



MS 62555

UNITED STATES
NUCLEAR REGULATORY COMMISSION

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July 18, 1986

MEMORANDUM: Robert E. Browning, Director
Division of Waste Management

FROM: F. Robert Cook, Senior On-Site License
Representative, Basalt Waste Isolation
Project (BWIP)

SUBJECT: OBSERVATIONS, COMMENTS AND RECOMMENDATIONS
FOR THE PERIOD JUNE 14 TO JULY 18, 1986

TECHNICAL ITEMS

1. Waste Package--

a. BWIP is considering a second waste package concept which includes a copper monolith to provide corrosion protection and restraint necessary to withstand external loads. Attachment A is a sketch of this concept.

b. BWIP has tentatively concluded that waste forms, including spent fuel, are not to be Q-listed. Hence quality assurance provisions of 10 CFR 60.151 would not be required for this component of the multiple barrier system. This conclusion apparently stems from application of Q-list methodology being implemented by BWIP in accordance with DOE instructions. Even though there are design requirements specified in 10 CFR 60 in way of assuring safety and/or isolation, demonstration of compliance with the requirements would not apparently be subject to the quality assurance requirements.

Additional comments concerning the concept of Q-listing and the way it is being used by the BWIP are in Section 8 below.

b. Generic studies concerning the performance of spent fuel as a waste form are being conducted by PNL for DOE. Information concerning this work were forwarded by separate correspondence. Of interest is PNL attempt to demonstrate congruent dissolution of spent fuel in repository ground water. They apparently consider that if congruent dissolution can be demonstrated, then the release rate criteria in 10 CFR 60 could be demonstrated to be met by the spent fuel itself for the isotopes which are

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retained in the fuel matrix. I believe iodine is not considered to be retained by the matrix and, therefore, congruent dissolution would not aid in the slow release of this element.

2. Repository Engineering--

a. Repository design activities are currently incorporating defense waste canisters into the concepts being developed by KE/PB. In addition packages which contain reactor structurals are being conceptualized and space in the repository assigned to these items.

b. Consideration of the use of robotics in the handling of waste and design provisions for retrieval are on-going but may not be incorporated in the conceptual design available with the SCP. An advanced conceptual design report would be utilized to incorporate features stemming from this work.

c. The stop work order has not applied to work at KE/PB. Design activities are continuing. Based on a recent comment from G. Kugler of KE/PB, they, KE/PB, consider their QA program is satisfactory and that this was confirmed by NRC/I&E as a result of the I&E's representative's attendance at a recent MAC audit of KE/PB. Kugler's comments indicate he considered that I&E "participated" in the audit. I would recommend that if Staff has not already sent a copy of the I&E representative's report to KE/PB they do so with a statement clarifying that NRC did not participate in the audit but was only an observer. It seemed apparent considering Kugler's comments that DOE has not forwarded the I&E representative's report to KE/PB.

d. Several key documents concerning repository and exploratory shaft design will be coming out in the next few months. These include a final draft of the SCP conceptual design report in September, an advanced conceptual design statement of work in November, a site specific requirements document in November, subsystem design requirements documents for the geologic repository disposal system subsystems in October and November and Engineering Study 11, concerning the exploratory shaft, in the late Fall. Appendix 7 visits to review these items in draft form are recommended.

e. Recent studies to evaluate methane gas inflow to the repository during operations have not included anticipation of free methane. This is based on the BWIP assumption that the methane observed in ground water is formed at locations below the basalts and has migrated up through the basalts dissolved in the ground water. Experiences concerning blow outs during drilling or testing, data indicating large variations in methane concentrations from none to saturation in Grande Ronde waters near the RRL and the existence of various grades of coal in interbeds in the Grande Ronde all suggest to me that methane may not be originating solely from formations below the basalts.

I recommend that Staff design reviews of the repository assess this aspect of the design bases for the repository since the existence of free methane could affect public health and safety.

f. Development of a design procedure which takes into account the non-elastic nature of the basalts is being conducted by KE/PB. This should allow better understanding of basalt rock mechanics and evaluation of the thermo-mechanical phenomena associated with the isolation capability of the geologic repository, as well as, the practical issues associated with the operational phase of the underground facility and retrievability.

The study plan or equivalent document which lays out KE/PB's strategy for this development effort, including the planning for validation of such a design procedure, should be of interest to the Staff. Control of such design work, per procedure, under appropriate quality assurance requirements is where I recommend the Staff focus its attentions. Considering KE/PB and BWIP/DOE/RL apparent conclusion of the adequacy of the KE/PB QA program, A review at this time of the KE/PB activities appears warranted.

3. Geology--

a. As noted in my previous report, I have requested copies of the various geophysical and mud logs for the B-N, 1-9 well on Saddle Mountain recently drilled by Shell and others. After about a month of trying to determine whether the logs could be reproduced, RHO discovered that the DOE print shop could do the job. I am informed by RHO that the logs should be available to me shortly. I will forward same to Staff upon receipt.

b. Hydrologic evaluation of the tectonic breccia observed in the DC-18 well in the lower Wanupum flow is on-going. Plans call for continued drilling in this well into the Grande Ronde to further investigate the nature of the main fault associated with the Gable Mountain structure.

c. Water samples from the DC-23GR well from around the Umtanum Flow do not reveal any methane. The Grande Ronde basalt flows above the Umtanum have been relatively tight, yielding little or no water, potentially indicative of no recent tectonic fractures. This is in contrast to other wells around the RRL, including DC-20, DC-22, and DC-4, which is within about 1 1/2 miles of DC-23GR.

d. Determination of the in-situ stress in this area (around DC-23) may be of use to determine whether there is a relationship between the tight nature of the Grande Ronde, hydrologically, and a low in-situ stress pattern with absence of recent tectonics. Low stresses could be consistent with the location structurally, i.e., being close to a "free edge" of the upper Grande Ronde flows at the Gable Butte structure. If The hypothesis suggested

herein is valid, it may be inappropriate to map fractures zones in basalts near a "free edge", such as at Sentinel Gap, and expect the frequency and extent of fractures to be indicative of deep basalt flows, for example, in the RRL at the repository horizon away from a "free edge".

4. Performance Assessment--

a. A review of the BWIP strategy for meeting the EPA's Individual Protection Requirement in 40 CFR 191.15 indicates that BWIP plans to depend upon showing compliance with the pre-emplacment groundwater travel time and meeting waste package containment with a 90% probability during the first 1000 years post-emplacment as in way of proving compliance for the EPA requirement. The strategy does not apparently include consideration of predicted irrigation scenarios in the areas outside the controlled zone, since this would constitute human intrusion into the repository, and according to NRC's definition of "anticipated events" (the term equated to EPA's "undisturbed performance") is not required by proposed changes to 10 CFR 60 intended to incorporate the EPA standard.

This appears to be a misinterpretation of the concept of human intrusion as used by EPA, considering discussion included by EPA under "Release Limits vs. Individual Dose Limits" in the background information for the subject standard, 40 CFR 191.15.

I note that for the BWIP site, irrigation practice around the controlled area similar to that currently on-going just a few miles to the west of the current RRL, over a short period of time could have a major effect on the hydrologic gradient in the area and significantly influence the groundwater flow from the repository to such irrigated areas. Pre-emplacment groundwater travel times could be greatly reduced and be of no significance in proving compliance with 40 CFR 191.15. In addition an expected failure of 10% of the waste packages may be insufficient to avoid releases to paths leading to an individual's well.

I recommend that Staff clearly indicate irrigation scenarios as being indicative of expected performance, "undisturbed performance" in the EPA terminology in applicable technical positions, and that the proposed rule be modified to properly consider expected processes and events in addition to "anticipated processes and events" of 10 CFR 60.2 which includes only natural processes and events, and not human induced processes and events.

5. Geochemistry--

a. As noted above under geology, recent groundwater chemistry measurements have indicated an absence of methane in the Grande Ronde Flows at DC-23.

b. Other detailed hydrochemistry data and evaluations from various weekly reports from a BWIP investigator (S. Hall) have been forwarded by separate correspondence to cognizant Staff. I consider these reports represent excellent and timely evaluation of raw data being collected at the site.

6. Site/Environmental--

a. Attachment B consists of a schedule for various BWIP environmental actions, the status of the preparation of various environmental related documents and selected concerns and issues being addressed by BWIP currently.

7. Hydrology--

a. As noted under item 3b above current hydrologic testing consists of evaluation of the tectonic breccia in DC-18.

b. Attachment C consists of alternative hydrologic test scenarios relative to the sinking of the exploratory shaft, currently being considered by BWIP. This subject was discussed with cognizant Staff.

8. Quality Assurance--

a. Comments on the Staff's technical position on Q-list methodology were forwarded to Staff and further review of the BWIP work in this area was accomplished. This review suggests that the appropriate consideration of structures systems and components important to safety and/or important to isolation that mitigate scenarios which affect isolation before and after repository closure, whether they be considered accidents or within the normal performance of geologic repository, should be highlighted by the Staff to DOE.

b. Attachment D includes a schedule for restarting work at BWIP affected by the recent stop-work-order and a logic network for actions being taken to restart work.

c. The definition of records, which should be retained by the records control center, being utilized by BWIP does not require the retention and control of original records of data created by an individual making observations of natural phenomena, human actions, or other matters of fact. For example, it recently came to my attention that original groundwater chemistry data records of readings being observed on instruments in the field at DC-18 and recorded by the technician in the field on data sheets--records--were not considered to be records which required retention. Hand made copies of the original data sheets were the records which were being retained in the laboratory notebook at the site and eventually sent to records retention for permanent storage.

The use of signatures to confirm the author of any particular record is not a practice followed by BWIP. It does not appear to be a requirement for individuals who create records of raw data to sign the original record they created. It is sufficient for a second person to certify that someone else took the data. For example, the requirement for signing laboratory notebooks is, that upon completion of the notebook the individual assigned the particular notebook need only sign it at the end after the pages are filled with data. I do not believe BWIP has a requirement to sign original records contemporaneously with the observation of the facts being recorded or assessments being accomplished.

I consider this practice may reduce the credibility of the BWIP records so as to render them useless at licensing. However, this practice is apparently consistent with the Supplemental Quality Assurance Requirements promulgated by DOE. I recommend this issue of records be addressed in Staff comments on the DOE Quality Assurance Plan and the supplemental QA requirements referred to herein. I will forward my proposed definitions via separate correspondence.

MISCELLANEOUS ITEMS

a. A major review of BWIP activities was conducted by DOE/HDQRS personnel during the week of July 13, 1986. Observations and other information were forwarded to cognizant Staff via separate correspondences. This was a substantial opportunity to review DOE/RL's actions and to understand DOE/HDQRS concerns and directives. Originally, I was restricted from this meeting; however, upon raising the issue with DOE/RL (Antonnen) the restricted status was changed to open. This represents a major desirable change in DOE's actions to abide by the Appendix 7 agreements to allow OR attendance at meetings.

During the meeting DOE (Stein) showed interest in my OR reports, inquiring as to what I normally reported. He complimented me on their substance and requested that I forward him copies of future reports routinely so as to stay abreast of the issues and concerns I identify. I plan to accommodate his request unless otherwise directed, noting that we have already agreed to forward copies to DOE (Knight).



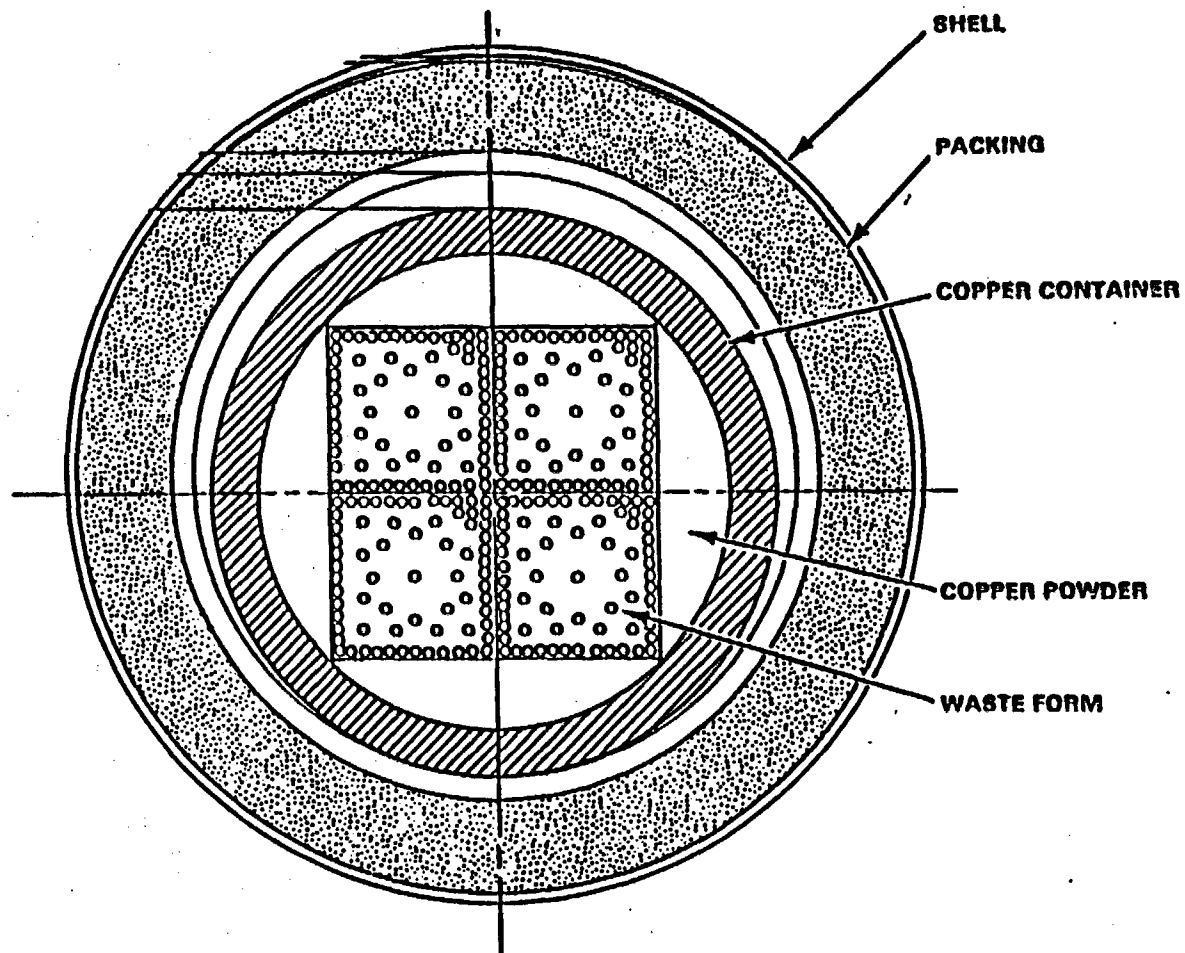
F. Robert Cook,
Senior On-Site Licensing
Representative,
Basalt Waste Isolation
Project (BWIP)

ATTACHMENTS A, B, C, D.

DISTRIBUTION:

cf:	JTBuckley	JOBunting	WLilley
JJLinehan	JMLibert	JMHoffman	SGBilhorn
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DOE/RL/OLOlson
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UIN/WBurke
D.DOE/WDixon
NP/RTHalf-Moon
Wash.DOE/THusseman
YIN/RJim
DOE/RStein



BWIP COPPER MONOLITH WASTE PACKAGE CROSS-SECTION

SITE INVESTIGATION



ENVIRONMENTAL/
SOCIOECONOMIC
MONITORING/
MITIGATION



△
1ST
DRAFT
EMMP,
SMMP

△
AFFECTED
PARTY
REVIEW
DRAFT

△
FINAL
RELEASED
WITH
SCP

EIS
ACTIVITIES



△
EIS SCOPING

JUN 1986 AUG 1986 OCT 1986 DEC 1986

JUN 1987



ENVIRONMENTAL COMPLIANCE PLAN

STATUS

- **FEDERAL/STATE POTENTIALLY APPLICABLE REGULATIONS IDENTIFIED**
- **FLOWCHARTING OF COMPLIANCE STEPS UNDERWAY**
- **INSTITUTIONAL INTERACTIONS**
EXTENSIVE HANFORD/REGULATORY INTERFACES ALREADY ESTABLISHED FOR MAJOR REGULATIONS
 - **NPDES - PERMIT - CLEAN WATER ACT**
 - **PSD - PERMIT - CLEAN AIR ACT**
 - **RCRA - PERMIT - RESOURCE CONSERVATION AND RECOVERY ACT**
- **HANFORD ENVIRONMENTAL COMPLIANCE TASK FORCE**
- **ARCHEOLOGICAL RESOURCE PROTECTION PLAN**
- **BWIP - SPECIFIC ENVIRONMENTAL COMPLIANCE INSTITUTIONAL INTERACTIONS PLANNED**
- **PMOA**

EMMP ACTIVITIES - CURRENT STATUS

- **KEY ISSUES IDENTIFIED FROM EA AND EARLY DIALOGUE WITH AFFECTED PARTIES**
- **COMMENTS RECEIVED FROM AFFECTED PARTIES ON EMMP ATC**
- **FIRST DRAFT OF EMMP UNDERWAY**
- **JULY MEETINGS PLANNED WITH AFFECTED PARTIES TO REVIEW KEY EMMP ISSUES**
- **LIMITED ENVIRONMENTAL FIELD WORK CURRENTLY UNDERWAY**
 - **THREATENED/ENDANGERED SPECIES SURVEY**
 - **ARCHEOLOGY SURVEY UNDERWAY/PLANNED**
 - **ENVIRONMENTAL EVALUATION (EE) CHECKLIST ACTIVITIES**
 - **PRELIMINARY IDENTIFICATION OF SCP ACTIVITIES**
- **PRELIMINARY IDENTIFICATION OF SCP ACTIVITIES**

SMMP ACTIVITIES - CURRENT STATUS

- **KEY ISSUES IDENTIFIED FROM EA AND EARLY DIALOGUE WITH AFFECTED PARTIES**
- **ATC UNDER REVIEW BY AFFECTED PARTIES**
- **FIRST DRAFT OF SMMP UNDERWAY TO SUPPORT AUGUST 15 SCHEDULE**
- **JULY MEETINGS PLANNED TO REVIEW KEY SMMP ISSUES**
- **LIMITED SOCIOECONOMIC TECHNICAL ACTIVITIES UNDERWAY**
 - **REVIEW OF SOCIOECONOMIC MODELS**
 - **UPDATE OF EXISTING SOCIOECONOMIC BASELINE**
 - **REVIEW OF SOCIOECONOMIC TASK FORCE APPROACHES FOR INVOLVING STATES, INDIANS, LOCALS**

KEY EMMP/SMMP CONCERNS/ISSUES

- **ENVIRONMENTAL BASELINE CONCERNS**
- **AFFECTED PARTY CONCERNS ABOUT EMMP/SMMP/EIS PROGRAM "FRAGMENTATION"**
- **INDEPENDENT IMPACT ASSESSMENT PROVISIONS OF ACT FOR AFFECTED PARTIES**

BWIP ENVIRONMENTAL COMPLIANCE ISSUES/CONCERNS

- **APPROACH FOR ADDRESSING STATE - LOCAL REGULATIONS**
- **EXTENSIONS OF FEDERAL FLOW-DOWN STATE/LOCAL REGULATIONS**
 - **CLEAN WATER ACT**
- **APPROACH FOR NON-FEDERAL FLOW-DOWN REGULATIONS/PERMITS**
 - **WATER RIGHTS**

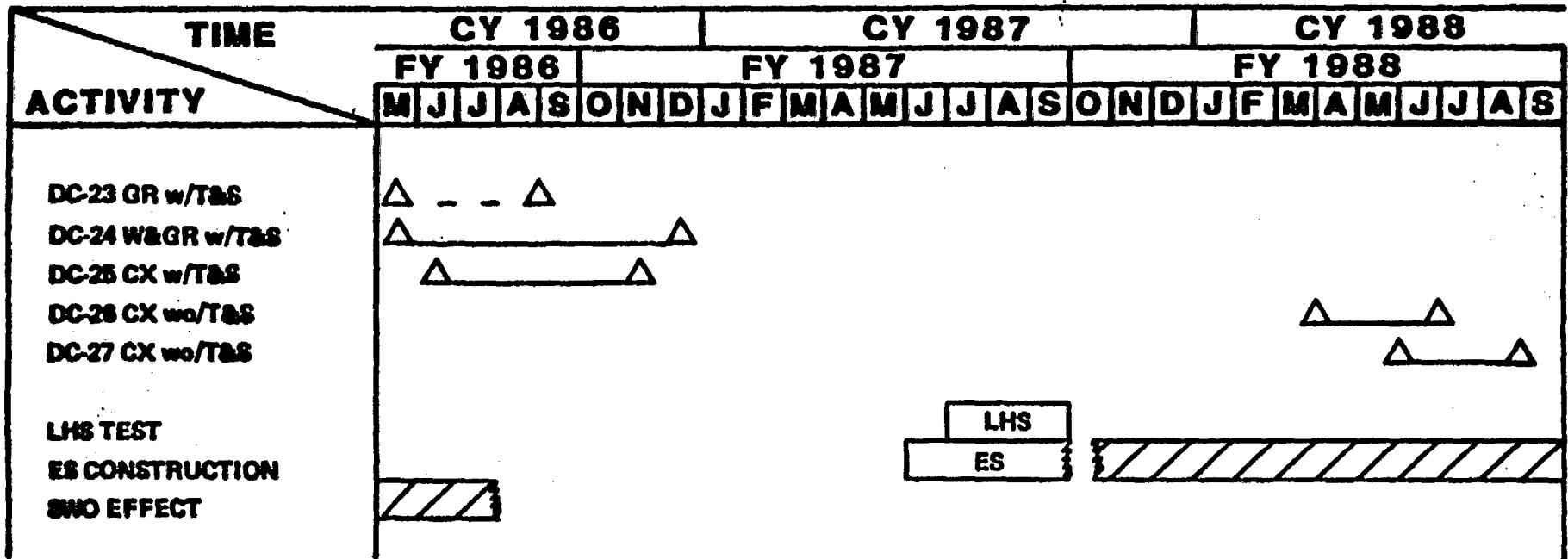
Attachment C

**SURFACE BASED HYDROLOGIC TESTING
COMPATIBILITY
WITH
EXPLORATORY SHAFT (ES) SCHEDULE**

CONTENTS

- ① BASELINE CASE FY 1988 WPAS (5-16-86)
- ② BWI RECOMMENDED CASE (7-16-86)
- ③ EXPEDITED LHS TEST WITH EXISTING FACILITIES (7-16-86)

① BASELINE CASE FY 1988 WPAS (5-16-86)



BACKGROUND

ES STARTS 1 TO 2 MONTHS BEFORE LHS TEST STARTS

HQ GUIDANCE (6-02-86) IMPACTS ES SCHEDULE

QUALITY PROGRAM REQUIRES ISSUE RESOLUTION STRATEGY (IRS) PROCESS, IMPACTS ES SCHEDULE

STOP WORK ORDER (SWO) IMPACTS ES SCHEDULE

88 WPAS DESIGNED TO MAINTAIN ES SCHEDULE

RISKS

SURFACE BASED HYDROLOGIC TESTING PLANS DEVELOPED BEFORE IRS PROCESS STARTED

IRS MAY REQUIRE ADDITIONAL WORK SCOPE

PROGRAM LACKS BENEFIT OF NRC REVIEW

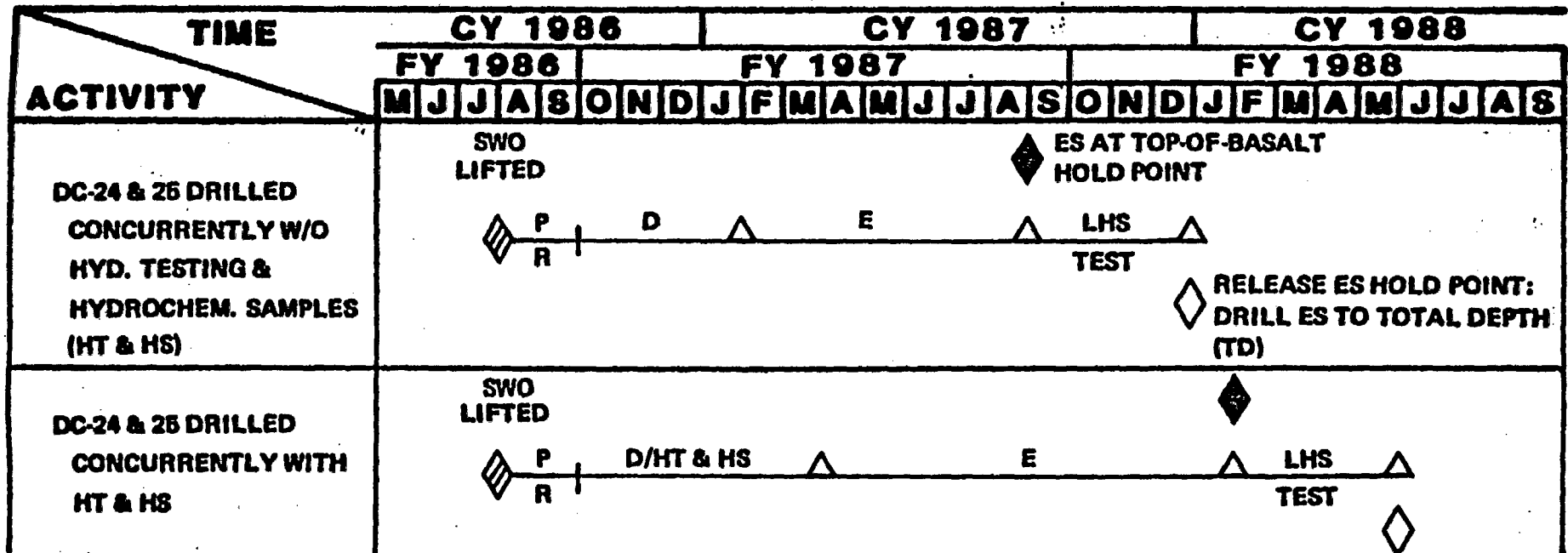
FACILITIES

EXISTING DC-19, 20, 22, 23, & RRL-2C

FY86/87 DC-24 & 25

FY88 DC-26 & 27

② BWI RECOMMENDED CASE (7-16-86)



ASSUMPTIONS

- DECOUPLE SURFACE BASED HYDROLOGIC TESTING FROM ES SCHEDULE
- STOP WORK ORDER (SWO) IMPACTS HYDROLOGY AND ES SCHEDULES
- ISSUE RESOLUTION STRATEGY (IRS) SUPPORTS PROGRAM
- ACCEPTABLE LHS-TEST PLAN
- ACCEPTABLE READINESS REVIEW

RISKS

- NRC REVIEW OF SURFACE BASED HYDROLOGY PROGRAM FROM IRS PROCESS MAY IMPACT ES SCHEDULE
- EQUILIBRATION TIME ESTIMATED BUT NOT CERTAIN
- IRS PROCESS NOT COMPLETE

FACILITIES

- EXISTING DC-19, 20, 22, 23, & RRL-2C
- FY86/87 DC-24 & 25 (PRE-ES START)
- FY87 DC-26 & 27 (NO SCHEDULE IMPACT)

2

BWI RECOMMENDED CASE

SURFACE BASED HYDROLOGIC TESTING PLAN

EXPLORATORY SHAFT (ES) CONSTRUCT



READINESS REVIEW

**INSTALL
DC-24 & 25
DC-26 & 27 (?)**

**EQUILIBRATE
FOR GW-LEVEL
BASELINE**

**LHS TEST
READINESS REVIEW**

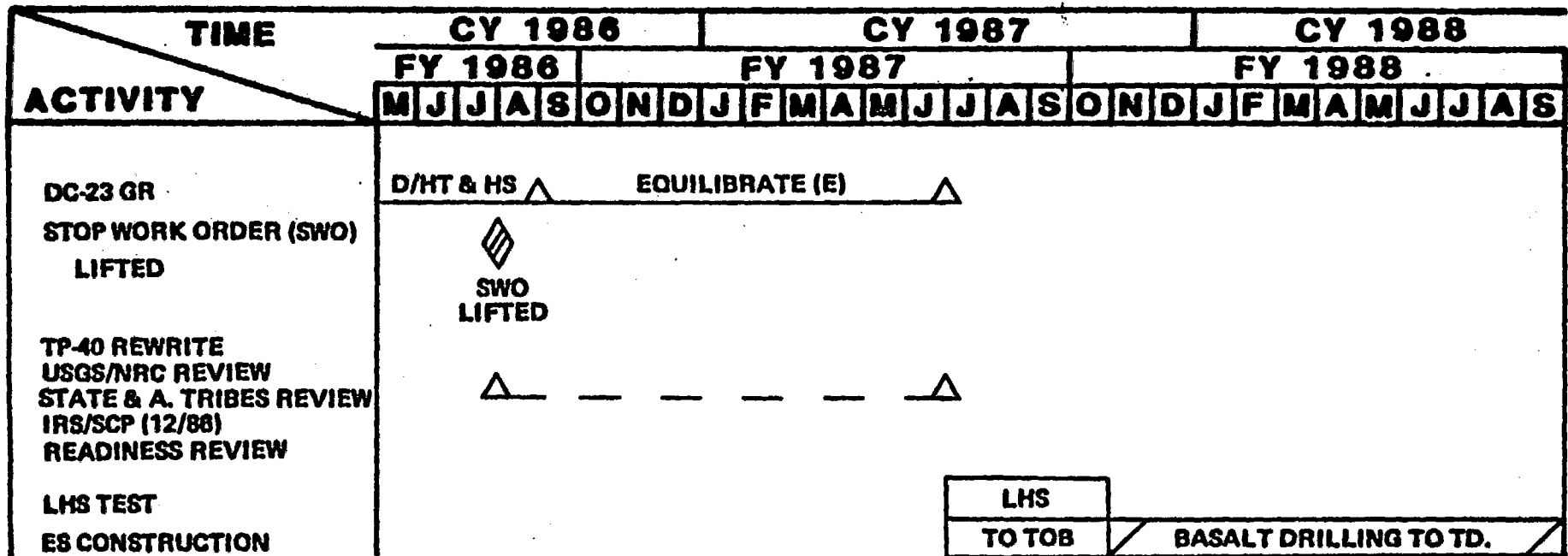
LHS TEST (S)

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**ES AT
TOP-OF-BASALT
HOLD POINT**



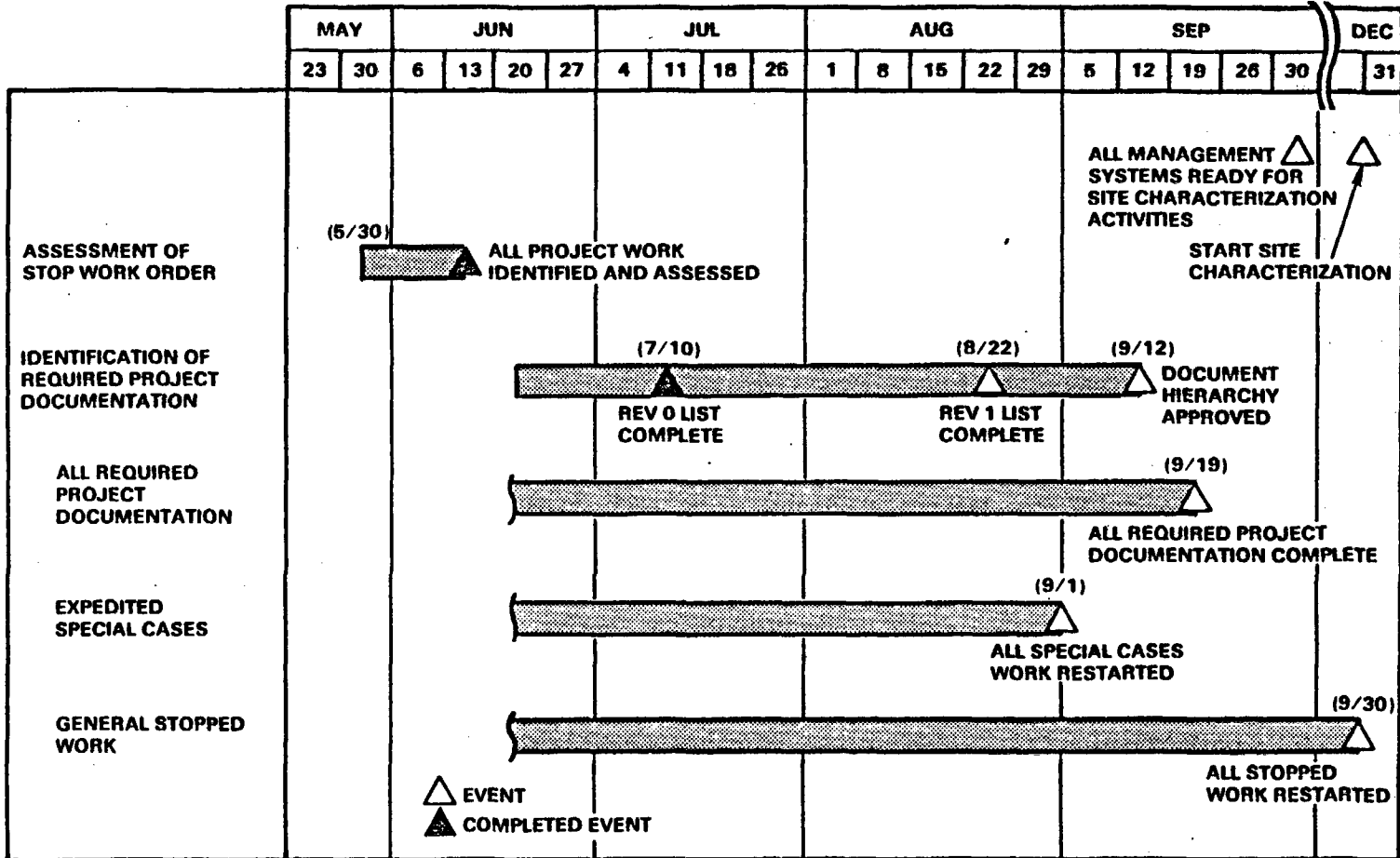
③ EXPEDITED LHS TEST WITH EXISTING FACILITIES (7-16-86)



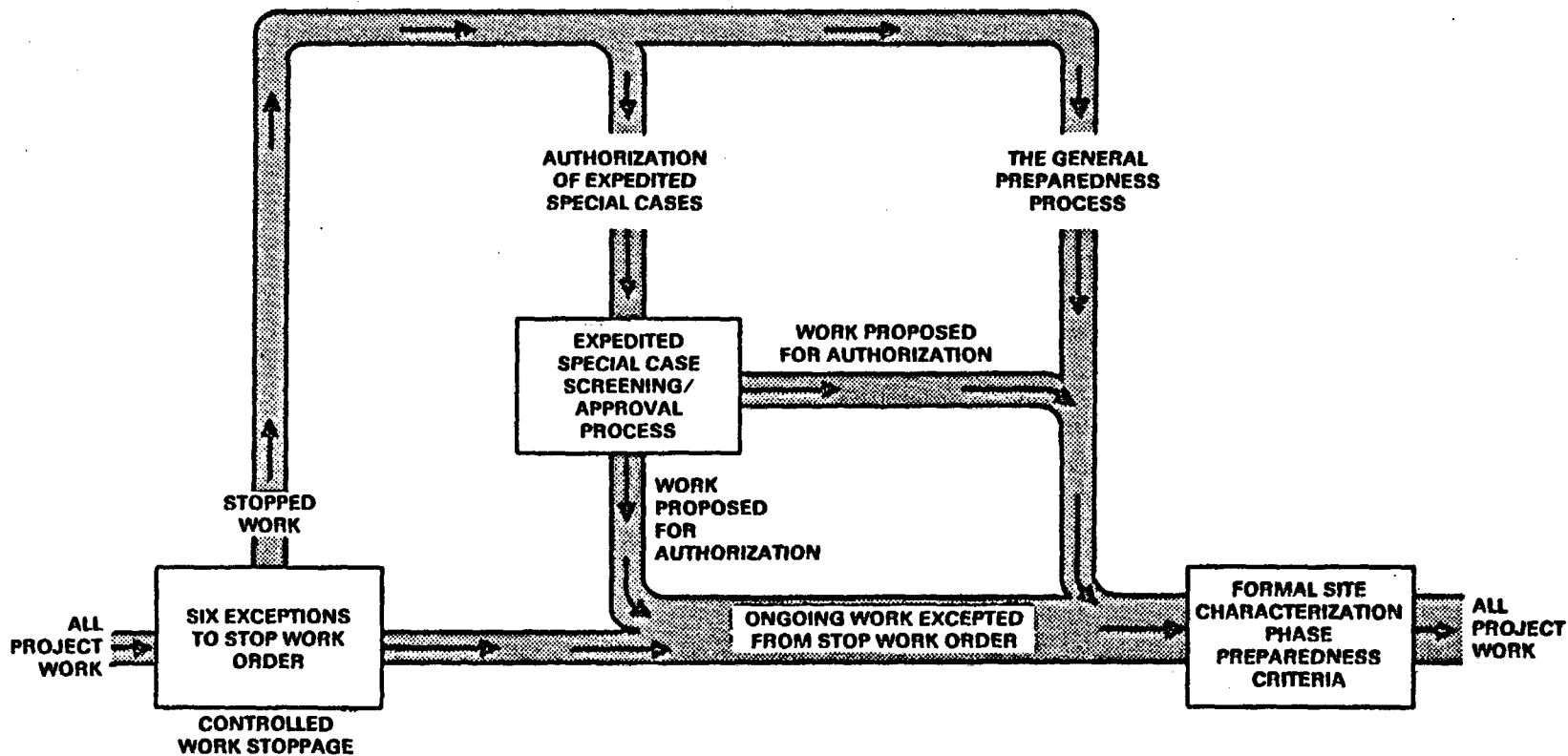
<p>ASSUMPTIONS</p> <ul style="list-style-type: none"> STOP WORK ORDER (SWO) IS NON-LIMITING LHS TEST COMPLETED PRIOR TO ES START ACCEPTABLE LHS-TEST PLAN ACCEPTABLE READINESS REVIEW ACCEPTABLE ISSUE RESOLUTION STRATEGY (IRS) CAN BE SUPPORTED BY EXISTING FACILITIES 	<p>RISKS</p> <ul style="list-style-type: none"> PROGRAM UNACCEPTABLE TO EXTERNAL REVIEWERS DOE-RL TECHNICAL REVIEW CONCLUDES PRE-EMPLACEMENT GROUNDWATER-LEVEL BASELINE AT CONTROLLED AREA SCALE NOT ESTABLISHED GROUNDWATER-LEVEL BASELINE WILL PERISH USING ONLY EXISTING FACILITIES MAY LIMIT IRS
	<p>FACILITIES</p> <p>EXISTING DC-19, 20, 22, 23, & RRL-2C</p>

Basalt Waste Isolation Project STOP WORK RECOVERY WORK PLAN MASTER SCHEDULE

Attachment D

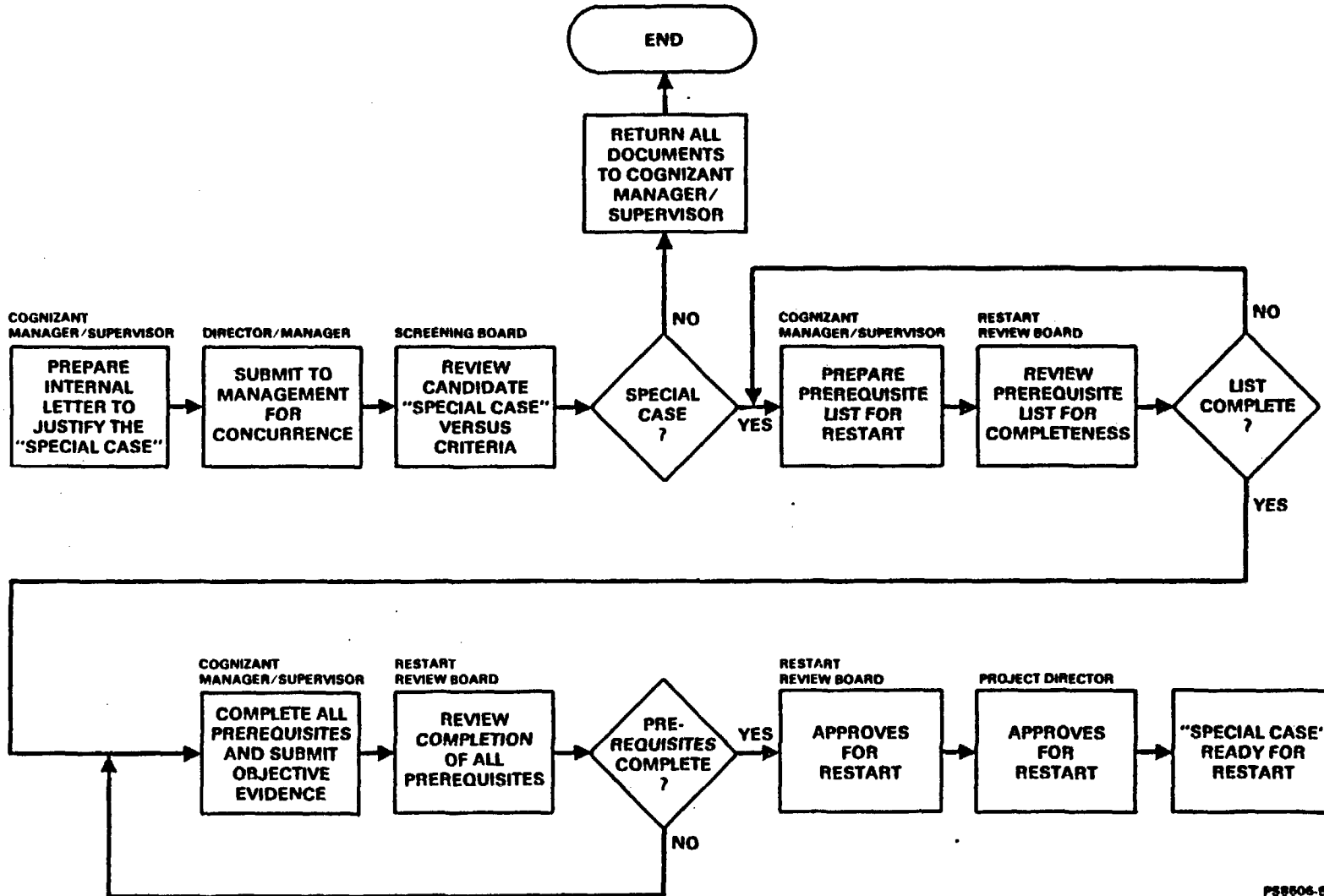


Basalt Waste Isolation Project STOP WORK RECOVERY PROJECT OPERATIONS



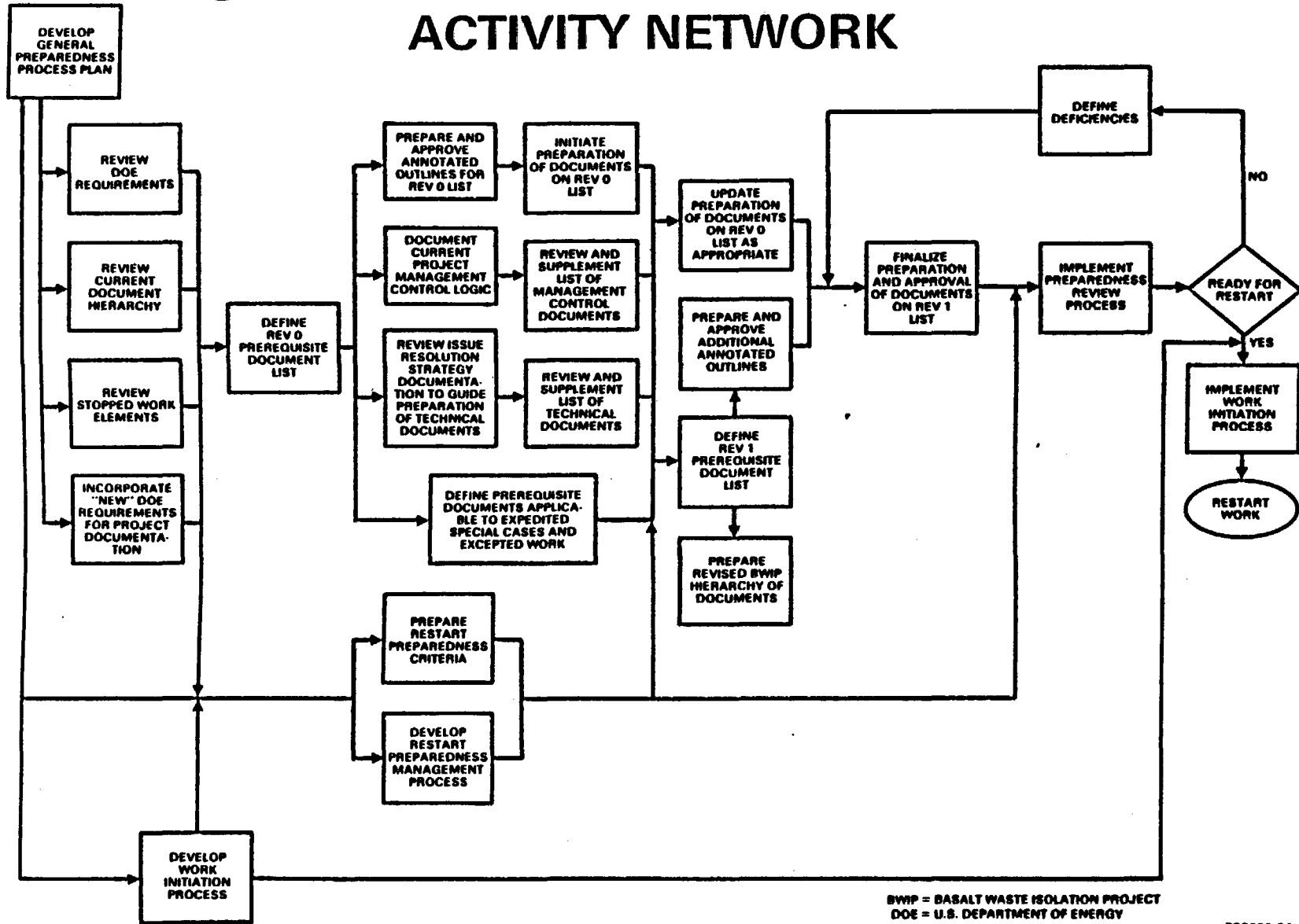
Basalt Waste Isolation Project STOP WORK RECOVERY

EXPEDITED SPECIAL CASES ACTIVITY NETWORK



Basalt Waste Isolation Project STOP WORK RECOVERY

GENERAL PREPAREDNESS PROCESS ACTIVITY NETWORK



BWIP = BASALT WASTE ISOLATION PROJECT
DOE = U.S. DEPARTMENT OF ENERGY

PS8606-84