



<h1>Project Navigator</h1>					<b>Guideline</b>				
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>					VALE #			PAGE	
					<b>NAV-GP-0072</b>			<b>1/16</b>	
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## Table of Contents

1.0	CONTEXT .....	2
2.0	PURPOSE .....	2
3.0	REFERENCE DOCUMENTATION .....	2
4.0	FEL/DTA STUDY STAGE PHR'S .....	3
4.1	GENERAL .....	3
4.2	FEL 1 STUDY PHR GUIDELINE .....	3
4.3	FEL 2 STUDY PHR GUIDELINE .....	4
4.4	FEL 3 STUDY PHR GUIDELINE .....	4
4.5	Direct to Approval (DTA) STUDY PHR GUIDELINE .....	4
5.0	CONSTRUCTION PHR'S .....	5
5.1	GENERAL .....	5
5.2	ERM PROJECT WORK .....	5
5.3	MAINTENANCE AND OPERATIONS WORK .....	5
5.4	CMO CONTINUOUS SERVICE CONTRACTS .....	6
5.5	FIELD ENGINEERING WORK .....	6
5.6	CHANGES DURING THE WORK .....	6
6.0	COMMISSIONING PHR'S .....	7
6.1	GENERAL .....	7
7.0	PREPARATION FOR THE PHR MEETING .....	7
7.1	THE PHR FACILITATOR .....	7
7.2	PHR MEETING INVITATIONS .....	8
8.0	USE OF THE PHR TEMPLATE (NAV-TP-0019) .....	9
8.1	PHR TYPE TAB .....	9
8.2	ATTENDEES TAB .....	10
8.3	PHR PREPARATION CHECKLIST TAB .....	10
8.4	METHODOLOGY TAB .....	10
8.5	HAZARDS CHECKLIST TAB .....	11
8.6	HAZARDS TRIGGERS TAB .....	11
8.7	MINUTES TAB .....	11
8.8	WORKERS SIGN OFF SHEET .....	13
8.9	HAZOP TAB (Optional) .....	13
8.10	PHR AUDIT TAB (Optional) .....	14
9.0	TYPICAL PHR MEETING AGENDA .....	14

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b> <b>PHR GUIDELINE</b> <b>FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				<b>VALE #</b> <b>NAV-GP-0072</b>		<b>PAGE</b> <b>2/16</b>	
				<b>DM # 1150795</b>		<b>REV.</b> <b>10</b>	
<b>Effective Date:</b>	May 10/16	<b>Revisit Date:</b>	Dec 2018	<b>Prepared By:</b>	T. Hirschfeld	<b>Approved By:</b>	T. Hirschfeld

## 1.0 CONTEXT

The Vale Ontario Operations PHR Program document specifies the policy and the requirements for all Process Hazards Reviews. It also provides definitions, roles and responsibilities, training requirements, and other essential information.

As per the PHR Program, PHR's must be conducted for all ERM projects at the **FEL/DTA Study Stages**, Detailed Design, **Construction** and **Commissioning** stages. The PHR reviews at each project stage focus on different aspects, but the intent and the approach are consistent.

PHR's should also be conducted for other activities where merited, e.g. Operations or Maintenance work that poses significant or unusual hazards.

## 2.0 PURPOSE

The purpose of a PHR is to identify and assess the hazards associated with the work to be done, and determine the required control measures.


This guideline describes best practices specific to Construction PHR's.

This guideline also applies to PHR's done for Operations / Maintenance work.

## 3.0 REFERENCE DOCUMENTATION

The following documents were used in the development of this document or are related to it. The most recent revision shall be used. Also refer to the [Project Navigator](#) Toolkit documents.

<a href="#">Link</a>	PHR Program – Ontario Operations
<a href="#">Link</a>	PHR Core Competency Training Module
<a href="#">SPEC-02001</a>	Process Hazards Review – Design Requirements
<a href="#">NAV-TP-0019</a>	PHR – Process Hazard Review Template
<a href="#">NOR 0052</a>	Health and Safety Systemic Requirements
<a href="#">NAV-TP-0070</a>	Project Navigator – RACI
<a href="#">NAV-GP-0075</a>	Pre-development Review Guideline

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				VALE # <b>NAV-GP-0072</b>		PAGE <b>3/16</b>	
				<b>DM # 1150795</b>		REV. <b>10</b>	
Effective Date:	May 10/16	Revisit Date:	Dec 2018	Prepared By:	T. Hirschfeld	Approved By:	T. Hirschfeld

## 4.0 FEL/DTA STUDY STAGE PHR'S

### 4.1 GENERAL

Process Hazards Reviews are conducted at the FEL 3/DTA Study, Detail Design, Construction and Commissioning stages. High level PHR reviews may also be conducted at the FEL 1 and FEL 2 stages. The focus is on business risks and/or Safety/Health/Environment risks for the operation, and impacts to the public. Additional PHR's may be required to evaluate new or revised portions of the project that could significantly change those impacts.

If additional hazards are identified during the study the PHR must be revised and distributed to all original PHR meeting participants.

All personnel performing field work activities related to Engineering design and / or Studies (e.g. field measurements, soils investigation, General Review of Construction, etc...) must do a Construction PHR, or review the existing PHR documents related to the work.


PHR's for Studies should be performed when the study is approximately 85% complete.

For studies that include engineering deliverables, the PHR should be done as part of the 85% Design Review.

The FEL Study Report should incorporate all recommendations from the FEL/DTA Study Stage PHR.

### 4.2 FEL 1 STUDY PHR GUIDELINE

The FEL 1 Study stage identifies the problem and the desired end state / deliverables. The FEL 1 Study also defines the options to be explored during the FEL 2 stage. The PHR process assists in the selection of the options. The FEL 1 PHR identifies any risks associated with that project, identifies any new processes and hazardous materials that may be potentially involved, and assesses those risks. This assessment may identify changes to the proposed project scope / deliverables required at FEL 1, and should be used as information for the FEL 2 Study development and subsequent PHR's.

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				<b>VALE #</b> <b>NAV-GP-0072</b>		<b>PAGE</b> <b>4/16</b>	
				<b>DM # 1150795</b>		<b>REV.</b> <b>10</b>	
<b>Effective Date:</b>	May 10/16	<b>Revisit Date:</b>	Dec 2018	<b>Prepared By:</b>	T. Hirschfeld	<b>Approved By:</b>	T. Hirschfeld

### 4.3 FEL 2 STUDY PHR GUIDELINE

The FEL 2 Study stage evaluates all suitable options. The FEL 2 PHR considers the operational implications of each option and provides input to management’s decision regarding a preferred option. The FEL 1 PHR should be reviewed, if applicable. New risks such as equipment, processes, personnel, etc should be identified. This assessment may identify changes to one or more of the proposed options being assessed at FEL 2, and should be used as information for the FEL 3 Study development and subsequent PHR’s.

### 4.4 FEL 3 STUDY PHR GUIDELINE


The FEL 3 Study stage develops the recommended option. The FEL 3 PHR considers the future operational and maintenance implications of the project, as part of the risk assessment for the preferred option. The FEL 1 and FEL 2 Study PHR’s should be reviewed, if applicable. Any hazards identified during the FEL 3 PHR should be noted as requiring review during the Detail Design and / or Execution phase of the project. All costs associated with addressing and controlling the hazards must be considered and included within the FEL 3 budget estimate.

FEL 3 PHR’s should include a review of functional requirements / specifications for major equipment and process controls etc, and a high level review of the proposed construction methodology.

### 4.5 DIRECT TO APPROVAL (DTA) STUDY PHR GUIDELINE

The DTA Study stage develops the execution details, where only one option is practical for the execution of the work. The DTA Study PHR considers the future operational and maintenance implications of the project, as part of the risk assessment. Any hazards identified during the DTA Study PHR should be noted as requiring review during the Detail Design and / or Construction phase of the project. All costs associated with addressing and controlling the hazards must be considered and included within the DTA budget estimate.

DTA Study PHR’s should include a review of functional requirements / specifications for major equipment and process controls etc, and a high level review of the proposed construction methodology.

<h1>Project Navigator</h1>				<b>Guideline</b>			
TITLE <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				VALE # <b>NAV-GP-0072</b>		PAGE <b>5/16</b>	
				DM # <b>1150795</b>		REV. <b>10</b>	
Effective Date:	May 10/16	Revisit Date:	Dec 2018	Prepared By:	T. Hirschfeld	Approved By:	T. Hirschfeld

## 5.0 CONSTRUCTION PHR'S

### 5.1 GENERAL

The focus of a Construction PHR is on the risks to the people doing the work, and others in the area. Significant impacts to the operating equipment, the public or the environment caused by the construction activities will also be examined.


For specific tasks where the exact scope and/or work methodology can't be identified in advance, or where the hazards are unusual, another approved field level risk assessment techniques such as SLAM, or Job Hazard Analysis (JHA) should be used to address the specific hazards of these tasks. This may be done instead of a PHR, or in conjunction with the PHR for the overall job.

### 5.2 ERM PROJECT WORK

One or more Construction PHR's are required for each contract and/or Work Package on ERM Projects. A Construction PHR must be done before doing any fieldwork, including mobilization of equipment or materials. Major work packages that involve many tasks or several different construction trades may require several separate Construction PHR's to adequately assess all of the hazards and identify / develop control measures for each. Specialty work may require a task-specific Construction PHR and/or a JHA. These should focus on actions of people, keeping in mind how they will actually do the work. Contract-specific Safety Plans for the project should incorporate Actions from the Construction PHR where appropriate (e.g. specific Audits, etc...).

### 5.3 MAINTENANCE AND OPERATIONS WORK

Maintenance or Operations work of a non-routine / hazardous nature requires some form of risk management. The Construction PHR methodology and template provides a method for identifying hazards & the required controls, and a means of documenting and communicating that information. This applies whether the work is being done by Vale personnel, contracted to external service providers, or a combination of personnel. In some circumstances, another risk management tool may be more appropriate. If the work is similar in scale / complexity / duration to a "typical" ERM contract, the Construction PHR approach will generally be a good choice.

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				VALE #		PAGE	
				<b>NAV-GP-0072</b>		<b>6/16</b>	
				DM # 1150795		REV.	
						<b>10</b>	
Effective Date:	May 10/16	Revisit Date:	Dec 2018	Prepared By:	T. Hirschfeld	Approved By:	T. Hirschfeld

#### 5.4 CMO CONTINUOUS SERVICE CONTRACTS


For Services type contracts, a Construction PHR should be done during the contract kickoff. The intent of this PHR is to review the hazards generally associated with the type(s) of field work activities included in the contract, and the required mitigation measures for those hazards. For abnormal / unusual tasks a JHA or other field level risk management tool may be appropriate to address the specific hazards of these tasks.

#### 5.5 FIELD ENGINEERING WORK

All personnel on ERM Projects that are performing field work activities related to Engineering design and / or Studies (e.g. field measurements, soils investigation, General Review of Construction, etc...) must do a Construction PHR, or review the existing Construction PHR documents related to the work.

#### 5.6 CHANGES DURING THE WORK

If the scope of work changes, or if additional hazards are identified during the work the PHR must be updated with the original PHR meeting participants or an appropriate field level risk assessment must be completed with the appropriate personnel. The new information must be reviewed with all affected workers.

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				<b>VALE #</b> <b>NAV-GP-0072</b>		<b>PAGE</b> <b>7/16</b>	
				<b>DM # 1150795</b>		<b>REV.</b> <b>10</b>	
<b>Effective Date:</b>	May 10/16	<b>Revisit Date:</b>	Dec 2018	<b>Prepared By:</b>	T. Hirschfeld	<b>Approved By:</b>	T. Hirschfeld

## 6.0 COMMISSIONING PHR'S

### 6.1 GENERAL

A Commissioning PHR must be done before doing any commissioning activities for the project. The focus of this PHR is on the risks to the people doing the work, and others in the area. Significant impacts to the operating equipment, the public or the environment caused by the commissioning activities will also be examined.

One or more Commissioning PHR's are required for each major piece of equipment or process system being commissioned. Major projects / work packages that involve many tasks or several different construction trades may require several separate Commissioning PHR's to adequately assess all of the hazards and identify / develop control measures for each. Specialty work may require a task-specific Commissioning PHR. These should focus on actions of people, keeping in mind how they actually have to do the work.

If additional hazards are identified during the work the PHR must be revised and distributed to all original PHR meeting participants. All affected workers must review and sign off the revised PHR.

Commissioning PHR's should be very specific as to the controls that are to be put into place.

Where applicable, the Commissioning Plan / Manual should incorporate all recommendations from the Commissioning PHR.


## 7.0 PREPARATION FOR THE PHR MEETING

### 7.1 THE PHR FACILITATOR

The Vale Superintendent responsible for the work (ERM Project Manager, or Operations / Maintenance Superintendent, or CMO Superintendent) will assign the PHR Facilitator.

The PHR Facilitator's role is to ensure that the PHR process is followed as per the Standard and this guideline, and that the relevant hazards and controls are documented in a manner that can be readily communicated to the affected workers.

The PHR Facilitator is responsible for issuing the meeting invitations, pre-screening the Hazards tabs, recording and publishing the Minutes and associated information, following the guidelines below. Although they may delegate some or all of these tasks to others, they remain responsible for the process and the quality of the finished PHR.

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				VALE # <b>NAV-GP-0072</b>		PAGE <b>8/16</b>	
				<b>DM # 1150795</b>		REV. <b>10</b>	
Effective Date:	May 10/16	Revisit Date:	Dec 2018	Prepared By:	T. Hirschfeld	Approved By:	T. Hirschfeld

Note: the PHR Facilitator must attend formal in-class PHR training from Vale Learning & Development.

Ideally, the Facilitator is also aware of the hazards associated with the work activities and the workplace, along with the required controls. This is not mandatory; however, because the PHR team will include others with that information.

## 7.2 PHR MEETING INVITATIONS

The Facilitator will review any relevant documents prior to organizing the PHR meeting, to identify Action Items that need to be addressed, and to develop a list of potential hazards.

Invitations to PHR meetings should be issued at least one week before the meeting, to ensure those invited can attend. Exceptions would include emergency work and similar circumstances. Note that SME's, OEM Technical Reps and others may require more than one week's notice.

Meeting invitations are to include the following documents for review by participants, where applicable.

Study Stage PHRs:

- a) Previous PHR's, SHE Reviews and other Risk Assessment documents
- b) The Project Stage Initiation Request
- c) The Project Charter and Execution Plan


Construction Stage PHRs:

- a) Previous PHR's, SHE Reviews for this or similar work
- b) The Scope of Work package and related documents
- c) The sequence of construction tasks and/or the schedule for the work
- d) A description of the equipment and process / procedures to be used

Commissioning Stage PHRs:

- a) Previous Commissioning PHR's for this or similar work
- b) the Scope(s) of the Work related to the items being commissioned
- c) The Commissioning Checklist / Plan / Manual



<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				<b>VALE #</b> <b>NAV-GP-0072</b>		<b>PAGE</b> <b>9/16</b>	
				<b>DM # 1150795</b>		<b>REV.</b> <b>10</b>	
<b>Effective Date:</b>	May 10/16	<b>Revisit Date:</b>	Dec 2018	<b>Prepared By:</b>	T. Hirschfeld	<b>Approved By:</b>	T. Hirschfeld

- d) the sequence of commissioning tasks
- e) a description of the equipment and processes / procedures to be used

A site tour should be conducted with all PHR Invitees prior to the formal meeting, where appropriate.

A Safety, Health and Environment Checklist should be completed for the work. If any question on the Checklist is answered “yes, the representatives from the appropriate department(s) must attend the meeting and/or review the Minutes and provide feedback.

## 8.0 USE OF THE PHR TEMPLATE (NAV-TP-0019)

The current version of the standard Vale PHR template must be used for all PHRs.


The template includes several tabs – all tabs must be completed in sequence from left to right. Note that the tabs labeled **HAZOP** and **PHR Audit** are optional, all other tabs must be filled out.

The template includes internal links between tabs that reduce data-entry effort; the entire workbook must be kept together for those to function.

- Any information filled out on the header section of any tab will auto-populate to all of the other tabs that include that data.
- Actions listed in the Minutes tab will be included on the PHR Audit tab.

### 8.1 PHR TYPE TAB

Select the appropriate PHR Stage - this will streamline the attendees list on the **Attendees** tab, and will auto-populate the Project Stage in the header section of several tabs.

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				<b>VALE #</b> <b>NAV-GP-0072</b>		<b>PAGE</b> <b>10/16</b>	
				<b>DM # 1150795</b>		<b>REV.</b> <b>10</b>	
<b>Effective Date:</b>	May 10/16	<b>Revisit Date:</b>	Dec 2018	<b>Prepared By:</b>	T. Hirschfeld	<b>Approved By:</b>	T. Hirschfeld

## 8.2 ATTENDEES TAB

The Vale Facilitator will review the list of potential attendees from the Attendees tab in the PHR template, and invite the appropriate personnel.

Representatives from the group managing the work (ERM or Plant) and from the Work Group(s) doing the work must participate in all PHR's associated with the work.

Subcontractors that are materially involved in the work or that can contribute to the identification of hazards and controls should attend the PHR meeting. They can be invited to the initial PHR meeting, or a separate PHR meeting for their work. Note that the interaction between work groups may sometimes create unique hazards that require representatives from all groups to participate in a single PHR meeting.

Descriptions are provided for the terms: "Attend", "Attend/Review", "Be Considered", and "Invited". These descriptions are aligned with the PHR Program document and the related guidelines.

## 8.3 PHR PREPARATION CHECKLIST TAB

The PHR Facilitator will review and complete this Checklist before the PHR meeting, to ensure the required preparatory work has been completed.


This includes reviewing previous Action Items that need to be addressed, reviewing the documents issued with the meeting invitation (see section 7.2), and pre-screening the **Hazards Checklist** and **Hazards Triggers** tabs to identify potential hazards and controls.

These details must also be reviewed with the PHR team before assessing the hazards. It is crucial that the participants understand the scope and the execution plan for the work being done. Photos, Plot-plan or General Arrangement drawings and P&ID's are useful aids. Full-size versions and/or electronic copies should be available for display during the meeting.

A site tour should be conducted with all PHR Invitees prior to the formal meeting, where appropriate.

## 8.4 METHODOLOGY TAB

The Overview of Scope should describe what the job entails and its boundaries. Include sufficient detail to assess the hazards associated with the work. Expand on this at the meeting as needed.

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				VALE # <b>NAV-GP-0072</b>		PAGE <b>11/16</b>	
				DM # <b>1150795</b>		REV. <b>10</b>	
Effective Date:	May 10/16	Revisit Date:	Dec 2018	Prepared By:	T. Hirschfeld	Approved By:	T. Hirschfeld

Example: *Installation of ISA Mill foundation.*

Under **Methodology** for a Construction or Commissioning PHR, list the job steps / commissioning tasks in the sequence they will be done, including major equipment, tie-ins, and any unusual hazardous materials.

Construction Methodology Example:

- *Mobilize and establish laydown areas for the job.*
- *Saw cut concrete at perimeter.*
- *Break and remove concrete elevated slab at elevation.*
- *Layout & install rebar and formwork for ISA Mill foundation*

Under the **New Processes or Materials** for Study PHRs list major equipment, process changes, tie-ins and working environment changes, and new Hazardous Materials.

Attach all relevant documentation e.g. flowsheets, general arrangements, drawings, Scope of Work, and P&ID's relating to the PHR.

## 8.5 HAZARDS CHECKLIST TAB

The Hazards Checklist is used to quickly identify hazard topics for review and discussion. It should be pre-screened beforehand and then discussed briefly at the meeting.


## 8.6 HAZARDS TRIGGERS TAB

The Hazards Triggers list is used to pre-screen for potential hazards and controls before the meeting – check off or highlight each line that may apply. This pre-screened trigger list is then used to prompt discussions during the PHR meeting.

## 8.7 MINUTES TAB

This tab is used to document the meeting discussions and to record the assignment of action items.

Using What If questions, list events that could cause a hazardous condition or undesired event to occur, and what the result might be (i.e. Injury/damage, etc...). Ensure that the What If statements are specific and completely describe the

<h1>Project Navigator</h1>					<b>Guideline</b>			
<b>TITLE</b> <b>PHR GUIDELINE</b> <b>FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>					<b>VALE #</b> <b>NAV-GP-0072</b>		<b>PAGE</b> <b>12/16</b>	
					<b>DM # 1150795</b>		<b>REV.</b> <b>10</b>	
<b>Effective Date:</b>	May 10/16	<b>Revisit Date:</b>	Dec 2018	<b>Prepared By:</b>	T. Hirschfeld	<b>Approved By:</b>	T. Hirschfeld	

associated Hazard. (Do not use single word What If statements.) List all of the What If statements (the possible events) for the first Hazard, then move on to the next Hazard, and so on, until the PHR is completed and agreed to by those in attendance.

For each of the potential hazards listed, describe the Existing Protection in place that will mitigate the hazard and lower the risk. Where appropriate, the Existing Protection should refer to legislation, SPI's/policies/procedures/programs, Engineering packages (drawings, scope of work, specifications, etc...) or other documents that govern the work. These may be Vale documents, or may come from a contractor or consultant.

Construction PHR Example:

- ***“Vale Working at Height Rescue Plan Work Sheet to be used as per Vale SPI-06 for Fall Protection.” is preferable to “WAH Rescue Plan.”***

List Actions that will further help mitigate the hazards and lower the risk, to help ensure everyone gets HomeSafe.

Use the [“Hierarchy of Controls”](#) model to generate possibilities.



All PHR Actions must be true action statements that can be readily audited.


Construction PHR Example:

- ***“the crew Supervisor will audit for compliance to standard ABC and complete audit form 123” is preferable to “comply with standard ABC.”***

In the Action By column, assign the person / role responsible (c/w the company name) for follow-up and mark the Status of the item as complete or incomplete. PHR action items may be assigned to Vale personnel or to the contractor / consultant; both parties are ultimately accountable for mitigation of the hazards identified.

Construction PHR Example:

- ***“John Smith, Vale” or “Jane Jones, ABC Contracting Inc.”, or “Safety Coordinator, XYZ Consultants, Ltd”.***

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				<b>VALE #</b> <b>NAV-GP-0072</b>		<b>PAGE</b> <b>13/16</b>	
				<b>DM # 1150795</b>		<b>REV.</b> <b>10</b>	
<b>Effective Date:</b>	May 10/16	<b>Revisit Date:</b>	Dec 2018	<b>Prepared By:</b>	T. Hirschfeld	<b>Approved By:</b>	T. Hirschfeld

In the Review With ... column, indicate the group(s) that need the information.

The “Entry By Record View” button displays only a single row on screen, this may be a more effective way to produce or edit the PHR Minutes line items.

Using the “Print By Review Group” button allows you to print only the items that the Workers must review and sign off, for example.

## 8.8 WORKERS SIGN OFF SHEET

The Workers Sign Off Sheet is not applicable for FEL PHRs.

Construction PHR’s must be reviewed with every worker assigned to the related tasks, before they start that work. Signatures are to be obtained to document those reviews. The Work Plan and Safety Plan should be included.

## 8.9 HAZOP TAB (OPTIONAL)

Hazards and Operability Studies are another method of identifying risks to personnel or equipment, by reviewing the possible deviations in process parameters for each part of a process stream or system, and identifying the related consequences. When a significant process change is being made that involves large or complex systems, the review may be lengthy and personnel specifically trained in HAZOP analysis should lead it.

For smaller process changes, or for a review of Construction / Maintenance work with some potential impacts on the process, the optional **HAZOP Considerations** tab in the PHR template can serve as a simple means of listing the Node, Process Parameter, Deviation and Consequence.

Construction PHR Example:


- *“Discharge line from Pump #23-A ... Pressure ... Increase ... Pressure Safety Valve will relieve to atmosphere.”*

The identified consequence can be copied to the PHR Minutes tab as a “What if ...” statement, and the associated hazards and controls can be identified.

The same technique can be used for a specific component of a piece of equipment.

Construction PHR Example:

- *“Motor from Blower #5 ... Starting Current ... Increase ... Motor will trip due to synchronization failure.”*

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b>  <b>PHR GUIDELINE FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				<b>VALE #</b> <b>NAV-GP-0072</b>		<b>PAGE</b> <b>14/16</b>	
				<b>DM # 1150795</b>		<b>REV.</b> <b>10</b>	
<b>Effective Date:</b>	May 10/16	<b>Revisit Date:</b>	Dec 2018	<b>Prepared By:</b>	T. Hirschfeld	<b>Approved By:</b>	T. Hirschfeld

## 8.10 PHR AUDIT TAB (OPTIONAL)

All PHR Actions should be audited for completion; use of this tab is optional.

PHR Actions listed in the **Minutes** tab are automatically copied over to the PHR Audit tab, providing a simple way to produce the audit document.

## 9.0 TYPICAL PHR MEETING AGENDA

Review the project background, the scope of work and battery limits, and the associated documentation (refer to section 7.2) to ensure that all attendees understand the work and execution methodology.

Discuss any Actions from related Process Hazard Reviews etc..., if applicable, to ensure that any identified hazards have been addressed.

Briefly review the Hazard Checklist to identify hazard categories.


Provide printed copies of the pre-screened Hazard Triggers list to all attendees.

For each item on the Hazard Triggers list, decide as a group whether the hazard applies to the work. If so, define the “What If ...” statement that best describes the Hazard, and determine the Existing Protection and the required Actions, if any.

- Copying the identified hazards from the Triggers list to the Minutes tab before the meeting and identifying the Existing Protection will speed up the meeting.
- Focus on the most significant hazards; those with the highest consequences, highest frequency, or both.
- There are many triggers on the list – keep the discussion of each to the minimum time required to identify the hazards, existing protection, and actions needed.
- If the Existing Protection effectively reduces the Hazard to an acceptable level, no Action item is required.

Record the discussions on the Minutes and assign a person accountable for further action in eliminating or managing the hazard.


- Recording the minutes “live” on screen during the meeting will usually generate more discussion, and Hazards and potential controls will be identified that may not have been otherwise.
- This requires a scribe with the confidence and ability to type in front a group. The PHR Facilitator usually won’t be able to do both jobs at once.

<h1>Project Navigator</h1>				<b>Guideline</b>			
<b>TITLE</b> <b>PHR GUIDELINE</b> <b>FEL / DTA STUDY / CONSTRUCTION / COMMISSIONING</b>				VALE # <b>NAV-GP-0072</b>		PAGE <b>15/16</b>	
				<b>DM # 1150795</b>		REV. <b>10</b>	
Effective Date:	May 10/16	Revisit Date:	Dec 2018	Prepared By:	T. Hirschfeld	Approved By:	T. Hirschfeld

Before concluding the meeting:

- Ask each attendee if they have any outstanding areas of concern related to the PHR. Document any relevant items in the Minutes.
- Ensure all attendees are clear on the next steps:
  - Whether further reviews must be done by those that could not attend the meeting.
  - Who will finalize and forward the PHR Minutes file to the attendees and to other stakeholders, and by when.
  - Who will review the PHR with the affected workers, before they start the work (or particular parts of the work, such as mobilization).

<b>REVISIONS</b>				
<b>Rev #</b>	<b>Nature of Change</b>	<b>Rev'n by</b>	<b>Approved by document owner</b>	<b>Issue Date YYYY/MM/DD</b>
1	The development of the Construction PHR Guideline.	Business Systems Group	PHR Review Committee	2012/08/15
2	Formatting changes	AD / TH	Trueman Hirschfeld	2012/08/23
3	Minor Updates	TP	Trueman Hirschfeld	2013/01/11
4	Section 2.0 included verbiage that the JHSC Rep to be officially notified of or attend Construction / Design PHR and notification to be filed as per PDR regulations.	TP	Trueman Hirschfeld	2014/02/12
5	Section 4.1 paragraph 4 updated to clarify the use of field level risk assessment tools. Section 4.1 a) updated for clarity	GM/DR	Trueman Hirschfeld	2014/07/07

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	Section 6.0 – clarification added			
6	Update Hierarchy of Controls graphic and replace term ALARA with “get HomeSafe”	TP	Trueman Hirschfeld	2015/06/05
7	General revision for alignment with PHR Program document. Merged all Project PHR Guidelines into one document.	TH	Trueman Hirschfeld	2015/11/15
8	Section 8.2 Attendees – added paragraph 3 regarding Subcontractor attendance at PHR Meetings	TH	Trueman Hirschfeld	2016/05/10
9	Section 4.5 Direct to Approval added	JL	J Lund/T Hirschfeld	2017/12/11
10	Aligned terminology from PMO to ERM			May 6/18