

운영기록 작성 및 사찰 수검

2024. 12. 16.

이 승 민



I IAEA 사찰 현장 활동

II 핵물질 종합 대장 (GL) 작성

III IAEA 사찰 수검



IAEA 사찰 현장 활동

- Records examination
- Item counting and identification
- Measurements
- Containment and surveillance
- Other (DIV)

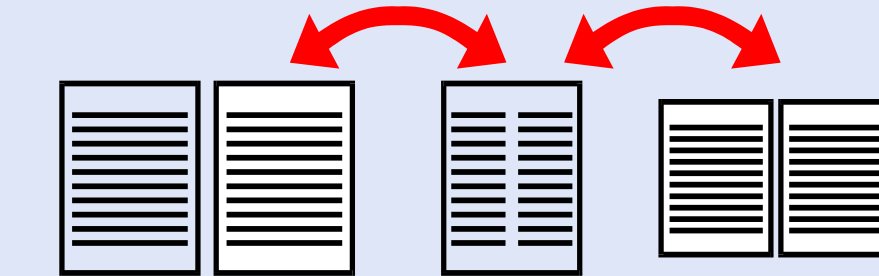


장부 검증



Nuclear Material accountability

- Physical Inventory List
- Material Balance Report
- Inventory Change Report



Operational Record

- 원자로 운전 기록
- 핵물질 거래 장부
- 핵물질 리스트(LII)

Item counting & identification

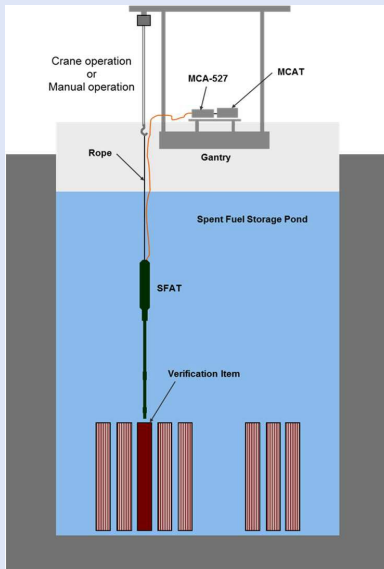
- 원자력시설의 운영 정보(Operational Record, General Ledger, Map) 가
현장과 일치하는 지 확인



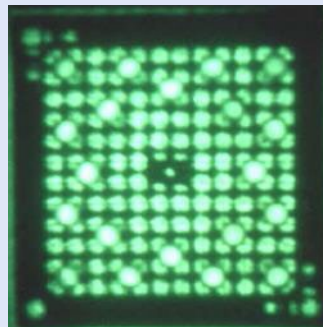
- 수량 확인, ID Check, Acoustic Test 등

경수로 사용후핵연료 측정

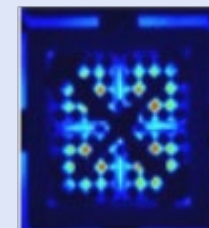
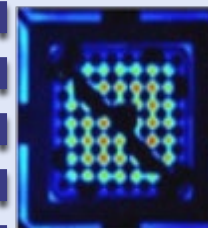
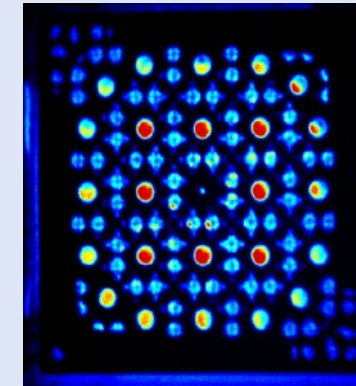
SFAT



ICVD



DCVD



중수로 사용후핵연료 측정

- OFPS System



봉인 장비 (Containment)



Metallic Seals
(CAPS)



Optical Seals
(COBRA)



Electronic Seals
(EOSS)

감시(Surveillance)



설계정보검증



DIV는 적합한 안전조치 적용 방법 도출 및 잠재적인 핵물질의 오용의 검증을 목적으로 실시

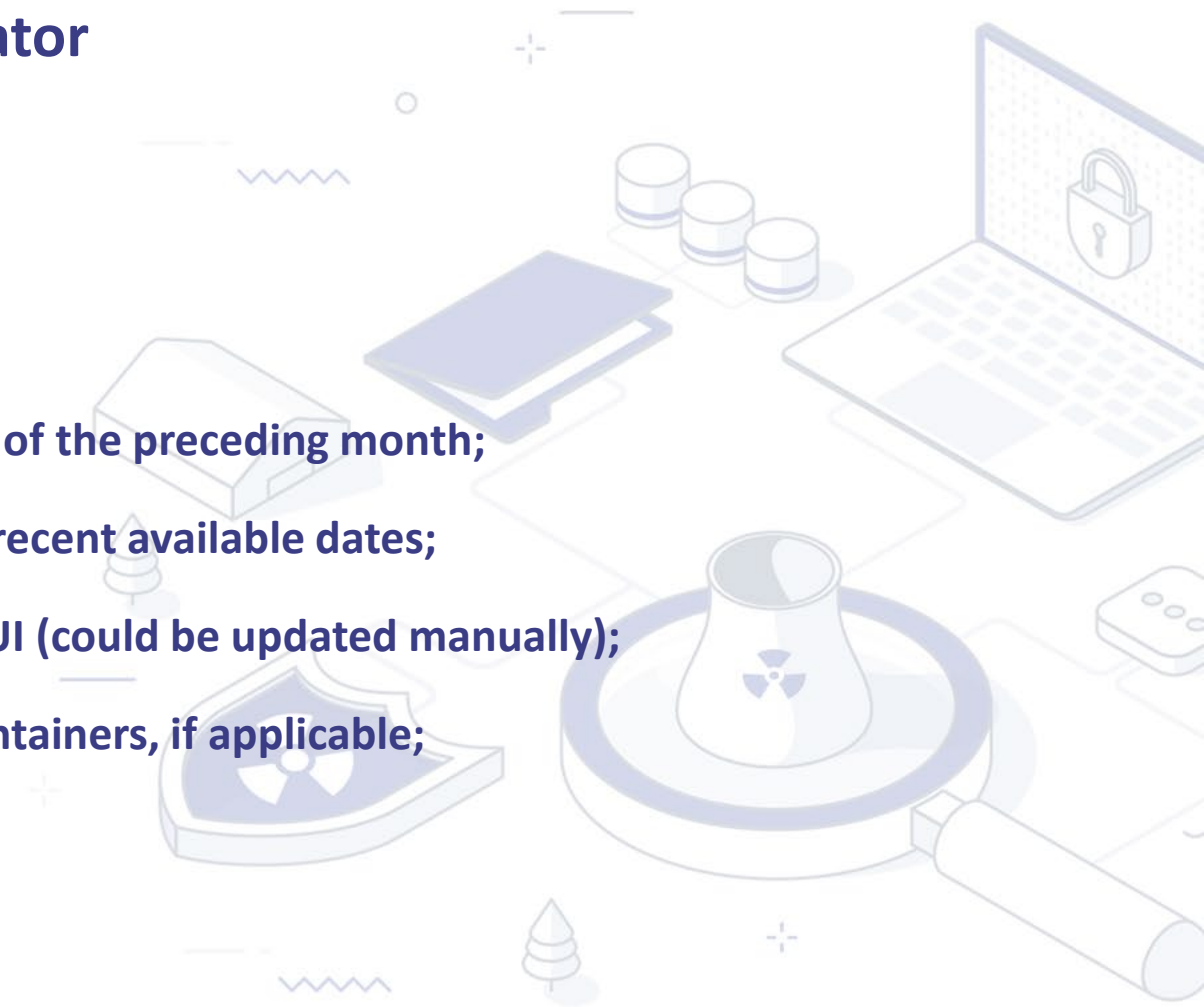
II

IAEA 사찰 수검 서류

4.4.2 Information provided by the operator

The operator will submit to the inspector:

- General Ledger;
- Inventory list as of the day before the RII/UI;
- Integrated thermal power diagram until the end of the preceding month;
- NIS (APRM) and S/W flow charts until the most recent available dates;
- Fuel location maps as of the day before the RII/UI (could be updated manually);
- List and maps of fuel assemblies in the casks/containers, if applicable;
- Relevant source documents.



핵물질 종합 대장

General Ledger (Inventory Record)

Date		2019.12.17	2019.12.26	2019.12.31	2020.01.31	2020.02.05	2020.02.05	2020.02.10
KMP		Pre-PIV	Fuel Withdrawal	monthly	monthly	LN/NP	Fuel Loading	Post-PIV
A New Fuel Storage	No. of Items (LEU)	0	0	0	0	0	0	0
	No. of Items (NU)	0	0	0	0	0	0	0
	LEU Total (g)	0	0	0	0	0	0	0
	LEU U-235 (g)	0	0	0	0	0	0	0
	N.U. Total (kg)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	D.U. Total (kg)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
B Reactor Core	No. of Items (LEU)	177	0	0	0	0	177	177
	No. of Items (NU)	0	0	0	0	0	0	0
	LEU Total (g)	75,842,693	0	0	0	0	76,279,776	76,279,776
	LEU U-235 (g)	3,205,129	0	0	0	0	3,225,452	3,225,452
	N.U. Total (kg)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	D.U. Total (kg)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C Spent Fuel Storage	No. of Items (LEU)	1,127	1,304	1,304	1,304	1,304	1,127	1,127
	No. of Items (PU)	1,059	1,059	1,059	1,059	1,127	1,127	1,127
	No. of Items (NU)	370	370	370	370	370	370	370
	LEU Total (g)	458,686,466	534,529,159	534,529,159	534,529,159	532,779,207	456,499,431	456,499,431
	LEU U-235 (g)	5,273,961	8,479,090	8,479,090	8,479,090	7,500,130	4,274,678	4,274,678
	N.U. Total (kg)	6,928.651	6,928.651	6,928.651	6,928.651	6,928.651	6,928.651	6,928.651
	D.U. Total (kg)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Pu Total (g)	4,508,826	4,508,826	4,508,826	4,508,826	4,823,176	4,823,176	4,823,176
	No. of Basket	1	1	1	1	1	1	1
	No. of Rods	1	1	1	1	1	1	1
	LEU Total (g)	1,744	1,744	1,744	1,744	1,744	1,744	1,744
	LEU U-235 (g)	10	10	10	10	10	10	10
D Other Location	N.U. Total (kg)	0	0	0	0	0	0	0
	D.U. Total (kg)	0	0	0	0	0	0	0
	Pu Total (g)	17	17	17	17	17	17	17
	No. of Items (LEU)	0	0	0	0	0	0	0
	No. of Items (HEU)	0	0	0	0	0	0	0
	No. of Items (DU)	5	5	5	5	5	5	5
	LEU Total (g)	0	0	0	0	0	0	0
	LEU U-235 (g)	0	0	0	0	0	0	0
	HEU Total (g)	0	0	0	0	0	0	0
	HEU U-235 (g)	0	0	0	0	0	0	0
	D.U. Total (kg)	0	0	0	0	0	0	0
	Pu Total (g)	0	0	0	0	0	0	0
	Th-232 Total (Kg)	0.002	0.002	0.002	0.002	0.002	0.002	0.002

● General Ledger

- 지난 IAEA 사찰 이후 주요 재고 변동일 및 사찰일 기준 핵물질 재고량 장부
(ex. PIT때는 MBR 재고량과 같아야 함)
- KMP D에 있는 모든 핵물질의 item 등을 작성
- 0.000g, 0.000kg 등 극미량 핵물질의 양은 별도 주석에 표기

핵물질 종합 대장 작성 방법

General Ledger (Inventory Record)

Facility : K0XX Date : 201X.X.X

KMP	Inspection Date	201X.X.X	201X.X.X	201X.X.X	201X.X.X	201X.X.X
	Inspection Type	RD	SD	PIT	Post-PIV	EH/CE
	Book Ending date	201X.X.X	201X.X.X	201X.X.X	201X.X.X	201X.X.X
New Fuel Storage	No. of Items (LEU)	40			0	0
	2007.05.10				0	0
	LEU Total (g)	14,404,930			0.000	0.000
	LEU U-235 (g)	547,562			0.000	0.000
	NU Total (kg)				0.000	0.000
B Reactor Core	No. of Items (LEU)				177	177
	No. of Items (NU)				93	93
	LEU Total (g)				74623117.000	74623117.000
	LEU U-235 (g)				2947661.000	2947661.000
	NU Total (kg)				1691.106	1691.106
C Spent Fuel Storage	No. of Items (LEU)		12	65	124	124
				1	63	63
	LEU Total (g)		4,157,341	1,805,464	50782186.000	50782186.000
	LEU U-235 (g)		34,887	973,769	355350.550	355350.550
	NU Total (kg)			2,307	1031.304	1031.304
	Pu Total (g)		40,593	342,676	388190.310	388190.310
	No. of Basket				7	7
	No. of Rods (LEU)				0	0
	No. of Rods (NU)				0	0
	LEU Total (g)				0.000	0.000
	LEU U-235 (g)				0.000	0.000
D Other Location	NU Total (kg)				0.000	0.000
	Pu Total (g)				0.000	0.000
	No. of Items (HEU)				6	6
	No. of Items (DU)				0	0
	HEU Total (g)				12.000	12.000
	HEU U-235 (g)				12.000	12.000
	DU Total (kg)				0.000	0.000
	Pu Total (g)				0.000	0.000

- 각 Column에는 Inventory KMP별 총 합계를 작성
- 재고변동 현황은 "Inventory Change Record"에 기재

핵물질 종합 대장 일자 기입

Facility : K0XX

Date : 201X.XX.XX

KMP	Inspection Date	201X.10.01	201X.11.01	201X.11.20	201X.12.01
	Inspection Type	RII	Random DIV	Post-PIV	EH/CG Seal Detach
	Book Ending date	201X.09.30	201X.11.01	201X.11.19	201X.11.30

- IAEA 사찰이 PIV 일 경우 Inspection date 는 사찰 수검일(오늘),
Book ending date 는 PIT 일자를 기입
- IAEA 사찰이 RII 일 경우 Inspection date 는 사찰 수검일(오늘),
Book ending date 는 어제 날짜를 기입
- IAEA 사찰이 DIV, CCV, UI 등 이미 재장전이 완료되었거나 재장전이 없을 경우,
Book Ending Date은 Inspection Date와 동일

GL- 손상 연료봉 바스켓

C Spent Fuel Pool	No. of Batch (LEU)	288	288
	No. of Items (LEU)	288	288
	No. of Batch (NU)	0	0
	No. of Items (NU)	0	0
	No. of Batch (DU)	2	2
	No. of Items (DU)	0	0
	No. of Batch (Pu)	288	288
	No. of Items (Pu)	288	288
	LEU Total (gU)	99,258,008	99,258,008
	LEU U-235 (gU)	857,930	857,930
	N.U. Total (kgU)	0	0
	D.U. Total (kg)	381	381
	Pu Total (gU)	969,073	969,073
	No. of Basket [Batch]	3	3
	No. of Rods [Items] (LEU)	115	115
	No. of Rods [Items] (NU)	0	0
	No. of Rods [Items] (Pu)	114	114
	LEU Total (gU)	252,019	252,019
	LEU U-235 (gU)	5,243	5,243
	N.U. Total (kgU)	0	0
	D.U. Total (kg)	0	0
	Pu Total (gU)	1,273	1,273

● 손상 연료봉 Basket의 경우

Basket은 Batch로,
연료봉 개수는 item 개수로 표시

GL- 기타 핵물질

General Ledger (Inventory Reco

Facility : K0C3

KMP	Inspection Date	2012. 07. 31	2012. 09. 03
	Inspection Type	Fresh fuel movement	Pre-PIV
	Book Ending date	2012. 07. 31	2012. 09. 02
	No. of Basket [Batch] *	1	1
	No. of Rods [Items] (LEU) *	6	6
	No. of Rods [Items] (NU) *	1	1
	No. of Rods [Items] (Pu) *	6	6
	LEU Total (gU) *	9,887	9,887.000
	LEU U-235 (gU) *	130	130.000
	N.U. Total (kgU) *	0.144	0.144
	D.U. Total (kg)		
D Other Location	Pu Total (gU) *	73	73.000
	No. of Batch (HEU) **	2	2
	No. of Items (HEU) **	2	2
	No. of Batch (Pu) ***	1	1
	No. of Items (Pu) ***	1	1
	HEU Total (gU) **	16	16.000
	HEU U-235 (gU) **	14	14.000
	Pu Total (gU) ***	0.03	0.030
Remarks		Fresh fuel movement NFS → SFP(60 A'ssy)	Mr. Esseyin Mr. Min, Mr. Park
Prepared by		Mr. S.M, Lee	Mr. S.M, Lee
Reviewed by		Mr. T.W, Lim	Mr. T.W, Lim

* 1 basket has 6 irradiated fuel pins

** 3 nuclear instrumentation detectors containing high enriched uranium

*** 1 calibration Source(PuC) for Kori Unit 3&4 S/G Tube Leak Monitor

※ 1 DU items(total 0kg) in reactor vessel neutron dosimetry are not included.

- 기타 핵물질의 경우
아이템 개수는 무게와 관계없이 모두 작성
- 0.000g, 0.000kg 등 극미량 핵물질의
양은 별도 주석에 표기
- 모든 소량핵물질은 KMP D 에 기록함

왼쪽 GL 에서,

1. 표에는 아이템이 2개 이지만,
주석에는 3개라고 설명하고 있음.
2. 1개 DU 아이템을 포함하지 않았다고
작성하였음



핵물질 종합 대장

Inventory Change Record (Summary : Pu)

Element Code : H,E,U. / L,E,U. / N,U. / D,U. / **Pu**

Date

Declaration Period : 19.05.10 ~ 20.02.10

Date	Description	MBA		I.C. Type	Flow KMP	MDC	No. of		Increase		Decrease		MBA Total	
		From	To				Batch	Item	Total (g)	Fissile (g)	Total (g)	Fissile (g)	Item	Total (g)
#####	Nuclear Loss	K009	K009	LN	2	BQ1G	8	8			2,396		1,096	4,669,765
#####	Nuclear Loss	K009	K009	LN	2	BV1G	10	10			2,780		1,096	4,666,985
#####	Spent Fuel Transport	K009	K009	SD	3	BQ3G	8	8			35,082		1,088	4,631,903
#####	Spent Fuel Transport	K009	K009	SD	3	BV3G	10	10			42,076		1,078	4,589,827
#####	Nuclear Loss	K009	K009	LN	2	BV1G	18	18			5,150		1,078	4,584,677
#####	Spent Fuel Transport	K009	K009	SD	3	BV3G	18	18			75,634		1,060	4,508,843
#####	Nuclear Production	K009	K009	NP	2	BQ1G	8	8	37,415,000				1,068	4,546,258
#####	Nuclear Production	K009	K009	NP	2	BV1G	70	70	293,572,000				1,133	4,639,830
#####	Nuclear Production	K009	K009	NP	2	BV1G	-5	-5	-16,637				1,128	4,823,193

● Inventory Change Record

- 지난 IAEA 사찰 이후 핵종별, IC type 별, MDC별, 재고 변동량 요약 작성
- ICR의 재고 변동량 합계와 Inventory Change Record 값이 같아야 함
 - 엑셀에서 계산시 소수점 4번째 자리 반올림 주의

핵물질 종합 대장

Declaration for Surveillance

Location	Date	Time	Activities
NFS			None
Core	19.12.24~ 12.26		Fuel Withdrawal(177EA)
	20.02.02~ 20.02.05		Fuel Loading(177EA)
Spent Fuel	19.12.24~ 12.26		Fuel Withdrawal(177EA)
	20.02.02~ 20.02.05		Fuel Loading(177EA)
Others			None

● Declaration for surveillance

- 감시카메라가 설치된 기간 동안 감시 영역 내에서 있었던 활동
- IAEA로 사전보고 한 신연료 및 사용후핵연료 운반 관련 내용도 작성
- IAEA로 사전보고 한 대형물체 이동도 작성
- 기타 연료 인출, 연료 장전 등 작성

핵물질 종합 대장

Declaration for Seal

0

No.	Location	Date	Time	Activities
1	Canal Gate EOSS Seal in Fuel Bldg.			None
2	Equip. Hatch EOSS Seal in Rx. Bldg.			None

● Declaration for seal

- 봉인이 설치, 제거된 일자를 작성
- KINAC 검사원이 봉인을 제거한 경우도 작성

핵물질 종합 대장

Advanced Information

Date : 2020.02.10

Declaration Period : 2019.07.01~2019.08.15

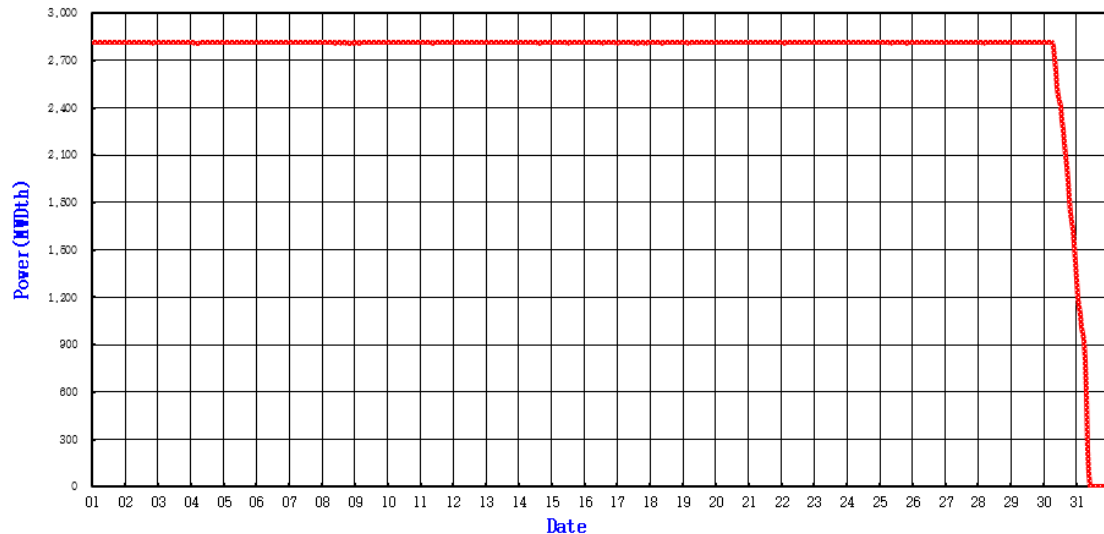
Advanced Information	Expected Date	Remarks

- 사전 정보 제공

- 다음달 IAEA에 제출하는 사전보고 사항을 작성

핵물질 종합 대장

KOXX Power Histogram
20xx XXX
84264.8 MWDth

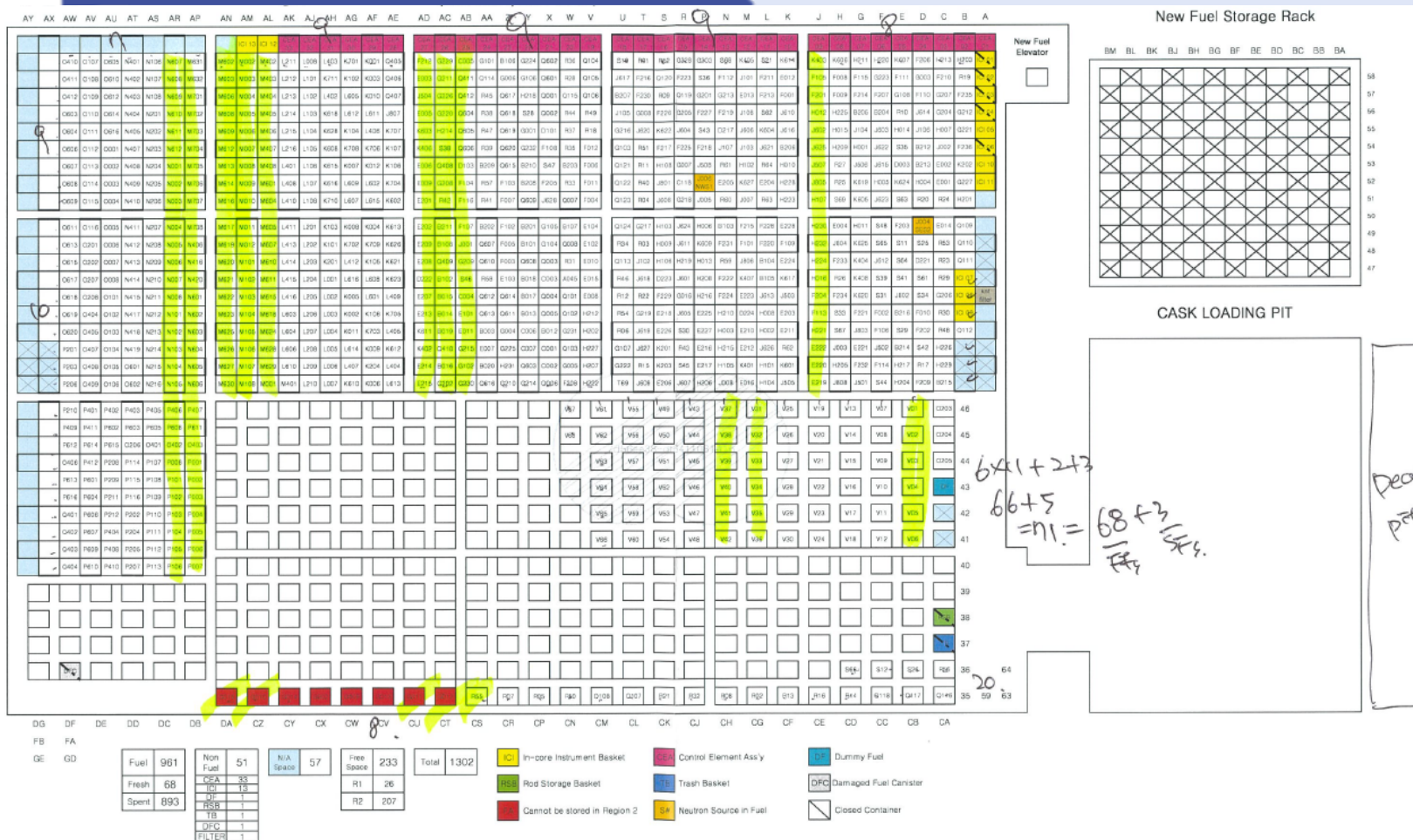


Remark 1 : Power production is thermal power production. (MW-Day-Thermal : MWDth)

● 기타 사찰에 필요한 자료

- 지난 사찰 이후 원자로 열출력 이력
(증기발생기 주급수유량 과 주증기유량 이력)
- 오래된 사용후핵연료의 연소도, 냉각기간 등
(요청 시)

- **사찰일 기준 사용후핵연료저장조, 신연료저장조, 원자로심 MAP**
 - 신연료저장고가 비어 있더라도, 빈 저장고 MAP을 제공
 - MAP은 모두 영문으로 작성되어야 함



사용후핵연료저장조 MAP 등

		KOC1				KOC2				KOC3			
		No	St	VM	R	No	St	VM	R	No	St	VM	R
Non Fuel Items	Basket for Failed Fuel Assembly												
	Basket for Failed Fuel Rods	3	C		B	2	C		B	1			
	Dummy (Depleted U)												
	Dummy (Lead/Steel)	3				3				2			
	Mock-up (Molded)					1	M		C				
	Inserts									11			
	Burnable Poison Stand												
	Basket for ICI												
	Basket for GTSP	2	M		C	1				1			
	CEA Transfer Container												
Miscel	Rx Vessel Specimen Cask	1				1				1			
	Cask(Source)	3											
	Chip Collection	1	C		B								
	Basket for Debris	1	M		B	1	M		B	1			
	Waste Basket									1			
	Rack Specimen (TREE)												
	Skeleton	6								1			
	Thimble Canister	2				1							
	Top nozzle									4			
	Upflow W Chip	1											
	Funnel												
	Waste Filter									1			
	Load Cell Availability for Weighing												
	Total	20				8				23			
	Closed item (Total)	3				2							
	Closed item that can be opened (Total)												
	Molded item (Total)	3				2							
	Latest information : check date	2019.03.08				2019.03.08				2019.03.05			
	checked by	P.W.LEE				P.W.LEE				W.H.DOE			

Note

GTSP : Guide Tube Support Pin
 Dummy : not including nuclear material
 BP Stand : Burnable Poison Stand
 Basket for In-Core Instrument (ICI)

Status

C : closed item
 M : molded item

Y

O

W

V

H

I

● 사찰일 기준 사용후핵연료저장조 MAP

■ SFP MAP은

‘한-IAEA IMWG 회의’ 등을 통해 이미 IAEA에 제공한
 사용후핵연료저장조 내 비연료 및 닫힘용기 목록과
 일치하여야 함


(또는 ‘사용후핵연료저장조 내 비연료 및 닫힘용기 목록’을 별도로
 제공하여야 함)

■ 일치하지 않는다면 변동 일자와 사유를 추가로
설명하여야 함


III 경수로 IAEA 사찰의 특징

- 경수로 원자력발전소는 매년 1회 물자재고조사(PIT)를 수행하여야 하고,
물자재고검사(PIV)를 수검 (일반적으로 연료 재장전 완료 시)
 - 봉인제거 및 카메라 설치를 위해 **Pre-PIV 수검**
- **설계정보검사(DIV)는 IAEA 계획 또는 필요 시(DIQ 변경 등) 수행**
 - 일반적으로 연료 재장전 시 경수로 유효성 확인을 위하여 무작위로 수행됨
- **무통보사찰(UI) 또는 무작위사찰(RII)는 IAEA 계획에 따라 무작위로 노심 개방되지 않은 기간 또는 재장전기간이 연장될 때 수행**
 - 무통보사찰(UI)을 위해 IAEA는 최신 정보를 사전에 알고 있어야 함 (운영, 정비, 연료 이송 일정 등)
- PIV, UI 중에 접근하기 어려운 장소(사용후핵연료 운반용기 내부 확인, 빈 노심 확인) 또는 불일치에 따른 후속 조치가 필요할 때 후속 사찰 또는 중간 사찰(Announced interim inspections) 활동 수행


III IAEA 사찰 절차서

 IAEA <small>International Atomic Energy Agency</small> Department of Safeguards	Procedures Implementation Procedure for Inspection Activities at LWRs under State-level Approach in the Republic of Korea Prepared for ROK SSAC	Date:	2015-08-25
		Version No.:	2
		Page:	1 of 11

<p>Procedures</p> <p>Implementation Procedure for Inspection Activities at LWRs (Sector-4) under State-level Approach in the Republic of Korea</p>

 IAEA <small>International Atomic Energy Agency</small> Department of Safeguards	Procedure Implementation Procedure for Unannounced Inspection at LWRs in the ROK Prepared for the ROK SSAC	Version Date:	2015-08-25
		Version No.:	2
		Page:	1 of 9

<p>Procedures</p> <p>Implementation Procedure for Unannounced Inspection at LWRs in the ROK</p>
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 IAEA <small>International Atomic Energy Agency</small> Department of Safeguards	Procedure Implementation Procedure for Random Interim Inspection at LWRs in the ROK Prepared for the ROK SSAC	Version Date:	2023-12-01
		Version No.:	1
		Page:	1 of 2

<p>Procedures</p> <p>Implementation Procedure for Random Interim Inspection at LWRs in the ROK</p>



IAEA 사찰활동 – Pre PIV

● IAEA 사찰활동 – Pre PIV

- 장부 검증
- 원자로건물 및 연료건물 감시장비 (XCAM 2) 설치
- 원자로 검증 (봉인 건전성 확인, methods E)
- 신연료 검증
 - 신연료저장고 : 수량확인, 비파괴검증(HM-5)
 - 사용후핵연료저장조 : 수량확인, ID 확인
- 사용후핵연료 검증
 - 수량확인, 비파괴검증(ICVD 또는 SFAT)
- 환경시료 채취(필요시)

- **Book audit** Facility accounting and operating records, supporting documents, such as fuel location maps, and the advance operational information to the Agency are examined for correctness and internal consistency. Facility accounting records are compared with the State reports. The list of inventory items (the LII) from the Operator is compared for consistency with State reports, ICRs and MBR, are compared with each other for consistency.
- **Surveillance** is installed to cover entire open core period. The XCAM camera with the backup XCAM will be installed inside the reactor containment building and spent fuel pond building, following the procedure of roaming camera concept.
- **Verification of the reactor core.** The core fuel will be verified by methods E (EOSS seals “in-situ” verification). Metal seals are removed from canal gate, equipment hatch and missile shield (where applicable) for HQ verification.
- **Verification of fresh LEU fuel assemblies.** The fresh fuel assemblies in dry storage will be verified by 100% item counting (method I) and by gross defect (method H using MMCC/HM-5), and by method A. The fresh fuel stored underwater will be verified by methods I + A. The required detection probability for fresh fuel verification by methods A or H will be Random Low (RL).
- **Verification of spent fuel assemblies.** The spent fuel assemblies will be verified by method I and by method H (RL) using e.g. ICVD or any other approved NDA instrument such as IRAT, SFAT or FDET in order to establish knowledge of the inventory before core opening.
- **Environmental sampling:** Environmental samples can be taken at any location at the facility, as may be required by the Agency.

IAEA 사찰활동 – PIV

● IAEA 사찰활동 – PIV

- 장부 검증
- 원자로건물 및 연료건물 감시장비 (XCAM) 제거
- 봉인 설치 (canal gate and equipment hatch, missile shield)
- 신연료 검증 (Pre-PIV와 동일)
- 사용후핵연료 검증 (Pre-PIV와 동일)
- 환경 시료 채취(필요시)
- **사용후핵연료 운반용기(CASK) 검증 (빈 상태 확인)**
- **사용후핵연료저장조 내 닫힌용기 및 비연료물질 검증**
 - **수량 확인, 비파괴검증(ICVD 또는 SFAT)**

- **Book audit** including examination of records and comparison of records with reports.
- **Surveillance for the open core period is reviewed and evaluated.** The cameras installed for open core period are serviced and removed in accordance with established roaming camera procedure.
- **EOSS and metal seals** are attached at canal gate and equipment hatch, and metal seals are attached to the missile shield if applicable/agreed.
- **Verification of fresh LEU fuel assemblies.** The fresh fuel assemblies in dry storage will be verified by 100% item counting (method I) and by gross defect (method H using MMCC/HM-5), and by method A. The fresh fuel stored underwater will be verified by methods I + A. The required detection probability for fresh fuel verification by methods A or H will be Random Low (RL).
- **Verification of spent fuel assemblies.** The spent fuel assemblies will be verified by method I and by method H (RL) using e.g. ICVD or any other approved NDA instrument such as IRAT, SFAT or FDET in order to establish the inventory at the time of core closing.
- **Confirmation of absence of nuclear material in closed containers and irradiated non-fuel items.** The confirmation of absence of nuclear material in closed containers and irradiated non-fuel items kept in the spent fuel pond (if applicable) will be carried out randomly (in accordance with approved procedure “Confirmation of Non-fuel items and Absence of NM in Closed Containers or position “, using e.g. IRAT/SFAT or other agreed verification methods. In addition, confirmation of the absence of any undeclared nuclear material in the spent fuel pond will be carried out using visual observation and NDA equipment (e.g. ICVD).

Environmental sampling: Environmental samples can be taken at any location at the facility, as may be required by the Agency. It is understood that no movements of casks should occur during open core periods and anytime when CG/EH seals are detached without advanced notification from ROK SSAC and prior verification by the Agency.

IAEA 사찰활동 – UI 또는 RII

● IAEA 사찰활동 – UI 또는 RII

- 장부검증
- 원자로 검증 (Pre-PIV와 동일)
- 신연료 검증 (Pre-PIV와 동일)
- 사용후핵연료 검증 (Pre-PIV와 동일)
 - 연료취급크레인 운전 불가능 시 Canal gate 봉인
건전성 확인
- 환경 시료 채취(필요시)
- 사용후핵연료 운반용기(CASK) 검증
 - UI 또는 RII 때 Cask 내부 확인이 가능한 경우에만

- The contents of closed spent fuel casks will not be verified during RIIs provided the cask loading has been properly notified in advance.

- **Book audit.** The updated operating and accounting records as of the day before the inspection should be provided latest at the end of inspection day. The update may be made by hand and signed by the operator. The NIS (APRM), S/W flow charts and power histograms can be dated as the end of the preceding month.
- **Verification of the reactor core.** The core fuel will be verified by method V (EH EOSS seal “in-situ” verification from SF building through existing cable⁴ and CG EOSS seal in-situ verification in SF building). One metal seal is replaced on Cannel Gate/Equipment hatch/Missile Shield, for HQ verification.
- **Verification of the spent fuel pond:** The spent fuel assemblies and rods (if applicable): methods I , and if possible⁵ according to the bridge availability H (RL). The spent fuel pond will be checked by visual observation to confirm the absence of undeclared activities and for the comparison with the facility declaration. Visual observation is performed, as necessary, in order to: verify the containment structures, check for indicators of undeclared nuclear materials, observe the spent fuel pond area and compare them with the declaration of the facility operation.
- **Verification of fresh LEU fuel assemblies:** The fresh fuel assemblies will be verified by methods I and, *if possible*, by methods A (using binoculars or other devices) or H (using MMCC/HM-5). The required detection probability for fresh fuel verification by methods A or H will be Random Low (RL).
- The contents of fully loaded closed spent fuel casks will not be verified during RIIs/UIs.
- The verification of fresh fuel (FF) and spent fuel (SF) transfers (transfers of SF to difficult-to-access storage are verified separately) is performed, if applicable, e.g. if SF cask loading is in progress at the time of RIIs/UIs.
- The conduct of planned inspection activities requiring the use of the crane or fuel-handling machine may be limited by unforeseen conditions in the LWRs. To the extent possible, the Agency inspector shall confirm the explanation given by the operator for the limiting condition before deciding on whether to waive inspection activity and considering follow-up actions, as appropriate.

Advanced Information

Facility KOXX
Period Jul-2023

Reference of Plant Status

No.	Contents	Status	Remarks
1	Canal Gate Seal Status	Attached / Detached	expected date for change of seal status
2	Equipment Hatch Seal Status	Attached / Detached	expected date for change of seal status
3	Missile Shield Seal Status(only for KOC3,4, KOM1,2)	Attached / Detached	expected date for change of seal status

No.	Advanced Information	Expected Date(Period)	Previously Date(Period)	Remarks
1	Pre-PIV - Seals detachment, XCAMS installation	date		
2	PIT - Fuel loading completion - Closed core PIT	date		
3	PIV - Seals attachment, XCAMS removal	date		
4	Request of seal detachment or seal attachment	date		ex) Seal detachment at C/G ex) Seal attachment at E/H
5	Respective company holidays and changes in normal working hours	date / period		
6	Fresh fuel receipts	date / period		
6-1	Dates when all fresh fuel will be available for verification in dry storage (before pre-PIV)	date		
7	SF Shipment (including transportation of dummy fuel or shipment of empty CASK)	date / period		ex) K001 → K005 (60 SFs) ex) K001 → K005 (Empty cask)
7-1	Closing of loaded SF casks	date		
8	Other information			
	- Periodic maintenance schedules of the cranes/fuel handling machines	date / period		
	- Scheduled power outages (O/H)	date / period		
	- fuel assembly dismantling operation (pin removal or exchange)	date / period		
	- Movement of large objects (over 2×2 m) out of containment (EH)/or out of the spent fuel pond (equipment such as RCP, RCP Motor, etc)	date		ex) Shipment of RCP motor
	- Works which can interfere operation or sight of IAEA cameras	date / period		

III

IAEA 사찰 수검

● 사전보고 양식 변경 (2024.10.29. 기준)

- 8. 'fuel assembly dismantling operation (pin removal or exchange)' 활동 추가

■ 기타 표현 구체화

6. Fresh fuel receipts

6-1. Dates when all fresh fuel will be available for verification in dry storage (before pre-PIV)

7. SF Shipment

(including transportation of dummy fuel or shipment of empty CASK)

7-1. Closing of loaded SF casks

- 한수원 표준절차서-1024에 반영을 요청함

감사합니다.

End of Documents

