



Heavy Water Plant (Baroda)

Safety Work Permit Procedure & Its Implementation

At

Institute for Plasma Research

on

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Introduction

- ✿ **Accident is a Unplanned, untended event in which injury , loss of life, loss of property and damage to the environment may be or may not be there.**
- ✿ **The incident/accidents are also taking place during maintenance job due to presence of chemicals, pressure, temperature , defective tools, oxygen deficiency, fall of person, fall of objects etc.**
- ✿ **For avoiding such type of incident safety work permit procedure is to be followed.**
- ✿ **SWP is a written document issued by shift Incharge for a specific maintenance activity for specific period.**

Legal Requirements

It is mandatory requirement to follow to “Permit to work system” as per section 87 (dangerous operation) of factory act and sub rule 20 of Rule 88(schedule-II) of AEFR 1996.

Aim & Purpose

- ✿ **The sole aim & purpose of the permit to work system is to carry out maintenance jobs safely.**
- ✿ **SWP system is applicable for all the jobs in the operational areas and non operational area.**

Advantages of correct SWP system

- ❁ **SWP Procedure is written document.**
- ❁ **Systematic maintenance Job Procedure.**
- ❁ **Maintenance job can be completed comfortably.**
- ❁ **Quality of work will be better.**
- ❁ **Work culture improves.**
- ❁ **Image of Organization improves.**
- ❁ **Chances of RDI is very less.**
- ❁ **Financial gain to individual.**
- ❁ **Employees becomes happy.**

Classification

Considering the Hazards & the level of Risks associated with the activities, the SWP system is classified into 4-Classes :

- ✿ **AVI (Avoid Verbal Instruction)**
- ✿ **Class -II permits**
- ✿ **Class - I permits**
- ✿ **Confined Space Entry permit.**

Avoid Verbal Instructions (AVI):

- * The clearance can be given on AVI by concerned Engineer/Supervisor for carryout the maintenance job involving least risk.**
- * Any Engineer/ foreman/supervisor has the authority to write & issue the AVI to the executing agency indicating clear description of the job.**
- * The executing agency shall carryout the job in close coordination with the respective area supervisor after getting clearance on AVI in writing.**
- * The executing agency shall return the AVI to the issuing agency after filling the details of the work carried out.**

Some Examples of Clearance on AVI

- * **Gland & flange tightening in cooling water lines, instrument air lines after depressurization,**
- * **PG replacement & Minor civil maintenance works,**
- * **Operation checks of control valve.**
- * **Leak arresting of Utility Control valves,**
- * **Calibration of portable monitors/ detectors etc.**
- * **Fuse replacement jobs in Distributed Control System.**
- * **checking of logics and other simulation checks during start up/shut down.**
- * **Indication lamps replacement etc.**

CLASS -II SWP:

- ✿ **The issuing authority for Class-II SWPs is Shift In charge.**
- ✿ **Permittee shall be Engineer / SA / Foreman/ Supervisor having complete knowledge of the job to be executed.**
- ✿ **Shift In charge shall arrange system isolation, draining, depressurization & purge with inert gas / air as per requirement and ensure decontamination of the loop.**
- ✿ **All connected valves shall be tagged properly and counterfoil of the tags should be kept in the control room safely.**
- ✿ **Shift In charge shall ensure proper isolation, tagging, safe working condition for maintenance and issue SWP. After receiving SWP, the job shall be carried out with utmost care & using required PPEs.**
- ✿ **After completion of the job ,the permittee shall return the SWP.**
- ✿ **The valve position shall be normalized with the help of counterfoil of the valve**

Examples of Class II

- ✿ **Maintenance jobs on cooling water and air lines after depressurization.**
- ✿ **Pump and valve maintenance Jobs maintenance after proper isolation, draining, depressurization, tagging and decontamination.**
- ✿ **Maintenance of A/C unit fixed in the electrical sub-station/laboratory building.**
- ✿ **Electrical motor / other electrical items removal/maintenance after isolating electrically and tagging at permanent plate form /ground floor.**
- ✿ **Monitors & on line analyzers' calibration**
- ✿ **Cleaning & replacement of centrifuge.**
- ✿ **Repair & replacement of LT Motor bearing & driving belts.**
- ✿ **Checking of terminal box of motors.**
- ✿ **Grass cutting in the switch yard area.**
- ✿ **Chipping work, brick work, plaster work etc of minor civil Maintenance**
- ✿ **False ceiling job at less than three meter height.**
- ✿ **Jobs of light equipments removal and maintenance.**
- ✿ **Painting job and sheet replacement having permanent plate form.**
- ✿ **In case of any doubt regarding class of SWP, Contact Dy M (S&E).**

Class II SWP for Non Operational area :

The issuing authority for Class-II SWPs is concerned area engineer/Supervisor/foreman.

Permittee shall be SA / foreman/ supervisor of concerned maintenance section having complete knowledge of job to be executed, hazards available and capacity to complete the job safely.

Counter sign of Dy PM and clearance of Dy M(S&E)/ EIC(S&E) /Safety Officer is not required for class II SWP.

CLASS -I SWP

- ✿ **The issuing authority for Class-I SWPs shall be Shift in charge, Control Room.**
- ✿ **Shift Incharge shall discuss the job to be taken up and shall prepare the SWP after proper isolation, tagging, draining, depressurization and decontamination of chemicals up to ND level.**
- ✿ **Permittee shall be Engineer / SA / foreman/ supervisor having complete knowledge of job to be executed, hazards available and capacity to complete the job safely.**
- ✿ **Job Hazards Analysis must be attached with the SWP and permittee shall follow religiously.**

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- ✿ **Class I SWP shall be counter signed by concerned section head after ensuring healthy working environment for maintenance/execution of the work.**
- ✿ **Dy M (S&E)/Safety Officer shall clear the SWP after ensuring safe working conditions for maintenance and instructions mentioned in the SWP are following.**
- ✿ **He can insist for specific recommendation if he feels necessary for safe execution of the job.**
- ✿ **Safety Officer is empowered to stop the job if serious unsafe condition persists/ violation of SWP system observed during maintenance.**

Examples of class I

- ✧ **Jobs at heights above 3.0 meters level.**
- ✧ **Hot Work- welding / cutting / grinding.**
- ✧ **Painting job and sheet replacement at height.**
- ✧ **On line systems handling chemicals and utilities.**
- ✧ **Hydro stretch test of vessels & pipes.**
- ✧ **Excavation work in the plant area/premises more than one feet deep.**
- ✧ **Shifting of heavy material from one elevation to another with the help of crane, EOT crane etc.**
- ✧ **lifting of filled gas cylinders from ground floor to higher elevation.**
- ✧ **Radiography job in the plant.**

Work at height

- ✿ **Risk of fall of object and fall of person.**
- ✿ **Work at height means 3.0 M or more height without platform.**
- ✿ **Permit for scaffolding for work at height.**
- ✿ **Standard Scaffolding preparation**
- ✿ **Fitness test for working at height.
(Physical test and medical test for height job).**
- Permit for maintenance job at height.**

CONFINED SPACE ENTRY ENTRY PERMIT:

- ✿ **Issuing authority : Class I SWP /Engr In charge of that area.**
- ✿ **First SWP (Class I) shall be issued for positive isolation & blinding.**
- ✿ **Isolate and blind the vessel with positive blinds of rated capacity .**
- ✿ **Drain, depressurize and decontaminate from hazardous chemicals up to non detectable level.**
- ✿ **Arrangement for continuous air supply.**
- ✿ **Analyze oxygen content inside the vessel.**
- ✿ **After preparation of SWP, check & ensure oxygen level inside confined space is 20 % V/V in the working area.**
- ✿ **The Oxygen level shall be mentioned on the permit and countersigned by competent person declared by AERB (for “Dangerous fumes” under Section 36).**
- ✿ **Oxygen level is required 19.5% V/V(mini.) In the atmosphere as per OSHA.**

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- * Other necessary arrangements for entry of person into confined space : Sufficient illumination level , Availability of rescue team , Ready BA set, communication means, fire fly, Safety engineer/ supervisor, manually operated trolley (if required) shall be arranged for entering into vessel.**
- * Physically and mentally fit person.**
- * SWP for vessel entry shall be cleared by Dy M (S&E) / Safety Officer after ensuring above mentioned arrangements and conditioned are safe for entry in to confined space.**

Electrical Safety Work Permit

- Plan the job & discuss among section.**
- * Isolate Electrical system and tag properly.**
Keep the fuses in the safe custody.
- * Electrical safety work permit shall be issued after proper isolation and tagging for maintenance job on the electrical system.**
- * The Electrical Engineer/SA shall issue SWP to Electrical Engineer /SA who is having complete knowledge of job and authorized.**
- * Permittee should ensure electrical isolation before starting the job on electrical system.**

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- ✿ **Work at height shall be started after proper scaffolding / proper ladder.**
- ✿ **The jobs shall be carried out under close supervision of Electrical Engineer.**
- ✿ **Street light fused lamp may be replaced with proper scaffolding/ arrangements for standing and carrying out job safely.**
- ✿ **Ground floor/lower elevation job shall be done under class II SWP.**
- ✿ **Class I SWP shall be Countersigned by Section head Electrical after ensuring proper electrical isolation and fuses are kept under lock & key of issuing authority.**
- ✿ **Safety Officer shall again ensure the safe condition for execution of the job.**
- ✿ **System shall be energized after completion of job and returning the permit .**

General Electrical Safety

- * The work at height equal or more than 3.0 M height without permanent plate form, work on live lines are to be done under Class I SWP.**
- * The SWP class I shall be counter signed by Dy MM (E) after personal inspection and ensuring the electrical isolation, tagging and endorsement in the permit with isolation tag number etc.**
- * The Safety Officer shall inspect the area personally for class I SWP maintenance job and ensure safe working conditions are maintained.**
- * Suitable Proper rubber gloves, electrical Safety Shoes, required PPES and proper tools must be used during Job on the electrical system.**

Responsibilities

- ✿ **Issuing authority** is fully responsible for creating and maintaining the safe working /maintenance conditions (Proper isolation, tagging and decontamination of hazardous chemicals and to maintain healthy working conditions) till the completion of the job.

Countersigning authority/Dy Manager

- * He shall ensure Proper isolations & tagging.**
- * He shall also ensure the precautions to be taken during the execution of the job are adequate for safe execution of the job.**
- * He is fully responsible for safe working /maintenance condition for execution of job till the return of SWP.**

Safety Officer

- ❁ **Safety Officer is responsible for maintaining healthy working conditions and environment.**
- ❁ **Permittee has maintained all the conditions suggested in the permit.**
- ❁ **Job is being carried out safely.**
- ❁ **All the PPEs are being used by maintenance staff.**
- ❁ **He is authorized to stop work, if he considers unsafe.**

AERB Competent person

- ✿ **He shall ensure that the atmosphere inside the confined space is conducive for carrying out work by checking for the absence of hazardous and toxic gases/fumes .**
- ✿ **The same shall be endorsed in the CS entry permit and counter signed by competent person.**
- ✿ **The air inside must have normal oxygen level i.e. Min19.5% as per OSHA. (20%v/v)**
- ✿ **If the above certification is not possible, he may allow the person entering the confined space is wearing suitable breathing air apparatus for adequate time period.**

Permittee

- ✿ He is responsible for the safe execution of the job.
- ✿ He shall ensure that all the tools and tackles used are without defect.
- ✿ He will ensure that cables used for electrical tools are preferably without joints.
- ✿ He will arrange scaffolding for work at height.
- ✿ He shall arrange PPEs for his workmen.
- ✿ He shall arrange fire team/rescue team for hot work permit if he feels necessary.
- ✿ He will clean the area after completion of job.
- ✿ He also has to ensure that the permit is returned to the issuing authority after completion of the job mentioning actual job done .

DESCRIPTION OF THE SWP SYSTEM

- ✿ **AVI / DR cum SWP request.**
- ✿ **Issuing authority**
- ✿ **Counter signing authority (Section head)**
- ✿ **Clearing /Approving authority**
- ✿ **Permittee**
- ✿ **Executing agency**
- ✿ **Returned to Issuing authority**
- ✿ **System normalisation**

Validity/ Renewal of the SWP

- ✿ **The validity of the SWP shall be for one shift only.**
- ✿ **If the work is not completed during this period, the permit shall be put up back to SI with a request to renew the same for next one shift.**
- ✿ **Shift in charge shall renew the SWP after ensuring that conditions are safe for maintenance (same as it was during issuing of the permit).**

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- * **For Class-I SWPs**, SI shall send the SWP to the Section head and then to Dy M (S&E)/ Safety Officer for his renewal in morning shift only after ensuring conditions are safe for maintenance.
- * If there is continuity of the job from one shift to another, the renewal shall be obtained by the permittee in person from the issuing authority only. He will ensure safe conditions for maintenance.
- * **Job can be started only after getting valid SWP and ensuring instructions mentioned in the permit are followed.**
- * **CSE permits shall be renewed by section head and cleared by safety officer in morning shift after ensuring 20% O₂ level and other conditions are safe.**
- * **If CSE permit job is continue in next shift also, the**

Working on same equipment by more than one agency

- ✿ **Normally only one permit shall be issued on any equipment.**
- ✿ **Simultaneous working by different sections on the same equipment should be avoided.**
- ✿ **If it is unavoidable due to specific urgency, max. two permits may be issued by giving cross-reference on both the permits.**
- ✿ **However, electrical de-energization is required, red tag shall be put on MCC / switch gear for each permit so that re-energization can be done only when both the permits are returned after job completion.**

Test run after job completion

- ✿ **In case no load run / test run of machine /leak test of equipment is planned, permittee has to obtain permission from permit issuing authority in writing indicating for test run only.**
- ✿ **The same shall be carried out in the presence of Dy Manager or his alternate senior officer. This shall amount to keeping the safety work permit under suspension till the above activity is completed.**
- ✿ **If the test activities are successful, the permit issuing authority shall arrange normalization of the equipment as per the SWP procedure.**
- ✿ **If the test activities are not successful, the permit issuing authority shall re issue the SWP after ensuring isolations, depressurization, decontamination and de-energize as applicable.**

Clubbing of Multi jobs in a single SWP

- ✿ a) Clubbing of multi jobs in a single SWP is not permitted.
- ✿ b) If Clubbing is unavoidable for certain jobs that require exactly same set of precautions (like painting / insulation / minor steam leaks / electric bulb fixing etc. at various elevations) a single SWP may be issued/obtained keeping all safety precautions in mind. The issuing authority is fully responsible if any thing goes wrong due to umbrella permit.

Loss of a permit:

- ✿ **If a permit is lost before completion of the job, permittee should ask issuing authority in writing for a fresh permit indicating that the said permit is lost. Electrical /Instrument isolations shall be mentioned in this fresh permit.**
- ✿ **If a permit is lost after the completion of the job, the permittee shall give a completion certificate (AVI) to issuing authority indicating that the said permit is lost. Normalization from Electrical /Instrument etc shall be done accordingly.**

Modification Jobs:

- ✿ **The job of the Modification /alteration in process/ utility lines shall be done only after approval of the same from LMC.**
- ✿ **The SWP shall be accompanied with approved drawing of proposed modification.**
- ✿ **SWP shall be prepared only after getting approved drawing of modification & approval from competent authority.**

Implementation

- ✿ **Changes are not easily acceptable.**
- ✿ **Resistance in isolation, tagging.**
- ✿ **It is delaying our job.**
- ✿ **Safety is creating problem.**
- ✿ **I am doing job safely since last 20 yrs without SWP.**
- ✿ **Production people are arguing : it is only 10 minutes job. Decontamination is difficult.**
- ✿ **Scaffolding is time consuming.**



 **Thank you**

General clarification

- ✿ **The SWP issued shall be expired automatically after 14th day of its issue.**
- ✿ **For work at height, first of all SWP shall be prepared and issued for scaffolding preparation.**

- ✿ At the time of isolation of equipment electrically (de-energisation), De-energisation shall be done by removing control fuses, keeping breaker in isolated position in OFF condition, switches & isolators in OFF condition and power fuses removed. The safety caution tag should be displayed. It should be ensured that the equipment/machine cannot be energize through another circuit.

- ✿ The concerned radiographer must be available at the Site very near the cordoned area through out the exposure. All operations should be planned in advance and executed in minimum possible time. The work must be carried out only under the guidance of the Shift In-Charge.
- ✿ If any job is suspended for more than two days, a fresh SWP shall be prepared for the same job after ensuring safe working conditions by issuing authority.
- ✿ Cables used should preferably be without joints and should have plugs of appropriate sizes for connecting to the switch board. ELCB should be used to protect the technician operating tools / devices.

- ✿ Job Hazards Analysis must be attached with the class I SWPs and permittee should follow religiously. Ensure that requisite PPEs are used by permittee and his team.
- ✿ Safety Head is empowered to stop any unsafe work being done in the plant either by plant personnel or contractors and bring it to the notice of General Manager. Safety Supervisors supervising such jobs should bring to the notice of Head, Safety / Safety Officer about any unsafe practices /procedures being adopted while execution of jobs.
- ✿ The permit will be handed over directly to the permittee in daily meeting room by the Permit Issuing Authority. The permit issuing authority will explain the job to be carried out to the permittee and also the isolation carried out before releasing the SWP. The section Head will ensure that concerned Engineer and permittee are explained the nature of job, Safety precautions to be taken or any other special instructions to be followed during execution of the job.
- ✿ It is the responsibility of the permittee to understand the job fully, before starting the job on SWP. “STAR” principle shall be followed while execution of the job. STAR implies for : S – STOP, T – THINK, A – ACT and R – REVIEW.

- ✿ Order to Operate (OTO) shall be followed for isolation and tagging of the equipments. While the valve tag Nos. will be mentioned in the SWP, the counterfoils of valve tags will be preserved with the book copy or in the safe place in the control room under responsibility of shift Incharge.
- ✿ Height pass is to be obtained for working at three or more than three mtrs. height job without permanent plate form.
- ✿ Proper scaffolding is to be made and check for its suitability before starting the job at height, if job is to be taken up at three or more than three mtr. height without permanent plate form,
- ✿ All concerned engineers / EIC shall ensure safety training has been imparted and safety pass is available with contractor worker prior to start the work.
- ✿ The permittee should have full knowledge of job, possible hazards involved and counter measures to be taken for avoiding incident during execution of the job.

- The engineer Incharge shall discuss and understand clearly the job is to be taken up. The same job will be explained to the permittee / workers involved in the execution of the job prior to starting the job. The JHA / safety measures will also be discussed among all concerned prior to start the job.
- The tags must be used on the valves. The valve tags in the field are to be removed by the user section once the job is over before the system line up after ensuring SWP has returned.
- Work Permit procedure shall be followed religiously by all concerned.
- Any job for which a permit has been issued will be treated as completed only when the SWP is returned, certification done duly signed by the permittee.
- The description of the job to be filled in by the Permit Issuing Authority shall be specific and complete in all respects without any vagueness.
- When a permit is already existing and during the course of maintenance if it is found that additional jobs are required to be taken up, then surrender the old permit with a specific request for a new permit.

Class-I SWPs for Non Operational area:

- ❁ **Class-I SWPs for Non Operational area shall be issued by shift in charge/ ASI (control room)** for hot jobs (welding, cutting and grinding jobs), confined space entry, excavation job having risk of damage/cutting of underground cables.
- ❁ **Concerned area Engineer /foreman /supervisor/ in charge shall issue remaining SWPs** for work in the non operational area. Issuing authority must have adequate knowledge of possible hazards may present and their counter measures to be taken.
- ❁ **Permittee shall be Engineer / Scientific assistant / foreman/ supervisor** of executing agencies having complete knowledge of job to be executed, hazards available and capacity to complete the job safely.
- ❁ **Class I SWP shall be counter signed by Dy Manager/ Section head** after ensuring proper isolation, tagging and writing his recommendations for safety items required for safe execution of job. He will also ensure healthy working environment for maintenance/execution of work.

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Examples class I SWP non operational area

- Trimming of branches at height shall be issued by Sr Scientific Assistant (Civil) to Scientific Assistant (Civil) after following class I procedure.
- Sheet replacement job at height shall be issued by concerned area in charge i.e. for work shop building - by Mechanical Engineer, Main stores building by Assistant store officer. UGP by Production shift in charge to the Engineer/Supervisor of executing agency having knowledge of complete job, hazards available and job shall be executed safely. .
- The permit for painting and sheet replacement job in operational area/plant building shall be issued by shift in charge(CR) to Civil Supervisor /Engr.
- Work at height in Switchyard area, Electrical substation shall be issued by Electrical Engineer for electrical jobs.
- Painting of building at height shall be issued by Electrical Supervisor/foreman/Engineer to Civil foreman/Scientific assistant.
- Job on live electrical line should be issued by Electrical Engineer.
- The SWP for class I jobs in the stores /steel yard area shall be issued by A.St.O. to the permittee from executing agency.
- Note: After deliberate discussion it was decided that the permit for routine hot work in the workshop shall not be issued. The engineer in charge of the job and work shop in-charge shall be responsible for execution of routine jobs safely. The major jobs like fabrication of vessel, confined space welding etc in the workshops shall be carried out after receiving valid permit.
- In case of any doubt regarding issuing of permit, the decision of Dy M(S&E) shall be final & permit shall be issued accordingly.