

IDO-10037
AEC Research & Development Report
Emergency Planning
(UC-2) TID-4500 (17th Ed.)
Issued: June 21, 1962

MANUAL FOR OPERATIONAL
DOCUMENTARY PHOTOGRAPHY
(ODP)

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Idaho Operations Office
U. S. ATOMIC ENERGY COMMISSION

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FOREWORD

The system presented in this document was initially submitted as a suggestion and given an award by the IDO Suggestion Awards Committee. The cooperation of Messrs. Riley Foote, B. F. Boardman, and H. L. Griffin of Phillips Petroleum Co in the development and testing of the system is acknowledged.

OPERATIONAL DOCUMENTARY PHOTOGRAPHS

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OPERATIONAL DOCUMENTARY PHOTOGRAPHS (V. V. Hendrix)

I. INTRODUCTION

The post-incident operations immediately following the SL-1 incident developed an urgent need for photographs of the SL-1 facility. A quick search of the files revealed a very meager store of photographs, most of which were quite out-of-date. This requirement for photographs was accentuated because on the night of the incident, most of the operational personnel received radiation dosages in the attempted rescue efforts such that they were not allowed further exposure. Pre-incident photographs were needed, therefore, not only for detailed planning but also for the purpose of orienting personnel who had no familiarity at all with the plant. Also, pre-incident photographs were needed to compare with post-incident photographs for an assessment of the physical damage incurred during the incident.

In cases where access is routinely limited due to high radiation fields as in process cells at the CPP and also in the event of another reactor incident of the SL-1 type, with its attendant high radiation fields, access to some areas may be allowed for periods of time amounting to only a few seconds. It can readily be seen that the briefing prior to such penetrations should be most explicit. This makes the use of photographs mandatory for this purpose.

II. PURPOSE

By Immediate Action Directive 8401* dated December 6, 1961, the Manager of the Idaho Operations Office was charged with the "full responsibility for overall site environment safety ... he is authorized and directed to keep currently informed respecting the safety characteristics of all reactors operating at the NRTS...". In order to comply with this directive and also to provide a basis for the accumulation of vital data to aid in rescue or recovery operations in the event of any type of a disaster occurring at the NRTS, this system of documentary photographic coverage has been adopted.

This program provides for complete and detailed photographic coverage of all facilities at the NRTS involving reactor operation, fuel storage or fuel processing.

III. APPROACH

Most reactor installations, particularly those which are unclassified, have been photographed extensively. These photographs, however, generally are

* The Naval Reactor Facility is specifically excluded from the direct responsibility of the Manager, IDO.

taken for specific purposes and are, for the most part, "glamour" shots. Such photographs are not likely to be uniform in coverage nor are the prints or negatives usually available for rapid and orderly retrieval.

It is believed that the Operational Documentary Photography System (ODP) is unique in that it provides for:

- (1) A basis for systematic coverage of all facilities of interest
- (2) A method of rapid recall of any photograph taken during the systematic coverage

A great many photographs would have to be taken to furnish complete detailed coverage of any of the NRTS reactor installations. Therefore, in this, as in most matters of practicality, a compromise solution is proposed. The plan employed is a basic one in that it affords minimal coverage. As is noted in Section V, an integral part of the plan requires participation by operations personnel at a facility and furnishing of information on areas of specific concern to them, based on both the Hazards Report and the operational history of the facility.

The approach used in building up a card deck of aperture cards, affording photographic coverage of the facility, is basically simple. The photographic negative is obtained with a 35-mm camera with, in most cases, a wide-angle lens. The 35-mm negative is mounted in the aperture card after the card has been coded to include the present data identifying the negative in respect to the series. The photographs are taken on a room coordinate basis that will be discussed in detail in Section IV. The cards bearing the aperture, after being selected, may be used to produce enlarged prints quickly or may be used to produce regular glossyprints. The rapid print is somewhat inferior to the glossy in quality but is quite adequate for most operations.

A program initiated by the Department of Defense and utilized by the AEC is underway to use the aperture cards with photographic negatives for recording facility as-built drawings. All as-built drawings of installations under IDO will be maintained in a deck of aperture cards which will be available for machine retrieval of specific drawings. These drawings may then be reproduced for study by either of the methods indicated above. The photographic negatives in the ODP program will utilize the same system for preliminary identification as is used in the as-built drawing coding system. One of the points included in the coding of the photographs is a listing of the applicable line drawing.

These two systems, line drawing aperture cards and the ODP aperture cards, are complementary and the respective card decks will be stored together where both line drawings and pictures will be readily available.

IV. INDEXING AND CODING OF PHOTOGRAPHIC DATA

The use of IBM aperture cards for the storage of vital emergency data in the form of photographic negatives requires proper coding and indexing. The IBM cards allow the recalling of specific data from large accumulations



of data by rapid machine selection. In order to accomplish this, care must be taken in coding the data in such a manner that using the code for setting up searches is not unduly complicated.

The aperture cards are punched for machine handling and recall. However, the data columns will be printed with the captions and in addition the punched data will be printed across the top of the card to assist in rapid visual identification.

In the following discussion, the coding spaces are divided into segments labelled (A) through (K) with a brief discussion of the function covered by the segment and later in text those actual codings used for these segments. A facsimile of an IBM card is shown in Figure 1. An outline of the coding as presented on the card is discussed below.

53 07603			05503			04			066272			3245310		
AREA	FACILITY	NUMBER	TYPE	NUMBER	ROOM	LINE DRAWING	SUBJECT	ORASSEMBLY	DATE	NO.	VAL.	NEGATIVE	SERIAL	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	
7	7	7	7	7	7	7	7	7	7	7	7	7	7	
8	8	8	8	8	8	8	8	8	8	8	8	8	8	
9	9	9	9	9	9	9	9	9	9	9	9	9	9	

OPERATIONAL DOCUMENTARY
PHOTOGRAPH

UNITED STATES ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE

FIG. 1 FACSIMILE OF IBM CARD.

A. NRTS Area Designation

The first three (1-3) spaces are used to locate the specific area at the NRTS. Numbers have been assigned to specific areas; these numbers incidentally are consistent with the first three numbers assigned the "as-built" line drawing aperture cards. The coding numbers for NRTS areas are presented in IV a, Appendix.

B. Facility Designation

Of the next five (4-8) spaces, the first two are used to indicate the type of facility presented in the photograph. The coding required for these spaces is presented in IV b (1), Appendix. Of the next three spaces, the first two are to be the building numbers. The third space will not be used until the building numbers require a further digit. Building numbers will be used in accordance with "as-built" drawings.

C. Room and Floor Designation

The next three (9-11) spaces will show floor and room numbers. These are literal numbers and are not otherwise coded.

D. Height Above Floor Designation

The next two (12-13) spaces will indicate height above the floor from which the photo was taken. These figures also are literal.

E. Photograph Location Designation

The next three (14-16) spaces furnish detailed information on what is photographed. A system of room coordinates is employed (see IV e, Appendix) to afford a simple method of locating and recalling data. The coordinates are always used with (1) oriented with plant north. The first space denotes the position of the camera with respect to the room coordinates. The second space denotes the direction in which the camera is facing. This also is with respect to the room coordinates. The third space denotes the angle the camera is viewing. It should be noted here that the point of reference is the camera and the same coordinates are used. With the coordinates in the vertical plane and the camera at zero overhead being (1), horizontal (3) and down (5).

F. Appropriate Line Drawing Designation

The next six (17-22) spaces will be used to give the serial number of the "as-built" line drawing plan view applicable to the photograph.

G. Appropriate Subject Coverage

The next six (23-28) spaces will be for coding appropriate subject coverage (refer to IV g, Appendix). The first two spaces are used in subject coverage with the appropriate system or subsystem as indicated in IV g (1), Appendix. The last four spaces may be employed by individual installations to use a numerical coding similar to that used in IV a, Appendix but covering specific plant details of interest to operations. Copies of III g (2), Appendix for each installation should be given the same distribution as the card decks.

H. Sequential Disassembly Designation

The next four (29-32) spaces will be used to list, by number, photographs of sequential disassembly steps keyed to the appropriate maintenance manual steps.

I. Date of Photograph Designation

The next four (33-36) spaces will be used in literal form to give the date of the photograph, eg, 11/62 would be presented as 1162.

J. Negative Technical Data Designation

The next two (37-38) spaces furnish data on the negative. The first space furnishes coded information giving the lens opening used in taking the picture [see IV j (1), Appendix]. The second space is coded to give the focal length of the lens used [see IV j (2), Appendix].

K. Photo Serial Number Designation

The next six (39-44) spaces give in literal form the serial number of the photograph as assigned by the Phillips Petroleum photo shop.

L. Security Classification of Photograph

The next space (45) presents in coded form the security classification of the photograph contained in the aperture card. See IV l for coding information.

V. OPERATIONAL PLANNING FOR DOCUMENTARY PHOTOGRAPHS

The foregoing text outlines the method of coverage proposed and the plan for accomplishing. It should be noted that it is a basic plan and normally will be designed for minimal coverage; however, it can be expanded in any area to cover items of specific interest or concern.

A. Basic Plan Coverage

The basic plan coverage for photographing will depend upon the size of the room and to some extent the contents of the room.

(1) Generally where the room is large it will include photos at each of the room coordinate points taken on horizontal plane (for example refer to IV e, Appendix) and where the principal object is located near the center of the room. The following are room coordinate codings only:

103, 183, 123
203, 213, 233
303, 343, 323
403, 433, 453
503, 543, 563
603, 653, 673
703, 763, 783
803, 873, 813

(2) In the case of a small room having equipment around the walls the basic plan would be:

013, 033, 053, 073

Now it can be readily seen that modifications to the basic plan can and in most cases should be made. Angle shots both from below and above should be taken where adequate coverage is not obtained by horizontal photographing. Physical obstructions may preclude some photographs, even for the basic coverage.

B. Additional Photographic Coverage

In planning for the coverage of an installation for documentary photographs, the cooperation of operational personnel is necessary to indicate the areas that should be covered in more detail than is contemplated by the minimal plan. Since all NRTS facilities are identified by room numbers and the aperture cards are coded by room numbers, it is suggested that in response to requests for areas of operational interest, that the reply include the room numbers where the items of interest are situated.

In evaluating a facility for areas of specific interest, the following considerations should be borne in mind:

(1) Plant areas where equipment or subsystems have caused difficulties in past operation.

(2) From a review of the Hazards Report, which systems or subsystems would be involved in the event of a maximum credible incident and, therefore, should be of concern for extensive photographic coverage.

(3) From a review of maintenance procedures, what systems or subsystems should be documented on sequential disassembly steps keyed to the appropriate manual steps.

(4) While the basic plan covers most access ways, attention should be given to any peculiar arrangements involving limited overhead clearance access or other limiting facility structures.

(5) While the building structures are not themselves of immediate concern, those portions that might be involved upon contact above or in close proximity to the reactor also should be photographed.

In order to allow for proper planning and scheduling of the photographing, the appropriate operating personnel should furnish replies advising the specific room numbers and types of additional photographs that are required in addition to the basic plan in order to provide for overall planning. In planning for sequential disassembly shots, the photographing can be scheduled to coincide with a normal shutdown operation. Items of equipment for which sequential disassembly photographs should be taken should be clearly indicated. This should include, as a minimum, the reactor and primary loop.

VI. PLAN OF OPERATION

For existing facilities and for new facilities as they become operational, copies of this manual will be issued to contractors operating facilities under IDO involving reactor operations and fuel storage or processing.

Contractors will for each such installation furnish to the Director, Technical Services Division, a listing in accordance with considerations mentioned in Section V (Operational Planning for Documentary Photographs) above.

Upon approval of the individual plans, Phillips Petroleum will be requested to accomplish the photography and preparation of coded aperture cards.

VII. DISTRIBUTION OF APERTURE CARD DECKS

- (1) Operating contractor - 2 decks
- (2) AEC, IDO, Technical Services Division - 1 deck
- (3) Master deck to be retained by Phillips Petroleum

VIII. METHOD OF UPDATING CARDS

In July of each year, machine-printed lists will be posted of all photos one year old; these lists will be furnished to appropriate operating personnel who will review the list and indicate those photos which are outdated. The lists will be forwarded to:

Director, Technical Services Division
Idaho Operations Office, USAEC
Idaho Falls, Idaho

APPENDIX

IV a - INDEX CODE NUMBER GUIDE

This guide will be used to assign the proper index code number to all aperture cards. The index code number must be accurately assigned.

Spare numbers are reserved throughout all categories of the index code to allow for future expansion. These spare numbers are not to be used without approval of the Idaho Falls Drafting Section supervisor. Only the numbers which have been assigned are listed.

Area Designation Code Number

This code covers the first three spaces (1-3) in the IBM aperture card coding.

<u>Code No.</u>	<u>Area Designation</u>	<u>Code No.</u>	<u>Area Designation</u>
032	ANP-1 (general)	117	Block 5
033	ANP-2 (administration)	118	Block 6
034	ANP-3 (A & M)	119	Block 7
035	ANP-4 (IET)	120	Block 8
036	ANP-5 (FET)	121	Block 9
037	ANP-6 (STPF)	122	Block 10
038	ANP-7 (LPTF)	123	Block 11
039	ANP-8 (PSTF)	124	Block 12
040	ANP-9 (STF air)	125	Block 13
056	ARBOR	126	Block 14
059	AREA/general	127	Block 15
063	AREA/GCRE	128	Block 16
066	AREA/ML-1	129	Block 17
068	AREA/SF	130	Block 18
070	AREA/SL-1 (ALPR)	131	Block 19
113	Block 1	132	Block 20
114	Block 2	133	Block 21
115	Block 3	134	Block 22
116	Block 4	135	Block 23

<u>Code No.</u>	<u>Area Designation</u>	<u>Code No.</u>	<u>Area Designation</u>
136	Block 24	559	NRF, ECF
137	Block 25	586	OMRE
138	Block 26	707	Site 1
139	Block 27	708	Site 2
140	Block 28	709	Site 3
141	Block 29	710	Site 4
142	Block 30	711	Site 5
143	Block 31	712	Site 6
144	Block 50	713	Site 7
145	Block 60	714	Site 8
188	Central Facilities	715	Site 9
200	CPP	716	Site 10
261	East Butte	717	Site 11
265	EBR-I	718	Site 12
266	EBR-I, AEF (BORAX)	719	Site 13
267	EBR-I, AFSR	720	Site 14
268	EBR-I, RTF (ZPR)	721	Site 15
272	EBR-I	722	Site 16
273	EBR-II	723	Site 17
289	EOCR	724	Site 18
400	Idaho Falls area	725	Site 19
520	Miscellaneous	726	Site 20
530	MTR/ETR/ATR	727	Site 21
556	NRF	728	Site 22
557	NRF, S1W (STR)	729	Site 23
558	NRF, A1W	730	Site 24

<u>Code No.</u>	<u>Area Designation</u>	<u>Code No.</u>	<u>Area Designation</u>
731	Site 25	739	Site 33
732	Site 26	759	SPERT (general)
733	Site 27	760	SPERT I
734	Site 28	761	SPERT II
735	Site 29	762	SPERT III
736	Site 30	763	SPERT IV
737	Site 31	800	TREAT
738	Site 32		

IV b (1) - TYPE OF FACILITY

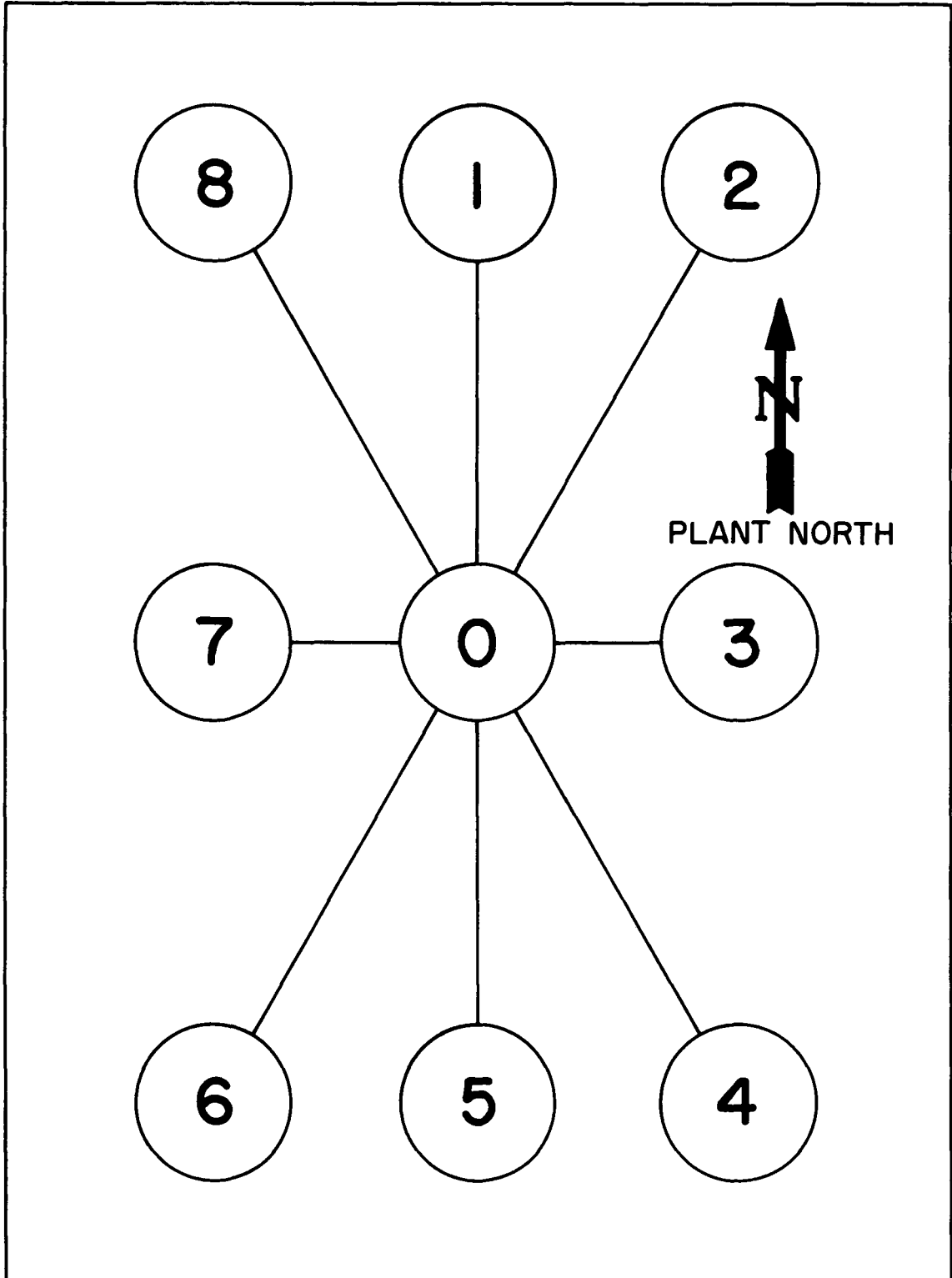
This code is used in the spaces (4-8) inclusive of the IBM aperture card.

<u>Code Number</u>	<u>Type of Facility</u>
00000	Topography
01000	Site and area maps
02000	Piping systems, outside service
03000	Waste systems, outside service
04000	Electrical distribution, outside service
*05000	Roads and streets
*06000	Buildings
*07000	Structures
08000	Railroads
09000	Communication and alarms, outside service
88880	Charts
99990	Miscellaneous

* Assigned numbers must be used.

IV e - ROOM COORDINATE PLOT

This plot is used as indicated in IV e to code the spaces (14-16) inclusive on the IBM aperture card.



IV g (1) - REACTOR SYSTEMS CODING

This is a subject coding and the following code is used to cover principal subsystems with the first two digits (23 and 24). The remaining spaces may be coded as required by the individual installations, that is, spaces 25-28 inclusive.

01. Auxiliary heating and cooling
04. Biological shielding
07. Canals
10. Compressed air system
13. Containment
16. Control rod system
19. Core
22. Data handling instrumentation
25. Demineralizer system
28. Electrical distribution system
31. Fire detection and alarm systems
34. Fuel unloading equipment
37. In-pile loops
40. Nuclear instrumentation
43. Power generating equipment
46. Pressure vessel
49. Pressurizer system
52. Primary coolant loop
55. Primary system purification
58. Process instrumentation
61. Radioactive waste treatment and disposal
64. Reactor maintenance equipment
67. Secondary coolant system
70. Secondary purification system
73. Shielded transfer cask
76. Standby power
79. Test instrumentation

IV j - NEGATIVE TECHNICAL DATA DESIGNATION

(1) APERTURE OPENING

This code presents the aperture opening of the lens of the camera when the picture was taken. It is presented in coded form in space 37 of the IBM aperture card.

0	f	2.5
1	f	3.5
2	f	4.5
3	f	6.3
4	f	8
5	f	11
6	f	16
7	f	22
8	f	32
9	f	45

(2) LENS FOCAL LENGTH CODING

This coding presents the focal length of the lens used in photographing the negative contained in the aperture card. The coded datum is presented in space 38 of the IBM aperture card.

0.	Variable
2.	24 mm
3.	35 mm
5.	50 mm
9.	90 mm

IV 1 - SECURITY CLASSIFICATION CODING

This is the classification of the photographed negative contained in the aperture card. This datum is presented in coded form on space 45 of the IBM aperture card.

0. Not reviewed for publication
2. Official use only
3. Confidential
4. Secret