarize the plant status requirements of the Con Edison core loading program.

3.0 CONDITIONS

Plant is shut down and ready for core loading.

4.0 PRECAUTIONS

No special precautions are applicable to this procedure.

5.0 PROCEDURE

Con Edison should complete Sections A and B prior to beginning core loading. Section B Core Loading Checkoff List should periodically be used to verify continuing plant status at least once per 12 hour shift until completion of core loading.

NOTE: Section C of the Core Loading Checkoff List should be used periodically to verify the boron concentration once every four hours until completion of core loading.

Additional items can and should be added to the lists by mutual agreement of Con Edison and WEDCO Operations representatives.

	Checked By	Date Time
A. Pre-Core Loading Checkoff List △		
1. Source Range nuclear instrumentation checked out and in service.		
2. Fuel handling tools checked out, clean and ready for use.		
3. Containment and Fuel Storage Building area Radiation Monitors checked out and in service.		
4. Fuel transfer system checked out and aligned.		
5. Refueling boron concentration established in the Reactor Coolant System and connected portions of the SIS and CVCS bounded by locked valves listed in Part B.1.d of this procedure.		
6. Core loading (temporary) instrumentation checked out, calibrated and in service.		
7. Access control established for core loading work areas.		
8. Personnel have completed training in fuel handling operations.		
9. Protective clothing and personnel monitoring requirements in effect.		
10. Detailed loading sequence established and fuel assembly and inserts verified.		

	Checked By	Date / Time
11. Primary source container opened and installation procedure rehearsed.		
12. Containment evacuation procedures established by Con Edison.		
13. A licensed Senior Operator is available for direct supervision of fuel loading.		
14. All pre-loading tests completed.		
15. Irradiation specimens installed.		
16. Reactor internals inspected and access port installed.		
17. Fuel transfer pit filled with approximately 50 inches of demineralized water.		

	Checked By	Date & TIME

B. Core Loading Checkoff List

1. Valve and equipment status.

a. Residual Heat Removal System in service.

b. Sampling System ready for normal service.

c. Component Cooling System in service.

d) Potential sources of unborated water isolated by locking the following valves:

CVCS	311A
	311B
	323A
	323B
	340A
	340B
	343A
	343B
	282
	376
	1132
	285
	317
	318
	326
	330
	339
	356
	363
	365
	378
	381
	383
	385
	386
	393
	394A
	394B
	315
Sampling System	994A

	Checked BY	Date & TIME

SIS 1800
1841
1802A
1802B
885A&B
845
1821
1831
350
841
1733
PW84
873A

e. Chemical and Volume Control System

1) Minimum of one charging pump available.

2) Volume control tank in service with N_2 blanket.

3) 12% boric acid in boric acid tanks.

f. Boration check list IPP-SU-5.3 completed.

g. Refueling Water Storage Tank ready to supply greater than 2000 ppm boron solution to charging pumps.

2. Plant auxiliary water, air, electrical distribution, and heating, ventilating and air conditioning systems in service as required.

3. Plant and special core loading instrumentation checked for response.

SECTION C

BORATED WATER SAMPLES TO BE OBTAINED DURING CORE LOADING

Time & Date at Hr. Intervals	Checked By	*RHR Pump Discharge Local Sample Valves A80 & A81 or A76 & A77 Operating Pumps Only	*RSWT Local Sample Valve 844		*Volume Control Tank 3/4"Drain Valve Adjacent to Valve 299		**Boric Acid Tank Local Sample Valves 338 & 375	
		Boron ppm	Boron ppm	Tank Level %	Boron ppm	Tank Level%	Boron ppm	Tank Level %

* Must be $\geq$ 2000 ppm.

** Must be 12 WT% boric acid which is equal to approximately 21,000 ppm Boron.

INDIAN POINT

NUCLEAR GENERATING STATION

UNIT NO. 2

SAMPLING OF THE REACTOR VESSEL PRIOR TO CORE LOADING

COPY NUMBER 4

APPROVED FOR EXECUTION

BY

JOINT TEST GROUP

B. Mooney	3/12/71
CON. EDISON PRODUCTION	DATE
[illegible]	3/12/71
CON. EDISON CONSTRUCTION	DATE
R. E. Barclay	3/12/71
WESCO OPERATIONS	DATE

STEPS 3.3 } CHANGED
5.5 } VA. JE
ON 3/11/71

PREPARED BY R. H. BINGLEY

APPROVED BY R. E. Barclay

DATE August 27, 1970

IPP-S.J.-5.4

Revision 1 - 3/12/71

SAMPLING OF THE REACTOR VESSEL PRIOR TO CORE LOADING

1.0 REFERENCE

1.1 Plant Manual Operating Instructions S-3.1 Boron Concentration Control.

1.2 Westinghouse Drawing 685J400 - Reactor Vessel Assembly.

2.0 PURPOSE

The purpose of this procedure is to provide a means to verify correct and uniform boron concentration in the reactor vessel prior to core loading.

3.0 CONDITIONS

3.1 The Reactor Coolant System has been isolated and applicable tagging and administrative controls have been used to prevent unauthorized change in the boron concentration.

3.2 The Reactor Coolant System is drained to refueling level and the reactor vessel head has been removed in preparation for core loading.

3.3 The Reactor Coolant System has been borated to refueling concentration (≥ 2000 ppm boron).

3.4 Residual Heat Removal System is in service circulating coolant through the reactor vessel.

4.0 PRECAUTIONS

4.1 Avoid dropping equipment, parts, or personal effects into the open reactor vessel.

4.2 Glass or other breakable containers shall not be lowered into the open vessel or brought in the near vicinity of the vessel.

4.3 Lanyards, fasteners, etc. shall be wrapped with tape or secured in a manner that will prevent loss into the open vessel.

5.0 PROCEDURE

5.1 After the reactor vessel has been borated, mix for at least two hours by operation of the residual heat removal loop. Maintain circulation until chemical sampling and analysis are complete.

5.2 Using the weighted bottle in accordance with the attached sketch OR CON EDISON'S METAL SAMPLE CONTAINER, TO obtain coolant samples from the following locations:

≈ 1 ft. from top water level

≈ 5 ft. from top water level

≈10 ft. from top water level

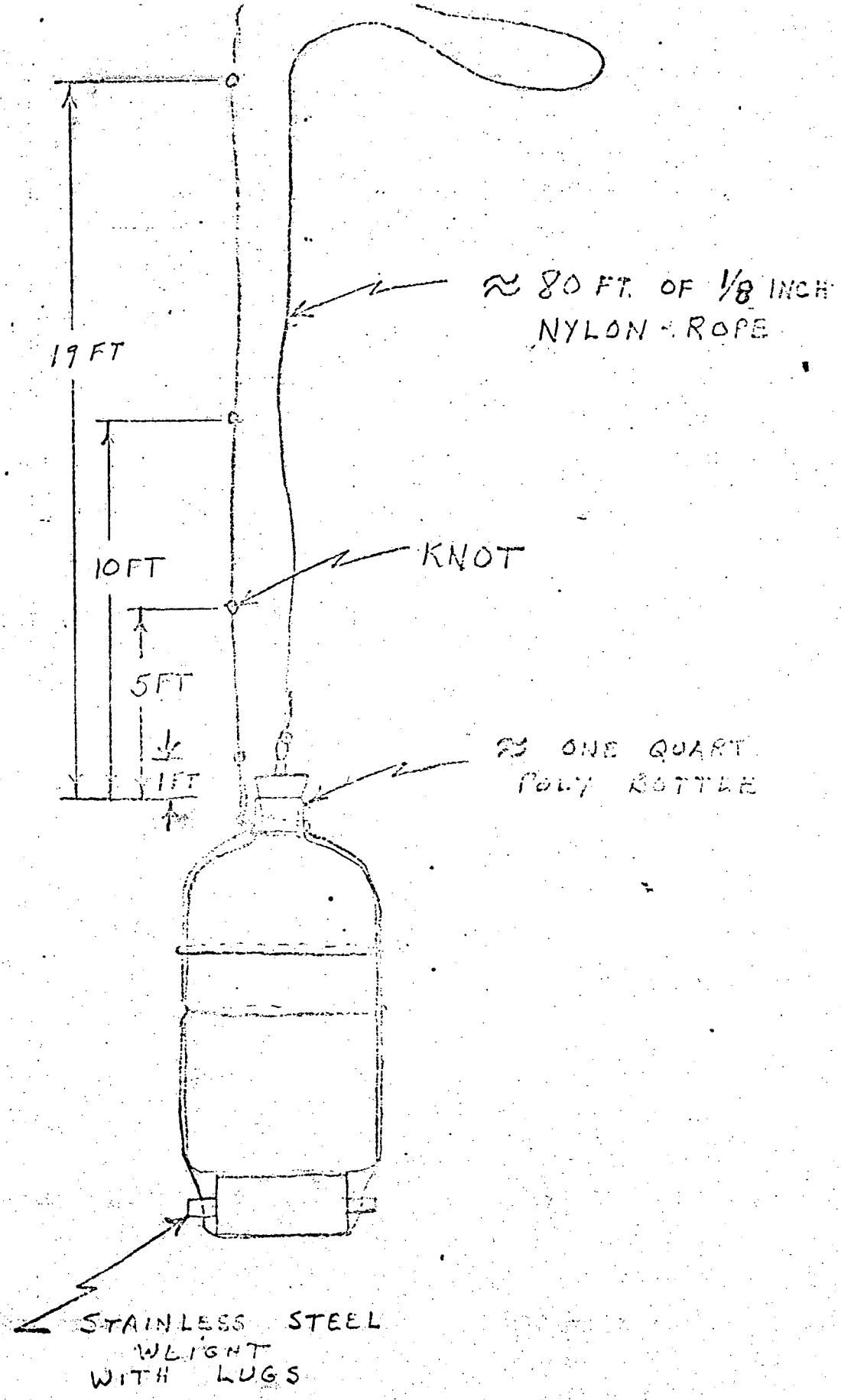
≈19 ft. from top water level

NOTE: Reactor vessel samples are taken by using a weighted bottle positioned at the appropriate level and pulling the cap. The bottle is then removed from the reactor vessel and liquid in the bottle analyzed.

5.3 Obtain a sample of the boron concentration at the discharge of the operating residual heat removal system pump, local sample valves, A80 and A81 or valves A76 and A77.

5.4 Record the results of the analysis of the various samples on the attached data sheet.

5.5 If necessary, adjust the boron concentration of the system in accordance with Reference 1.1 Operating Instructions S-3.1 to ≥ 2000 ppm and repeat sampling and analysis.



NOTE:
WRAP BOTTLE AND WEIGHT WITH TUCK TAPE.

DATA SHEET

Reactor Vessel Boron Analysis Results After Final Adjustment:

	ppm
Reactor Vessel 1' level	_____
Reactor Vessel 5' level	_____
Reactor Vessel 10' level	_____
Reactor Vessel 19' level	_____
Residual Heat Removal Loop	_____

Remarks:

Performed By: _____ Date _____

WEDCO Observer: _____

Con Edison Observer: _____

ATTACHMENT E

Attachment to KJC-525

I. Construction

A. Work Items Scheduled Before Core Loading

1. Inside Vapor Containment Building

   a. Items required for Core Loading

      (1) Complete the modifications and testing of polar crane

      (2) Complete RV cavity seal ring and grout

      (3) Complete assembly and checkout of manipulator crane and Fuel Transfer System

      (4) Complete Preservice Inspection (top of pressurizer and inside RV nozzles)

      (5) Remove RV head, remove internals, prepare and reinstall the lower internals. Complete work on the upper internals.

      (6) Install source range nuclear instrumentation

      (7) Complete and checkout Radiation Monitoring System in VC and FHB

      (8) Remove lower internal stand, move in CRDM concrete missile shield blocks, miscellaneous cleanup and install equipment hatch.

   b. Items scheduled before Core Loading, but which could be done out of sequence in parallel with Core Loading.

      (1) Complete spray header work in dome

      (2) Complete insulation above el. 95'

      (3) Complete H&V System

      (4) Complete hangers and restraints above el. 95'

      (5) Complete piping restraints within primary system boundary.

2. Outside Vapor Containment Building

   a. Complete BA Systems including heat tracing on those components and piping exposed to 12% boric acid.

B. During Core Loading, both hatches have to be installed and at least one door on each hatch closed at all times. The only feasible work in the Vapor Containment Building at this time would be that in support of the Core Loading and closely controlled work items in support of system checkout and grooming.

Outside the Vapor Containment Building the major work items would be:

1. Pipe hangers and restraints
2. Insulation
3. Painting
4. Any remaining structural items
5. Turbine redundant overspeed trip
6. Permanent lighting
7. Punch list and cleanup

C. Work Items Scheduled Before Criticality

1. Complete seal table and incore instrumentation work.
2. H&V - install demisters and charcoal filters - replace fan motor cooling coil - Unit No. 22
3. Loose Parts Monitoring System
4. Failed fuel detector
5. Electrical fire stops and barriers
6. Complete Reactor Protection System
7. Install missile protection beams external to Vapor Containment Building
8. Punch list items in connection with the following:
   a. Complete WDS - liquid and gas
   b. Complete electrical tunnel fire protection
   c. "Boots" on joints of 480 volt DG bus
   d. Complete H&V System in Fan Room
9. General Cleanup

D. Work Items Scheduled after Core Loading

1. Some seismic and pipe whip restraints
2. Portions of computer software package
3. Some painting and insulation
4. Grading and leveling and street lighting
5. Filtered Exhaust System for the Fuel Storage Building
6. Punch list items in connection with the following:
   a. H_2 Recombiner System
   b. Iodine Removal System
   c. Cathodic Protection System
   d. Structural, gratings, stairs, platforms, handrails, etc.
   e Miscellaneous
7. General cleanup

II. Systems

A. The following, in addition to the Vapor Containment Building, are expected to be tested and functional by commencement of Core Loading.

1. Reactor Coolant System
2. Pressurizing System
3. Component Cooling System
4. Pressure Relief System
5. Residual Heat Removal System
6. Primary Sampling System
7. Chemical Volume Control System
8. Waste Disposal System (part, liquid only)
9. Auxiliary Steam System and Service Boilers
10. Circulating Water System
11. Service Water System
12. Instrument Air System
13. Station Air System
14. Radiation Monitoring System in VC and FHB

15. Nuclear Instrumentation System (Source Range)

16. Weld Channel Pressurization System

17. Fuel Handling System

18. Emergency Diesel Generators

19. SIS (capability of delivering H_2O to RCS)

III. Tests

A. To the extent not previously conducted, the following tests will be performed after Core Loading:

1. Feedwater Treatment Demonstration

2. Auxiliary Feedwater Control Checkout (Interlock Check with SIS System)

3. Secondary Sampling System (Flash Evaporator Portion Test)

4. Lube Oil Purification System Test

5. Waste Disposal System Gaseous Waste Checkout

6. Solid Waste System Checkout

7. Heating, Ventilation and Air Conditioning and Filter Systems Tests

8. Nuclear Instrumentation (Intermediate and Power Range Test)

9. Rod Control System (With Reactor Vessel Head Removed Test)

10. Fixed Incore Detector Checkout

11. H_2 to Hydrogen Recombiner

12. Waste Disposal System Gas Pressure Test

13. Fire Protection System Functional Test (Isophase Bus Portion)

14. Emergency Feedwater Supply Checkout

15. Preoperational Test of Computer

B. The following tests are planned for completion after Core Loading and prior to initial criticality:

1. Boron Recycle Process Test

2. Incore Movable Detector Checkout

3. Reactor Coolant System Flow Measurement

4. Pressurizer Spray Flow Verification

5. Rod Control System Checkout

6. Rod Drive Position Indicator Checkout

7. Rod Stepping Test

8. Rod Drop Test

9. Part Length Mechanism Brake Test

10. Fixed Incore Detector Checkout

11. Main Turbine Steam Stop Valve Test

12. Lube Oil Purification System Functional Test

13. Steam Generator Manual and Auto Control and Level Checkout

14. Steam Dump Test

15. Preoperational Test of Computer

16. Flow Coastdown

17. Alignment of Tavg and Delta T Instruments
18. Reactor Protection System Operational Time Response
19. Reactor Protection Setpoint Test
20. Reactor Protection I&C
21. Safeguards I&C
22. SIS (Loss of AC Power)
23. SIS Functional Test - Electrical
24. Inverters, Batteries and Chargers Test