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SUBPART A - ENVIRONMENTAL STANDARDS FOR MANAGEMENT AND STORAGE		
§ 191.01 APPLICABILITY		
COVERS WASTE MGT. & STORAGE OPERATIONS NOT SUBJECT TO 40 CFR PART 190.	COVERS BOTH NRC AND AGREEMENT STATE LICENSED FACILITIES NOT SUBJECT TO 40 CFR PART 190, AND DOE FACILITIES NOT REGULATED BY NRC OR BY AGREEMENT STATES.	
§ 191.02 DEFINITIONS		
EXCEPT AS DEFINED, TERMS HAVE SAME MEANING AS IN SUBPART A OF 40 CFR PART 190.	EXCEPT AS DEFINED, TERMS HAVE SAME MEANING AS IN SUBPART A OF 40 CFR PART 190.	RECOMMENDED CONSISTENCY WITH NWPA AND COORDINATION WITH NRC (HLW) AND OTHER AGENCIES (TRU).
"SPENT NUCLEAR FUEL" - IRRADIATED FUEL REMOVED FROM A NUCLEAR REACTOR.	SAME DEFINITION WITH ADDED SPECIFICATION "CONSTITUENT ELEMENTS OF WHICH HAVE NOT BEEN SEPARATED BY REPROCESSING."	[CONFORMED TO NWPA]
"HIGH-LEVEL RADIOACTIVE WASTE" DEFINED IN TERMS OF > TABLE 1 CONCENTRATIONS FOR: - FIRST CYCLE LIQUID WASTE FROM REPRO. - CONC. WASTES FROM SUBSEQUENT EXTRACTION. - SOLIDS FORMED FROM SUCH LIQ. WASTES. - SPENT NUCLEAR FUEL IF DISPOSED OF WITHOUT REPROCESSING.	DEFINED AS: - LIQUID WASTE PRODUCED DIRECTLY IN REPROCESSING AND ANY SOLID MATERIAL DERIVED FROM SUCH LIQ. WASTE THAT CONTAINS FISSION PRODUCTS IN SUFFICIENT CONCENTRATIONS. - OTHER HIGHLY RADIOACTIVE MATERIAL DETERMINED BY NRC BY RULE TO REQUIRE PERMANENT ISOLATION.	RECOMMENDED CONSISTENCY AND COORDINATION WITH NRC DEFINITION. [CONFORMED TO NWPA]
"TRANSURANIC WASTES" DEFINED IN TERMS OF α-EMITTING TRANSURANICS WITH > 100 nCi/g, $T_{\frac{1}{2}}$ > 1 YR	DEFINED AS α WASTES > 100 nCi/g, $T_{\frac{1}{2}}$ > 20 YR, EXCEPT FOR HIGH-LEVEL RADIOACTIVE WASTE; WASTES DETERMINED BY DOE NOT TO REQUIRE DEGREE OF ISOLATION REQUIRED BY 40 CFR PART 191, EPA CONCURRING, OR WASTES APPROVED FOR DISPOSAL BY NRC ON CASE-BY-CASE BASIS UNDER 10 CFR PART 61.	RECOMMENDED EQUIVALENCY IN LIEU OF MTHM CONCEPT FOR DOE WASTES AND FOR SOME KINDS OF COMMERCIAL RADIOACTIVE WASTES.

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	"RADIOACTIVE WASTE" IS DEFINED AS THE HIGH-LEVEL AND TRANSURANIC RADIOACTIVE WASTE COVERED BY 40 CFR PART 191.	
"MANAGEMENT AND STORAGE" DEFINED TO INCLUDE PREPARATION FOR STORAGE OR DISPOSAL, OR ACTIVITIES ASSOCIATED WITH DISPOSAL	"STORAGE" MEANS RETENTION OF SPENT NUCLEAR FUEL OR RADIOACTIVE WASTES WITH INTENT AND CAPABILITY TO READILY RETRIEVE SUCH FUEL OR WASTE FOR SUBSEQUENT USE, PROCESSING, OR DISPOSAL. "MANAGEMENT" MEANS ANY ACTION (EXCEPT FOR TRANSPORTATION) CONDUCTED TO PREPARE SUCH FUEL OR RADIOACTIVE WASTE FOR STORAGE OR DISPOSAL, OR THE ACTIVITIES ASSOCIATED WITH THE DISPOSAL OF SUCH WASTE.	
§ 191.03 STANDARDS		
EXCEPT FOR VARIANCES GRANTED UNDER SUBPART 191.04, THE COMBINED ANNUAL DOSE EQUIVALENT TO ANY MEMBER OF THE PUBLIC DUE TO OPERATIONS COVERED BY PART 190, PLANNED DISCHARGES UNDER THIS PART, AND DIRECT RADIATION FROM THESE OPERATIONS SHALL NOT EXCEED: - 25 MREM WHOLE BODY, - 75 MREM THYROID, OR - 25 MREM TO ANY OTHER ORGAN.	MANAGEMENT AND STORAGE ACTIVITIES AT ALL FACILITIES REGULATED BY NRC OR AGREEMENT STATES SHALL NOT RESULT IN COMBINED ANNUAL DOSE EQUIVALENT TO ANY MEMBER OF THE PUBLIC DUE TO OPERATIONS COVERBY PART 190, DISCHARGES OF RADIOACTIVE MATERIALS, AND DIRECT RADIATION IN EXCESS OF: - 25 MREM WHOLE BODY, - 75 MREM THYROID, OR - 25 MREM TO ANY OTHER CRITICAL ORGAN.	
	MANAGEMENT AND STORAGE ACTIVTIES AT DOE FACILITIES SHALL NOT RESULT IN COMBINED ANNUAL DOSE EQUIVALENT TO ANY MEMBER OF THE PUBLIC FROM DISCHARGES OF RADIOACTIVE MATERIAL AND DIRECT RADIATION IN EXCESS OF 25 MREM WHOLE BODY OR 75 MREM TO ANY OTHER CRITICAL ORGAN.	

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§ 191.04 VARIANCES FOR UNUSUAL OPERATIONS		
IMPLEMENTING AGENCY MAY GRANT VARIANCES, SUBJECT TO NOTICE TO STATE GOVERNORS AND TO PUBLIC.	EPA ADMINISTRATOR MAY GRANT A VARIANCE FROM THE EXPOSURE STANDARDS FOR DOE FACILITIES NOT REGULATED BY NRC OR AGREEMENT STATES, SUBJECT TO VARIOUS CONDITIONS, INCLUDING THAT THE VARIANCE WILL PREVENT A MEMBER OF THE PUBLIC FROM RECEIVING A CONTINUOUS EXPOSURE > 100 MREM/YR DOSE EQUIVALENT AND AN INFREQUENT EXPOSURE OF > 500 MREM/YR DOSE EQUIVALENT FROM ALL SOURCES.	
§ 191.05 EFFECTIVE DATE		
EFFECTIVE 12 MONTHS AFTER PROMULGATION OF RULE.	EFFECTIVE 30 DAYS AFTER PUBLICATION IN FEDERAL REGISTER.	
SUBPART B - ENVIRONMENTAL STANDARDS FOR DISPOSAL		
§ 191.11 APPLICABILITY		
APPLIES TO RADIOACTIVE MATERIALS RELEASED INTO THE ACCESSIBLE ENVIRONMENT. DOES NOT APPLY TO DISPOSAL DIRECTLY INTO OCEANS OR OCEAN SEDIMENTS.	APPLIES TO RADIOACTIVE MATERIALS RELEASED INTO: - THE ACCESSIBLE ENVIRONMENT, AND - CERTAIN SOURCES OF GROUND WATER IN THE VICINITY OF DISPOSAL SYSTEMS. DOES NOT APPLY TO DISPOSAL DIRECTLY INTO OCEANS OR OCEAN SEDIMENTS, OR TO WASTES DISPOSED OF BEFORE PROMULGATION OF THIS RULE.	
§ 191.12 DEFINITIONS		
"DISPOSAL" MEANS ISOLATION OF RADIOACTIVE WASTES WITH NO INTENT TO RECOVER THEM.	(DELETED ?)	["DISPOSAL" MEANS EMPLACEMENT IN A REPOSITORY WITH NO FORESEEABLE INTENT OF RECOVERY.]

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"DISPOSAL SYSTEM" MEANS ANY COMBINATION OF ENGINEERED AND NATURAL BARRIERS THAT CONTAINS RADIOACTIVE WASTES AFTER DISPOSAL.	"DISPOSAL SYSTEM" MEANS ANY COMBINATION OF ENGINEERED AND NATURAL BARRIERS THAT ISOLATE SPENT NUCLEAR FUEL OR RADIOACTIVE WASTE AFTER DISPOSAL.	
	"WASTE" MEANS ANY SPENT NUCLEAR FUEL OR RADIOACTIVE WASTE ISOLATED IN A DISPOSAL SYSTEM.	
	"WASTE FORM" MEANS THE MATERIALS COMPRISING THE RADIOACTIVE COMPONENTS OF SPENT NUCLEAR FUEL OR RADIOACTIVE WASTE AND ANY ENCAPSULATING OR STABILIZING MATRIX.	
"ACCESSIBLE ENVIRONMENT" INCLUDES:(1) THE ATMOSPHERE,...(ETC.) THAT ARE MORE THAN 10 KM. IN ANY DIRECTION FROM THE ORIGINAL LOCATION OF ANY OF THE RADIOACTIVE WASTES IN A DISPOSAL SYSTEM.	"ACCESSIBLE ENVIRONMENT" MEANS:(1) THE ATMOSPHERE,...(ETC.) THAT ARE BEYOND THE CONTROLLED AREA.	RECOMMENDED EPA EXTEND THE DEFINITION TO INCLUDE MAJOR SOURCES OF POTABLE GROUNDWATER THAT ARE BEYOND THE CONTROLLED AREA (AS DEFINED IN 10 CFR PART 60) AND ARE MORE THAN 2 KM. IN A HORIZONTAL DIRECTION FROM THE ORIGINAL LOCATION, ETC.
	"CONTROLLED AREA" MEANS A SURFACE LOCATION, IDENTIFIED BY PASSIVE INSTITUTIONAL CONTROLS, EXTENDING HORIZONTALLY NO MORE THAN 2 KM. FROM THE OUTER BOUNDARY OF THE WASTES' ORIGINAL LOCATION, AND THE SUBSURFACE UNDERLYING SUCH A SURFACE LOCATION.	

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"BARRIERS" MEANS ANY MATERIALS OR STRUCTURES THAT PREVENT OR SUBSTANTIALLY DELAY MOVEMENT OF RADIOACTIVE WASTES TOWARD THE ACCESSIBLE ENVIRONMENT.

"PASSIVE INSTITUTIONAL CONTROLS"MEANS:(1) PERMANENT MARKERS PLACED AT A DISPOSAL SITE; (2) PUBLIC RECORDS OR ARCHIVES;(3) FEDERAL GOVERNMENT OWNERSHIP OR CONTROL OF LAND USE; OR (4) OTHER METHODS OF PRESERVING KNOWLEDGE ABOUT A DISPOSAL SYSTEM.

"ACTIVE INSTITUTIONAL CONTROLS" MEANS:(1) GUARDING A DISPOSAL SITE, OR (2) PERFORMING MAINTENANCE OPERATIONS OR REMEDIAL ACTIONS AT A DISPOSAL SITE, OR (3) CONTROLLING OR CLEANING UP RELEASES FROM A DISPOSAL SITE.

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"BARRIER" MEANS ANY MATERIAL OR STRUCTURE THAT PREVENTS OR SUBSTANTIALLY DELAYS MOVEMENT OF WATER OR RADIONUCLIDES TOWARD THE ACCESSIBLE ENVIRONMENT.

"PASSIVE INSTITUTIONAL CONTROL" MEANS:(1) PERMANENT MARKERS PLACED AT A SITE;(2) PUBLIC RECORDS AND ARCHIVES;(3) GOVERNMENT OWNERSHIP AND REGULATIONS REGARDING LAND OR RESOURCE USE; AND (4) OTHER METHODS OF PRESERVING KNOWLEDGE ABOUT A GEOLOGIC REPOSITORY.

"ACTIVE INSTITUTIONAL CONTROL" MEANS ANY MEASURE OTHER THAN A PASSIVE INSTITUTIONAL CONTROL PERFORMED TO:(1) CONTROL ACCESS TO A SITE, (2) PERFORM MAINTENANCE OPERATIONS OR REMEDIAL ACTIONS AT A SITE, (3) CONTROL OR CLEAN UP RELEASES AT A SITE, OR (4) MONITOR PARAMETERS RELATED TO GEOLOGIC REPOSITORY PERFORMANCE.

"AQUIFER" MEANS AN UNDERGROUND GEOLOGICAL FORMATION, ETC., CAPABLE OF YIELDING A SIGNIFICANT AMOUNT OF WATER TO A WELL OR SPRING.

"TRANSMISSIVITY" MEANS THE HYDRAULIC CONDUCTIVITY INTEGRATED OVER THE STRURATED THICKNESS OF AN UNDERGROUND FORMATION. THE TRANSMISSIVITY OF A SERIES OF FORMATIONS IS THE SUM OF THE INDIVIDUAL TRANSMISSIVITIES OF EACH FORMATION.

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I"ENGINEERED BARRIERS" MEANS MAN-MADE COMPONENTS OF A DISPOSAL SYSTEM DESIGNED TO PREVENT THE RELEASE OF RADIONUCLIDES INTO THE GEOLOGIC MEDIUM INVOLVED.

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"COMMUNITY WATER SYSTEM' MEANS A SYSTEM FOR PROVIDING PIPED WATER FOR PUBLIC CONSUMPTION, WITH AT LEAST 15 SERVICE CONNECTIONS USED BY YEAR-ROUND RESIDENTS, OR REGULARLY SERVES 25 YEAR-ROUND RESIDENTS

"SIGNIFICANT SOURCES OF GROUND WATER" MEANS: (1) AN AQUIFER THAT:

- IS SATURATED WITH WATER WITH < 10^4 MG/L TOTAL DISSOLVED SOLIDS;
- IS WITHIN 2,500 FT. OF LAND SURFACE;
- HAS TRANSMIISSIVITY >200 GAL/DAY/FT., PROVIDED EACH FORMATION OR PART THEREOF HAS INDIVIDUAL HYDRAULIC CONDUCTIVITY >2 GAL/DAY/FT^2;
- CAPABLE OF CONTINUOUS YIELD ≥ 10^4 GAL/DAY TO A PUMPED OR FLOWING WELL FOR A PERIOD OF AT LEAST A YEAR; OR

(2) PROVIDES THE PRIMARY SOURCE OF WATER FOR A COMMUNITY WATER SYSTEM AS OF THE EFFECTIVE DATE OF THIS RULE.

"SPECIAL SOURCES OF GROUND WATER" MEANS THOSE CLASS I GROUND WATERS IDENTIFIED BY EPA AS IRREPLACEABLE, IN THAT NO REASONABLE ALTERNATIVE SOURCE OF DRINKING WATER IS AVAILABLE TO SUBSTANTIAL POPULATIONS.

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	"UNDISTURBED PERFORMANCE" MEANS THE PREDICTED BEHAVIOR OF A DISPOSAL SYSTEM, INCLUDING CONSIDERATIONS OF UNCERTAINTIES IN EXPECTED BEHAVIOR, IF UNDISTRUBED BY HUMAN INTRUSION OR THE OCCURENCE OF UNLIKELY NATURAL EVENTS.	
"REASONABLY FORESEEABLE RELEASES" MEANS THE CUMULATIVE RELEASES OF RADIOACTIVE WASTES.... THAT ARE ESTIMATED TO HAVE MORE THAN 1 CHANCE IN 100 OF OCCURRING WITHIN 10^4 YRS.	(SEE § 191.13)	RECOMMENDATION THAT ANALYSIS OF REPOSITORY PERFORMANCE SHALL DEMONSTRATE LESS THAN 50% CHANCE OF EXCEEDING TABLE 2 LIMITS, MODIFIED AS APPROPRIATE, ON CURIES RELEASED TO ENVIRONMENT IN 10^4 YEARS; EVENTS WHOSE MEDIAN FREQUENCY IS LESS THAN 1 IN 1000 IN 10^4 YEARS NEED NOT BE CONSIDERED; ALSO THAT USE OF QUANTITATIVE PROBABILISTIC CONDITION BE DEPENDENT ON EPA SHOWING IT IS PRACTICAL TO MEET - OTHERWISE, QUALITATIVE CRITERIA RECOMMENDED.
"VERY UNLIKELY RELEASES" MEANS THE CUMULATIVE RELEASES BE ESTIMATED TO HAVE BETWEEN 1 CHANCE IN 100 AND ABOUT 1 CHANCE IN 10,000 OF OCCURRING IN 10^4 YRS.	(SEE § 191.13)	
"PERFORMANCE ASSESSMENT" MEANS AN ANALYSIS THAT IDENTIFIES EVENTS AND PROCESSES WHICH MIGHT AFFECT THE DISPOSAL SYSTEM, THEIR EFFECTS ON BARRIERS, AND THE PROBABILITIES AND CONSEQUENCES OF THE EVENTS.	ALSO REQUIRES ESTIMATES OF THE CUMULATIVE RELEASES OF RADIONUCLIDES, CONSIDERING THE ASSOCIATED UNCERTAINTIES, CAUSED BY ALL SIGNIFICANT PROCESSES AND EVENTS, AND REQUIRES THE ASSEMBLY OF THESE ESTIMATES INTO AN OVERALL PROBABILITY DISTRIBUTION OF CUMULATIVE RELEASE TO THE EXTENT PRACTICABLE. (SEE APPENDIX B, FOLLOWING).	

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	"IMPLEMENTING AGENCY" MEANS THE NRC FOR SPENT NUCLEAR FUEL OR HIGH-LEVEL OR TRANSURANIC WASTES TO BE DISPOSED OF IN NRC-LICENSED FACILITIES, AND DOE FOR ALL OTHER RADIOACTIVE WASTES.	
§ 191.13 CONTAINMENT REQUIREMENTS		
DISPOSAL SYSTEMS SHALL BE DESIGNED TO PROVIDE REASONABLE EXPECTATION THAT FOR 10^4 YEARS AFTER DISPOSAL:	DISPOSAL SYSTEMS SHALL BE DESIGNED TO PROVIDE A REASONABLE EXPECTATION, BASED ON PERFORMANCE ASSESSMENTS, THAT THE CUMULATIVE RELEASES OF RADIONUCLIDES TO THE ACCESSIBLE ENVIRONMENT FOR 10^4 YEARS AFTER DISPOSAL:	(SEE DEFINITIONS, PREVIOUS PAGE).
- REASONABLY FORESEEABLE RELEASES BE LESS THAN TABLE 2 QUANTITIES, AND	- HAVE A LIKELIHOOD OF LESS THAN 1 CHANCE IN 10 OF EXCEEDING TABLE 1 QUANTITIES; AND	RECOMMENDATION THAT ANALYSIS OF REPOSITORY PERFORMANCE SHALL DEMONSTRATE LESS THAN 50% CHANCE OF EXCEEDING TABLE 2 LIMITS,
- VERY UNLIKELY RELEASES BE LESS THAN 10 TIMES TABLE 2 QUANTITIES.	- HAVE A LIKELIHOOD OF LESS THAN 1 CHANCE IN 1,000 OF EXCEEDING 10 TIMES TABLE 1 QUANTITIES.	MODIFIED AS APPROPRIATE, ON CURIES RELEASED TO ENVIRONMENT IN 10^4 YEARS; EVENTS WHOSE MEDIAN FREQUENCY IS LESS THAN 1 IN 1000 IN 10^4 YEARS NEED NOT BE CONSIDERED; ALSO THAT USE OF QUANTITATIVE PROBABILISTIC CONDITION BE DEPENDENT ON EPA SHOWING IT IS PRACTICAL TO MEET - OTHERWISE, QUALITATIVE CRITERIA RECOMMENDED.
	PERFORMANCE ASSESSMENTS NEED NOT PROVIDE COMPLETE ASSURANCE THAT ABOVE REQUIREMENTS BE MET DUE TO SUBSTANTIAL UNCERTAINTIES IN PROJECTING DISPOSAL SYSTEM PERFORMANCE; WHAT IS REQUIRED IS A REASONABLE EXPECTATION, BASED ON RECORD BEFORE THE IMPLEMENTING AGENCY. (SEE APPENDIX B, FOLLOWING).	
§ 191.14 ASSURANCE REQUIREMENTS		
DISPOSAL SHALL BE CONDUCTED IN ACCORDANCE WITH THE FOLLOWING PROVISIONS:	SAME REQUIREMENT, EXCEPT THESE PROVISIONS DO NOT APPLY TO FACILITIES REGULATED BY NRC (SEE INSTEAD 10 CFR PART 60).	
- WASTES SHALL BE DISPOSED OF PROMPTLY	(DELETED)	DELETION RECOMMENDED.

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- DISPOSAL SYSTEMS SHALL BE SELECTED AND DESIGNED TO KEEP RELEASES TO THE ACCESSIBLE ENVIRONMENT AS SMALL AS REASONABLY ACHIEVABLE;	(DELETED)	USE OF ALARA CONCEPT RECOMMENDED SOLELY FOR CONSIDERATION OF THE GEOLOGIC CHARACTERISTICS OF SITES.
- DISPOSAL SYSTEMS SHALL USE SEVERAL DIFFERENT TYPES OF BARRIERS TO ISOLATE THE WASTES FROM THE ACCESSIBLE ENVIRONMENT. BOTH ENGINEERED AND NATURAL BARRIERS SHALL BE INCLUDED. EACH SUCH BARRIER SHALL BE DESIGNED SEPARATELY TO PROVIDE SUBSTANTIAL ISOLATION.	SAME, EXCEPT LAST REQUIREMENT ON DESIGN OF EACH SEPARATE BARRIER HAS BEEN DELETED. (SEE APPENDIX B, FOLLOWING).	RECOMMENDED USE OF MULTIPLE BARRIERS BE REVISED TO GIVE MORE EMPHASIS TO THE SYSTEM AS A WHOLE; BARRIERS SHOULD BE DESIGNED SO THAT THEY COMPLEMENT EACH OTHER AND HELP TO COMPENSATE FOR UNEXPECTED FAILURES.
- DISPOSAL SYSTEMS SHALL NOT RELY ON ACTIVE INSTITUTIONAL CONTROLS BEYOND A REASONABLE PERIOD OF TIME, E.G., A FEW HUNDRED YEARS.	ACTIVE INSTITUTIONAL CONTROLS SHOULD BE MAINTAINED FOR AS LONG A PERIOD OF TIME AS IS REASONABLE AFTER DISPOSAL; CREDIT FOR SUCH CONTROLS FOR ISOLATION OF WASTES SHALL NOT BE TAKEN FOR MORE THAN 100 YEARS AFTER DISPOSAL. (SEE APPENDIX B, FOLLOWING). DISPOSAL SYSTEMS SHALL BE MONITORED AFTER DISPOSAL TO DETECT ANY SUBSTANTIAL AND DETRIMENTAL DEVIATIONS FROM EXPECTED PERFORMANCE. THIS MONITORING SHALL BE DONE WITH TECHNIQUES THAT DO NOT JEOPARDIZE THE ISOLATION OF THE WASTES AND SHALL BE CONDUCTED UNTIL THE IMPLEMENTING AGENCY DETERMINES THAT THERE ARE NO SIGNIFICANT CONCERNS TO BE ADDRESSED BY FURTHER MONITORING.	RECOMMENDED A TIME LIMIT OF 100 YEARS AND THAT SUITABLE SURVEILLANCE BE REQUIRED DURING THAT PERIOD.

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- DISPOSAL SYSTEMS SHALL BE IDENTIFIED BY THE MOST PERMANENT MARKERS AND RECORDS PRACTICABLE TO INDICATE THE DANGERS OF THE WASTES AND THEIR LOCATION.	SAME, EXCEPT OTHER PASSIVE INSTITUTIONAL CONTROLS ARE ADDED.	BROADENING OF THE DEFINITION OF PASSIVE INSTITUTIONAL CONTROLS RECOMMENDED BY THE ASSURANCE REQUIREMENTS SUBGROUP.
- DISPOSAL SYSTEMS SHALL NOT BE LOCATED WHERE THERE HAS BEEN MINING FOR RESOURCES OR THERE IS A REASONABLE EXPECTATION OF OF EXPLORATION FOR RESOURCES, ETC.	PLACES WHERE THERE HAS BEEN MINING FOR RESOURCES, OR WHERE THERE IS A REASONABLE EXPECTATION OF EXPLORATION FOR RESOURCES..... SHOULD BE AVOIDED. RESOURCES TO BE CONSIDERED INCLUDE (AMONG OTHERS) GROUND WATERS THAT ARE EITHER IRREPLACEABLE....OR ARE VITAL TO THE PRESERVATION OF UNIQUE AND SENSITIVE ECOSYSTEMS.	CONSIDERATION OF A POTENTIAL REPOSITORY SITE SHOULD NOT BE PRECLUDED BECAUSE NATURAL RESOURCES ARE AT OR NEAR A SITE, BUT RATHER, THEIR PRESENCE SHOULD BE TAKEN AS A HIGHLY UNFAVORABLE FACTOR...
- DISPOSAL SYSTEMS SHALL BE SELECTED SO THAT REMOVAL OF MOST OF THE WASTES IS NOT PRECLUDED FOR A REASONABLE PERIOD OF TIME AFTER DISPOSAL.	SAME REQUIREMENT.	ASSURANCE REQUIREMENT ON RETRIEVABILITY OF WASTE SHOULD BE DELETED.
§ 191.15 PROCEDURAL REQUIREMENTS (PROCEDURAL REQUIREMENTS ARE SPECIFIED, APPLICABLE TO PERFORMANCE ASSESSMENTS TO DETERMINE COMPLIANCE WITH THE CONTAINMENT REQUIREMENTS OF § 191.13, ABOVE.)	APPENDIX B - GUIDANCE FOR IMPLEMENTATION OF SUBPART B (PROCEDURAL REQUIREMENTS ARE SPECIFIED AS GUIDANCE NOT AS AN INTEGRAL PART OF 40 CFR PART 191. IMPLEMENTING AGENCIES ARE NOT BOUND BY THIS GUIDANCE.) THIS GUIDANCE INDICATES EPA INTENT REGARDING CERTAIN ISSUES THAT MAY ARISE WHEN IMPLEMENTING §§ 191.13 AND 191.15 (NEW). SOME APPLIES ONLY TO DISPOSAL IN MINED GEOLOGIC REPOSITORIES AND WOULD BE INAPPROPRIATE FOR OTHER TYPES OF SYSTEMS.	

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- ASSESSMENTS SHALL CONSIDER REALISTIC PROJECTIONS OF THE PROTECTION PROVIDED BY ALL OF THE ENGINEERED AND NATURAL BARRIERS OF A DISPOSAL SYSTEM.	GUIDANCE SAME, PLUS EXCEPTION FOR PORTIONS OF SYSTEM THAT MAKE NEGLIGIBLE CONTRIBUTIONS TO OVERALL ISOLATION PROVIDED BY THE DISPOSAL SYSTEM.	
- ASSESSMENTS SHALL NOT ASSUME THAT ACTIVE INSTITUTIONAL CONTROLS CAN PREVENT OR REDUCE RELEASES TO THE ACCESSIBLE ENVIRONMENT BEYOND A REASONABLE PERIOD, E.G., A FEW HUNDRED YEARS. IT SHOULD BE ASSUMED THE FEDERAL GOVERNMENT WILL RETAIN PASSIVE INSTITUTIONAL CONTROL OF DISPOSAL SITES IN PERPETUITY. SUCH PASSIVE INSTITUTIONAL CONTROLS SHOULD BE ASSUMED TO KEEP THE CHANCE OF INADVERTENT HUMAN INTRUSION VERY SMALL AS LONG AS THE FEDERAL GOVERNMENT RETAINS SUCH PASSIVE CONTROL OVER DISPOSAL SITES.(SEE § 191.14, ABOVE).	IMPLEMENTING AGENCY WILL ASSUME THAT NONE OF THE ACTIVE INSTITUTIONAL CONTROLS CAN PREVENT OR REDUCE RADIONUCLIDE RELEASES FOR MORE THAN 100 YEARS AFTER DISPOSAL. THE FEDERAL GOVERNMENT IS COMMITTED TO RETAINING OWNERSHIP OF ALL DISPOSAL SITES AMD WILL ESTABLISH APPROPRIATE MARKERS AND RECORDS. EPA BELIEVES SUCH MARKERS, RECORDS AND OTHER PASSIVE INSTITUTIONAL CONTROLS SHOULD BE EFFECTIVE IN DETERING EXPLOITATION OF THESE DISPOSAL SITES, AND THAT THEY CAN SUBSTANTIALLY REDUCE THE CHANCE OF INADVERTENT HUMAN INTRUSION; EPA BELIEVES THAT PASSIVE INSTITUTIONAL CONTROLS CANNOT BE ASSUMED TO COMPLETELY ELIMINATE THE CHANCE OF HUMAN INTRUSION INTO THESE DISPOSAL SITES.	RECOMMENDED A TIME LIMIT OF 100 YEARS FOR ACTIVE INSTITUTIONAL CONTROLS.
- ASSESSMENTS SHALL USE INFORMATION ABOUT LIKELIHOOD OF HUMAN INTRUSION AND ALL OTHER UNPLANNED EVENTS THAT MAY CAUSE RELEASES TO THE ACCESSIBLE ENVIRONMENT AS DETERMINED BY THE IMPLEMENTING AGENCY FOR EACH DISPOSAL SITE.	INADVERTENT INTRUSION BY EXPLORATORY DRILLING FOR RESOURCES (OTHER THAN THOSE IN THE DISPOSAL SYSTEM) SHOULD BE THE MOST SEVERE INTRUSION SENARIO TO BE CONSIDERED BY IMPLEMENTING AGENCIES. IMPLEMENTING AGENCIES SHOULD ASSUME PASSIVE INSTITUTIONAL CONTROLS OR THE INTRUDERS' OWN EXPLORATORY PROCEDURES SUFFICE TO INFORM INTRUDERS OF THE INCOMPATIBILITY OF THE AREA WITH THEIR ACTIVITIES.	

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IMPLEMENTING AGENCIES SHOULD CONSIDER THE LIKELIHOOD AND CONSEQUENCES OF INADVERTENT EXPLORATORY DRILLING. THE LIKELIHOOD OF SUCH INADVERTENT DRILLING SHOULD NOT BE ASSUMED TO BE > 30 BOREHOLES/KM^2 OF REPOSITORY AREA PER 10^4 YEARS FOR REPOSITORIES IN PROXIMITY TO SEDIMENTARY ROCK FORMATIONS; OR > 3 BOREHOLES/KM^2, FOR REPOSITORIES IN OTHER GEOLOGIC FORMATIONS. THE CONSEQUENCES OF SUCH INADVERTENT DRILLING SHOULD NOT BE ASSUMED TO BE MORE SEVERE THAN:

- DIRECT RELEASE TO THE LAND SURFACE OF ALL THE GROUND WATER IN THE REPOSITORY HORIZON THAT COULD PROMPTLY FLOW INTO THE NEWLY CREATED BOREHOLE, OR 200 M^3 OF GROUND WATER, WHICHEVER IS GREATER; AND
- CREATION OF A GROUND WATER FLOW PATH WITH A PERMEABILITY TYPICAL OF A BORHOLE FILLED BY SOIL OR GRAVEL THAT WOULD NORMALLY SETTLE INTO AN OPEN HOLE OVER TIME, NOT THE PERMEABILITY OF A CAREFULLY SEALED BOREHOLE.

IMPLEMENTING AGENCIES ARE FREE TO DEVELOP LESS SEVERE ASSUMPTIONS THAN THE ABOVE, AS APPROPRIATE TO THE PARTICULAR DISPOSAL SYSTEM.

(SCOPE OF PERFORMANCE ASSESSMENTS AS REQUIRED BY § 191.13 AND DEFINED IN § 191.12.)
SUCH PERFORMANCE ASSESSMENTS NEED NOT CONSIDER CATEGORIES OF EVENTS OR PROCESSES THAT ARE ESTIMATED TO HAVE < 1 CHANCE IN 10,000 OF OCCURRING OVER 10^4 YEARS. ALSO, EVENTS AND PROCESSES MAY

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BE OMITTED FROM THE PERFORMANCE ASSESSMENTS IF THE REMAINING PROBABILITY DISTRIBUTION OF CUMULATIVE RELEASES WOULD NOT BE SIGNIFICANTLY CHANGED.

(COMPLIANCE WITH § 191.13.)

WHENEVER PRACTICABLE, IMPLEMENTING AGENCY SHOULD ASSEMBLE AS RESULTS OF PERFORMANCE ASSESSMENTS INTO A "COMPLEMENTARY CUMULATIVE DISTRIBUTION FUNCTION" THAT INDICATES THE PROBABILITY OF EXCEEDING VARIOUS LEVELS OF CUMULATIVE RELEASE. WHEN UNCERTAINTIES IN PARAMETERS ARE CONSIDERED IN A PERFORMANCE ASSESSMENT, THE EFFECTS OF THE UNCERTAINTIES CAN BE INCORPORATED INTO A SINGLE SUCH DISTRIBUTION FUNCTION FOR EACH DISPOSAL SYSTEM CONSIDERED. EPA CONSIDERS A DISPOSAL SYSTEM MAY BE CONSIDERED TO BE IN COMPLIANCE IF THIS SINGLE DISTRIBUTION FUNCTION MEETS THE REQUIREMENTS OF § 191.13.

(COMPLIANCE WITH § 191.15 (NEW)).

WHEN THE UNCERTAINTIES IN UNDISTURBED PERFORMANCE OF A DISPOSAL SYSTEM ARE CONSIDERED, IMPLEMENTING AGENCIES NEED NOT REQUIRE A VERY LARGE PERCENTAGE OF THE RANGE OF ESTIMATED RADIONUCLIDES FALL BELOW THE LIMITS ESTABLISHED IN § 191.15. EPA BELIEVES COMPLIANCE MAY BE BASED UPON THE "BEST ESTIMATE" PREDICTIONS (E.G., THE MEAN OR THE MEDIAN OF THE APPROPRIATE DISTRIBUTION, WHICHEVER IS HIGHER).

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§ 191.15 GROUND WATER PROTECTION REQUIREMENTS

- DISPOSAL SYSTEMS SHALL BE DESIGNED TO PROVIDE THAT, FOR FIRST 1000 YEARS AFTER DISPOSAL, UNDISTURBED PERFORMANCE OF THE DISPOSAL SYSTEM SHALL NOT CAUSE AVERAGE ANNUAL RADIONUCLIDE CONCENTRATIONS WITHIN ANY SIGNIFICANT SOURCE OF GROUND WATER OUTSIDE THE CONTROLLED AREA TO EXCEED:
  - 5 pCi/L OF RA-226 AND RA-228;
  - 15 pCi/L OF α-EMITTERS (INCLUDING RA-226 AND RA-228); OR
  - COMBINED $\beta\gamma$-EMITTERS THAT WOULD PRODUCE ANNUAL DOSE EQUIVALENT TO WB OR ANY INTERNAL ORGAN > 4 MREM/YR IF AN INDIVIDUAL CONTINUOUSLY CONSUMED 2 L/DAY OF DRINKING WATER FROM SUCH A SOURCE OF GROUND WATER.

- DISPOSAL SYSTEMS SHALL ALSO BE DESIGNED SO THAT, FOR 1000 YEARS AFTER DISPOSAL, UNDISTURBED PERFORMANCE OF THE DISPOSAL SYSTEM SHALL NOT CAUSE THE AVERAGE ANNUAL RADIONUCLIDE CONCENTRATIONS IN WATER WITHDRAWN FROM ANY PORTION OF A SPECIAL SOURCE OF GROUND WATER TO EXCEED THE CONCENTRATIONS IN § 191.15 (AS GIVEN ABOVE).

- IF ANY OF THE AVERAGE ANNUAL RADIONUCLIDE CONCENTRATIONS IN WATERS CONSIDERED ABOVE ALREADY EXCEED THE ABOVE LIMITS BEFORE CONSTRUCTION OF THE DISPOSAL SYSTEM, THE DISPOSAL SYSTEM SHALL BE DESIGNED TO PROVIDE A REASONABLE EXPECTATION THAT, FOR 1000 YEARS AFTER DISPOSAL, UNDISTURBED

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RECOMMENDATION THAT FOR FIRST 500 THE STANDARD EMBODY AN EXTREMELY LOW LIKELIHOOD THAT INCREASES IN RADIOACTIVE CONTENT IN POTABLE WELL WATER APPROACH PRESENT EPA DRINKING WATER LIMITS.

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	PERFORMANCE OF THE DISPOSAL SYSTEM SHALL NOT INCREASE THOSE AVERAGE ANNUAL RADIONUCLIDE CONCENTRATIONS BY MORE THAN 10% OF THE CONCENTRATIONS EXISTING BEFORE DISPOSAL SYSTEM CONSTRUCTION. HOWEVER, IF THE 10% POTENTIAL INCREASE WILL EXCEED THE ABOVE NUMERICAL LIMITS, THE INCREASE SHALL BE LIMITED TO THE VALUE OF THE NUMERICAL LIMITS.	
§ 191.16 ALTERNATIVE PROVISIONS FOR DISPOSAL OF EXISTING HIGH-LEVEL AND TRANSURANIC RADIOACTIVE WASTES		
(NOT IN ORIGINAL NOTICE)	- THE ADMINISTRATOR MAY BY RULE SUBSTITUTE ALTERNATIVE PROVISIONS FOR DISPOSAL OF SPECIFIC WASTES THAT: - EXIST ON THE EFFECTIVE DATE OF THIS SUBPART; - HAVE BEEN STORED IN SUCH A MANNER THAT RETRIEVAL AND RELOCATION OF THE WASTES WOULD BE UNUSUALLY DIFFICULT OR WOULD PRESENT SUBSTANTIAL RISKS TO HUMAN HEALTH AND THE ENVIRONMENT; AND - CAN BE ISOLATED FROM THE ENVIRONMENT SO THAT THE RISKS WOULD BE NO MORE THAN RISKS FROM RETRIEVAL AND RELOACTION TO A DISPOSAL SYSTEM MEETING SUBPART B REQUIREMENTS. - THE ADMINISTRATOR SHALL PROMULGATE SUCH ALTERNATIVE PROVISIONS ONLY AFTER: - DOE HAS PROVIDED EPA WITH INFORMATION ON COSTS, RISKS, BENEFITS OF DISPOSAL UNDER THE ALTERNATIVE PROVISIONS AND REASONS WHY SUBPART B PROVISIONS WOULD BE IMPRACTICAL; - ALTERNATIVE PROVISIONS HAVE BEEN PROPOSED FOR PUBLIC COMMENT IN THE FEDERAL REGISTER;	

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§191.16 EFFECTIVE DATE

EFFECTIVE IMMEDIATELY UPON PROMULGATION OF RULE.

APPENDIX, TABLE 1

CONCENTRATIONS IDENTIFYING HIGH-LEVEL RADIOACTIVE WASTES

APPENDIX, TABLE 2, RELEASE LIMITS FOR CONTAINMENT REQUIREMENTS (Ci/1000 MTHM)

AMERICIUM-241	10
AMERICIUM-243	4
CARBON-14	200
CESIUM-135	2000
CESIUM-137	500
NEPTUNIUM-237	20
PLUTONIUM-238	400
PLUTONIUM-239	100
PLUTONIUM-240	100
PLUTONIU,-242	100
RADIUM-226	3
STRONTIUM-90	80
TECHNETIUM-99	10000

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- A PUBLIC COMMENT PERIOD OF AT LEAST 90 DAYS HAS BEEN COMPLETED, INCLUDING OPPORTUNITY FOR PUBLIC HEARINGS; AND
- PUBLIC COMMENTS RECEIVED HAVE BEEN FULLY CONSIDERED IN DEVELOPING THE FINAL VERSION OF THE ALTERNATIVE PROVISIONS.

§ 191.17 EFFECTIVE DATE

EFFECTIVE WITHIN 30 DAYS AFTER PUBLICATION IN FEDERAL REGISTER.

APPENDIX

(DELETED)

APPENDIX A, TABLE 1, RELEASE LIMITS FOR CONTAINMENT REQUIREMENTS (Ci/1000 MTHM)

AMERICIUM-241 OR -243	100
CARBON-14	100
CESIUM-135 OR -137	1000
IODINE-129	100
NEPTUNIUM-237	100
PLUTONIUM-238, -239, -240, OR -242	100
RADIUM-226	100
STRONTIUM-90	100
TECHNETIUM-99	10000

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RECOMMENDED FACTOR OF 10 INCREASE IN TABLE VALUES.

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APPENDIX, TABLE 2 (CONT'D)	(Ci/1000 MTHM)
TIN-126	80
ANY OTHER α-EMITTER	10
ANY OTHER NON-α-EMITTER	500

APPENDIX, NOTE 1

RELEASE LIMITS IN TABLE 2 APPLY TO:

- AMOUNT OF HIGH-LEVEL WASTES GENERATED FROM 1,000 MTHM, OR
- AMOUNT OF TRU WASTES CONTAINING 10^6 Ci OF α-EMITTING TRANSURANICS.

QUANTITIES IN TABLE 2 SHALL BE ADJUSTED TO DEVELOP RELEASE LIMITS FOR A SPECIFIC DISPOSAL SYSTEM (EXAMPLES GIVEN).

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APPENDIX A, TABLE 1 (CONT'D)	(Ci/1000 MTHM)
THORIUM-230 OR -232	10
TIN-126	1000
URANIUM-233, -234, -235, -236 OR -238	100
ANY OTHER α-EMITTER, $T_{\frac{1}{2}}$ > 20 YRS.	100
ANY OTHER NON-α-EMITTER, $T_{\frac{1}{2}}$ > 20 YRS.	1000

APPENDIX A, NOTE 1

RELEASE LIMITS IN TABLE 1 APPLY TO:

- AMOUNT OF SPENT NUCLEAR FUEL CONTAINING 1,000 MTHM, BURNUP BETWEEN 25,000 AND 40,000 MWD/MTHM;
- AMOUNT OF HIGH-LEVEL WASTES GENERATED FROM 1,000 MTHM, BURNUP BETWEEN 25,000 AND 40,000 MWD/MTHM;
- EACH 10^9 Ci OF γ OR β-EMITTERS, 20 YRS. < $T_{\frac{1}{2}}$ < 100 YRS., IDENTIFIED BY NRC AS HIGH-LEVEL RADIOACTIVE WASTE;
- EACH 10^6 Ci OF OTHER RADIONUCLIDES (γ- OR β-EMITTERS, $T_{\frac{1}{2}}$ > 100 YRS.; OR α-EMITTERS, $T_{\frac{1}{2}}$ > 20 YRS.) IDENTIFIED BY NRC AS HIGH-LEVEL RADIOACTIVE WASTE; OR
- AMOUNT OF TRU WASTES CONTAINING 10^6 Ci OF α-EMITTING TRANSURANICS, $T_{\frac{1}{2}}$ > 20 YRS.

APPENDIX A, NOTE 2

SAME REQUIREMENT.

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RECOMMEND A SUITABLE EQUIVALENCY TO THE MTHM CONCEPT (SUCH AS ONE BASED ON NUMBER OF FISSIONS) BE ESTABLISHED FOR DEFENSE WASTES, AND FOR SOME KINDS OF COMMERCIAL WASTES.

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APPENDIX, NOTE 1 (CONT'D)

APPENDIX, NOTE 2

IF A MIXTURE OF RADIONUCLIDES IS PROJECTED TO BE RELEASED, THE LIMITING VALUE WILL BE DETERMINED AS FOLLOWS: FOR EACH RADIONUCLIDE IN THE MIXTURE, DETERMINE THE RATIO BETWEEN THE CUMULATIVE RELEASE QUANTITY OVER 10^4 YEARS AND THE TABLE 2 AND NOTE 1 LIMIT. THE SUM OF ALL SUCH RATIOS MAY NOT EXCEED 1.

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APPENDIX A, NOTE 3

FOR REACTOR FUELS EXPOSED TO BURNUPS OF < 25,000 MWD/MTHM, OR > 40,000 MWD/MTHM, UNITS OF WASTE DEFINED IN NOTE 1 (FIRST TWO UNITS) SHALL BE ADJUSTED:

- IF BURNUP KNOWN, THEN:

$$\text{ADJUSTED UNIT} = \frac{(\text{NOTE 1 UNIT})(30{,}000\ \text{MWD/MTHM})}{(\text{FUEL'S ACTUAL BURNUP, MWD/MTHM})}$$

- IF BURNUP NOT KNOWN, THEN:

$$\text{ADJUSTED UNIT} = \frac{(\text{NOTE 1 UNIT})(1.5 \times 10^8\ \text{Ci})}{\left(\begin{array}{l}\text{TOTAL SR-90 AND CS-137 IN WASTE}\\ \text{OR SPENT FUEL - 10 YRS. AFTER}\\ \text{DISCHARGE FROM REACTOR}\end{array}\right)}$$

APPENDIX A, NOTE 4

FOR HIGH-LEVEL WASTE STREAMS THAT HAVE BEEN SEPARATED INTO COMPONENTS DESTINED FOR DIFFERENT DISPOSAL SYSTEMS, OR NO LONGER ASSOCIATED WITH THE QUANTITY AND EXPOSURE OF THE ORIGINAL REACTOR FUEL, FIRST TWO UNITS OF NOTE 1 ARE NOT RELEVANT, AND LAST TWO UNITS OF NOTE 1 SHALL BE USED.

APPENDIX A, NOTE 5

SAME REQUIREMENT, ENCOMPASSING TABLE 1 AND NOTES 1 THROUGH 4.

APPENDIX B (SEE SEC. 10.1F ABOVE)

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