

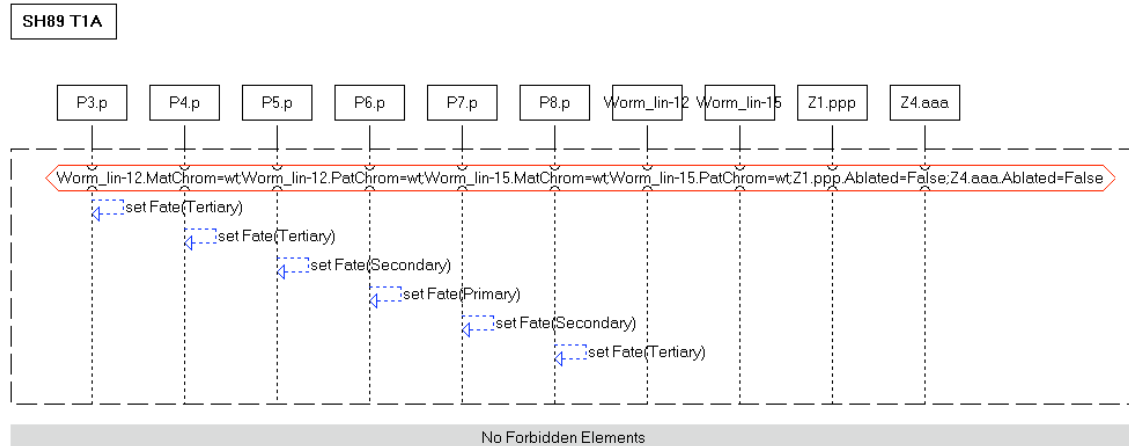
Supplementary Documentation: eLSCs

General Organization

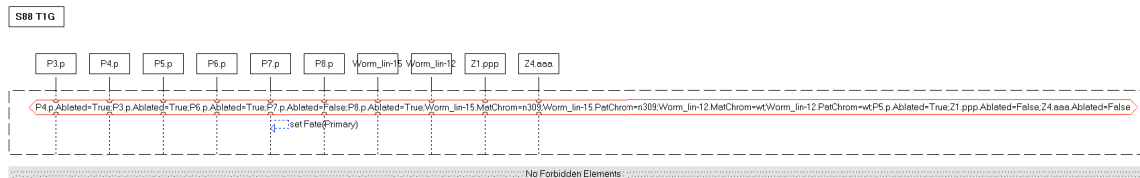
For essentially each line of data that appears in the tables in the three “core” papers (Sternberg and Horvitz, 1986; Sternberg, 1988; Sternberg and Horvitz, 1989; see text for exceptions where data were not included) there is an existential chart describing both the experimental set-up and the result. These charts are organized in Use Cases for each paper: “SH86 EXP”, “S88 EXP”, and “SH89 EXP”. The experimental results reported in a table in the paper are labeled in the model according to their position in the table. For example, the existential chart corresponding to the third *lin-7* loss-of-function mutant animal reported in SH89 Table 2 is labeled in the model as “T2 A b3” referring to Table 2, Section A, Subsection b, Animal Number 3. Our labeling scheme is indicated below either by numbers/letters either added to the original or included in the original tables.

The Basics

Existential LSCs (eLSCs) provide a simple and intuitive way to capture experimental results. During testing, they can be monitored to determine whether there exists a run of the system that can satisfy the eLSC (see text for further details). The eLSC shown below represents the wild-type VPC pattern, as reported in SH89 Table 1 A. Each of the VPCs is represented as a (vertical) instance line, as are the genes *lin-12* and *lin-15*, and the AC/VU precursor cells Z1.ppp and Z4.aaa. The experimental set-up is represented in the red hexagon, which expresses the condition under which the remaining chart events must occur for this existential LSC to be satisfied. For this experiment the condition states that *lin-12* and *lin-15* are not mutated (the status of these particular genes was important for this experiment; all other genes could have been specified as “wild-type”, but it was not necessary for testing this result since during testing a procedure was in place to set all other genes to “wild-type”; see text section on Jump Starts). The condition also specifies that Z1.ppp and Z4.aaa are not ablated. The scenario continues by P3.p acquiring a tertiary fate (represented by the self message SetFate(Tertiary)), P4.p becoming tertiary, P5.p becoming secondary, P6 becoming primary, P7.p becoming secondary and P8.p becoming tertiary. The LSC does not define an ordering between the times the VPC acquire their fate, thus although visually P3.p fate specification appears before P4.p fate specification, any ordering of the fate acquisition between these VPCs that gives the specified pattern all the VPCs will satisfy the chart. It is possible to add synchronizing conditions and also actual timing constraints to capture the biological timing of fate specification for the different fates, but for the purpose of the testing the more basic level of description was sufficient.

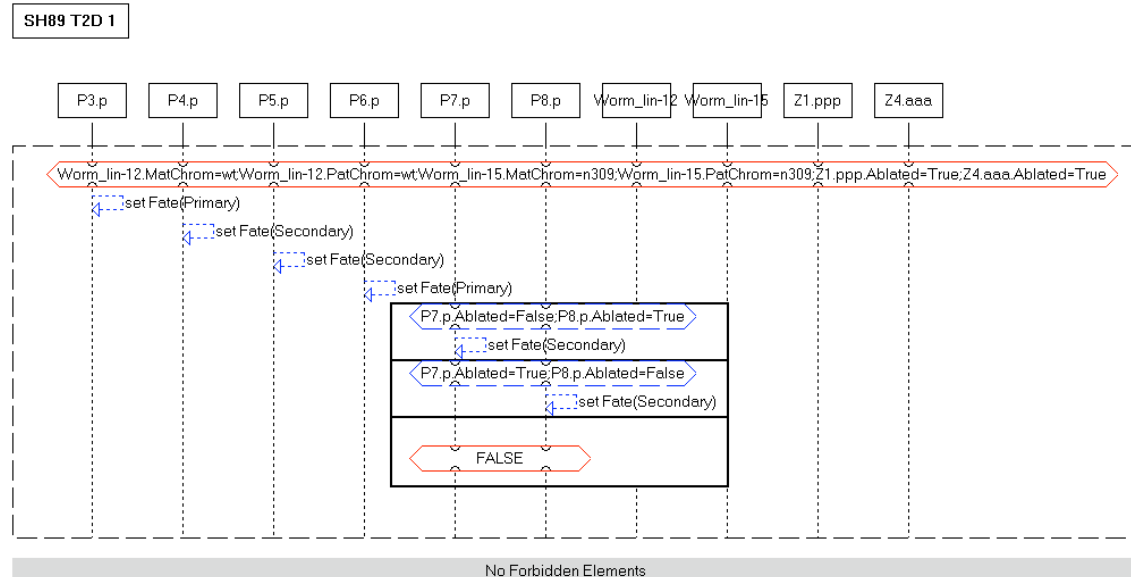


Existential charts can also be used to capture information on mutations and cell ablations. SH88 performed an experiment in a *lin-15(n309)* homozygote, in which P3.p, P4.p, P5.p, P6.p, and P8.p were ablated, but the worm's AC/VU precursors were left intact. This resulted in P7.p adopting the primary fate. In order for the eLSC "S88 T1G", to be satisfied – indicating that the model can reproduce this laboratory observation – P7.p must set its fate to primary.



Data with partial information

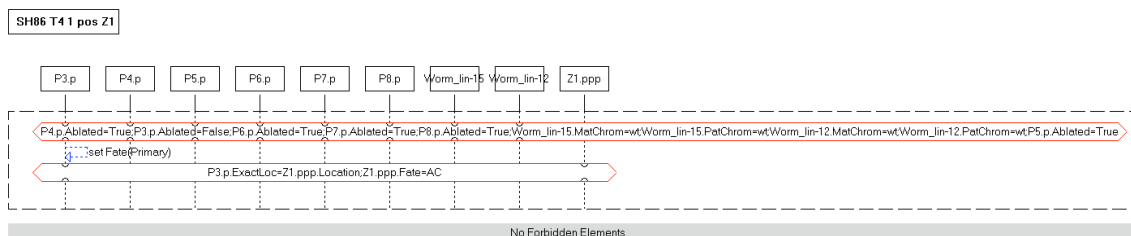
Some reported data provides only partial information. For example, in SH89 T2 D 1, it is stated that one P7/8 cell was inadvertently ablated in the process of ablating the gonad in a *lin-15(n309)* background. This information is captured using an eLSC with a conditional subchart capturing both possibilities. This example demonstrates the flexibility of the language and approach to capture the actual experiment and result as performed and recorded in the lab. The LSC contains a conditional structure – the first section of the conditional chart describes the case where P8.p was ablated and P7.p remained intact and adopted a secondary fate, the second section of the conditional chart describes the case where P7.p was ablated and P8.p remained intact and adopted a secondary fate, while the third section of the conditional chart contains the condition FALSE, meaning that this existential chart is not satisfied under either other option.



Another example for partial information appears in SH89 T3 c, where P5.p, P6.p and P7.p are ablated and the results from multiple animals are summarized in a single row as follows: $2^{\circ}/3^{\circ} 1^{\circ}/2^{\circ} - - - 1^{\circ}/2^{\circ}$ meaning that in some animals P3.p assumed a secondary fate and in some a tertiary fate, and in some animals P4.p assumed a primary fate and in some a secondary fate, etc. Since it is not immediately clear which actual combinations of fates were observed, we created an existential chart for each possible configuration. Testing later showed which configurations could actually be reproduced by the model. One possibility is that the remaining configurations were not actually observed in the lab.

Positional Data

Some experimental results included the spatial positions held by each VPC at the time of Fate adoption (see for example SH86 Table 4), in addition to the VPC fates themselves. The eLSCs representing these results include both types of data.



For example, in SH86 T4 animal 1, the LSC above describes the case where P3.p acquires a primary fate and is positioned adjacent to the AC (which, in this case, is Z1.ppp). Another LSC describes a situation where Z4.aaa is the anchor cell. Other experimental results do not include VPC position (see SH86 Table 1). The eLSCs for these data contain only the information reported in the table in the paper.

P3.p nonVPC Fate

Some experimental results from the model's core papers involve P3.p with a VPC fate and others involve P3.p with a non-VPC fate (i.e. P3.p fused with Hyp7 rather than becoming part of the VPC equivalence group). The mechanisms and rules regarding this fusion are not the focus of the study in the three core papers represented in our model. Our model assumes that P3.p fusion is a decision independent of most of the cellular and genetic perturbations performed in the core papers.

One exception is that we model P3.p in *lin-15(n309)* mutants with no chance of fusion since P3.p fusion in *lin-15(n309)* mutants was never reported in the core papers. Based on additional non-“core” data (Chen and Han, 2001), in all other animals we represent P3.p fusion as occurring with a 41.9% chance in each worm.

For a given reported result, we checked if there was a reported result for the same experiment that was identical but with a reciprocal P3.p VPC/nonVPC fate. In other words, if P3.p was seen to fuse in one result of experiment A, then we looked for another result of experiment A in which P3.p did not fuse, i.e., had a VPC fate. If we did not find such a reciprocal result in the paper, we created an existential LSC for it. This way, during testing, when we looked for new simulation results, we did not simply identify eLSCs that failed to be satisfied for this relatively trivial reason. We put these LSCs in a “nonVPC” Use Case corresponding to the appropriate paper. For example, there is a “SH89 EXP nonVPC” Use Case.

Non-Canonical Fates

Though our model does not yet contain rules governing adoption of intermediate or hybrid VPC fates, we include results involving those fates in the eLSCs. As a result, the model runs do not produce these fates. These eLSCs are appropriately marked “hybrid” or “intermediate”. This will make it easy to test behavior of a future model that does include rules for generation of those non-canonical fates.

However, even with this version of the model, we wanted to be able check that simulations in the current model at least reproduce the experimentally-observed fate patterns in the cells that adopted canonical fates. So for each animal that exhibited a hybrid or intermediate fate, we made an additional parallel eLSC that specifies the expected fates of all VPCs except those which were observed to adopt non-canonical fates. For the latter, we did not specify the fate that was adopted. In this way, the data these animals represent could be at least partially included in the testing.

Labeling Scheme

SH86

Table 1. Pn.p but not Pn.px Cells Can Regulate

Animal	Time ^a	P3.p	P4.p	P5.p	P6.p	P7.p	P8.p	Egl
		S S	S S	LLTN	TTTT	NTLL	S S	+
normal		S	S S	LLTN	TTTT	NTLL	S S	+
1	pre	S S	----	LLTN	TTTT	NTLL	S S	+
2	pre	S S	LLTT	----	TTTT	NTLL	S S	+
3	pre	S S	S S	----	TTTT	NTLL	S S	+
4	pre	S	S S	UUTO	----	TTTT	S S	+
5	pre	S S	S S	LLTT	----	NTLL	S S	-
6	pre	S S	S S	LLTO	----	TTLL	S S	-
7	pre	S	S S	LLTO	----	TTLL	S S	-
8	pre	S S	S S	LLTO	----	TOLL	S S	-
9	pre	S S	S S	LLTN	TTTT	----	NTLL	+
10	pre	S	S S	LLTN	TTTO	----	?LUU	+
11	pre	S S	S S	LLTN	TTTT	----	NU S	+
12	pre	S S	S S	LLTN	TTTO	----	S S	+
13	pre	S S	----	----	LT TT	NTLL	S S	+
14	pre	S	S S	----	----	TTLL	UU S	-
15	post	S	S S	LL--	TTTT	NTLL	S S	+
16	post	S S	S S	LO--	TTTT	NOLL	S S	+
17	post	S	S S	LLTN	-- TT	NTLL	S S	+
18	post	S S	S S	LLTN	OT--	NTLL	S S	sterile
19	post	S	S S	LLTN	TTTT	-- LL	S S	+
20	post	S	S S	LLTN	TTTT	-- LL	S S	+
21	post	S S	S S	LLTN	----	NOLL	S S	-
22	post	S	S S	LLTN	----	NTLL	S S	-
23	post	S S	S S	LLUU	----	-- OL	S S	-

Table 2. Pn.px Cells Are Not Equivalent in Developmental Potential

	P3.p ^a	P4.p	P5.p	P6.p	P7.p	P8.p	Observed
A	S S	S S	LLTN	TTTT	NTLL	S S	152
B	S S	S LL	TNTT	TTNT	LL S S S		0
C	S S	LLTN	TTTT	NTLL	S S S S		10
D				other ^b			12

Table 3. Test of the Ground State of Pn.p Cells

Gonad	Fates	Number of Animals							
		P3.p	P4.p	P5.p	P6.p	P7.p	P8.p	new ^a	previous ^b
a	+	3°	3°	2°	1°	2°	3°	many	many
b	-	3°	3°	3°	3°	3°	3°	1	many
c	+	2°/3°	1°/2°	--	--	--	1°/2°	1	2
d	-	3°	3°	--	--	--	3°	5	0

Table 4. Fates of Isolated Pn.p Cells

Experiment	P3 . p	P4 . p	P5 . p	P6 . p	P7 . p	P8 . p
normal	S S	S S	LLTN	^{a c} TTTT	NTLL	S S
1	^{a c} TTTO	-----	-----	-----	-----	-----
2	LLTD	^{a c} -----	-----	-----	-----	-----
3	(LLTT)	^{a c} -----	-----	-----	-----	-----
4	-----	^{a c} LTTT	-----	-----	-----	-----
5	-----	LLTN	^{a c} -----	-----	-----	-----
6	-----	-----	^{a c} TTTT	-----	-----	-----
7	-----	-----	TTTT	-----	-----	-----
8	-----	-----	-----	-----	^{a c} TTTT	-----
9	-----	-----	-----	-----	^{a c} TTTO	-----
10	-----	-----	-----	-----	^{a c} (TTTT)	-----
11	-----	-----	-----	-----	^{a c} (TTTT)	-----
12	-----	-----	-----	-----	^{a c} (LTTO)	-----
13	-----	-----	-----	-----	-----	^{a c} OTTO
14	-----	-----	-----	-----	-----	^{a c} TTUT
15	-----	-----	-----	-----	^{a c} -----	TTLL
16	-----	-----	-----	^{a c} -----	-----	S S

Table 5. Fates of Subsets of Pn.p Cells

	Number of animals		Fates of Pn.p cells					
	new ^a	previous ^b	P3.p	P4.p	P5.p	P6.p	P7.p	P8.p
6 cells (normal)	1		3 ^o	3 ^o	2 ^o	1 ^o	2 ^o	3 ^o
5 cells	2	1	0	3 ^o	--	2 ^o	1 ^o	2 ^o
	3	2	2	3 ^o	2 ^o	1 ^o	--	2 ^o
	4	1	0	3 ^o	3 ^o	2 ^o	--	1 ^o
	5	1	0	3 ^o	3 ^o	2 ^o	1 ^o	--
4 cells	6	1	0	3 ^o	--	2 ^o	--	1 ^o
	7	0	1	3 ^o	--	--	1 ^o	2 ^o
	8	1	1	3 ^o	3 ^o	2 ^o	1 ^o	--
3 cells	9	1	0	3 ^o	2 ^o	--	--	1 ^o
	10	1 ^c	0	--	--	--	1 ^o	2 ^o
	11	1 ^c	0	--	2 ^o	--	1 ^o	--
2 cells	12	1 ^c	0	3 ^o	1 ^o	--	--	--
	13	1 ^c	0	--	--	--	--	1 ^o

Table 1 Fates of VPCs in experimental animals

Genotype	AC	P3.p	P4.p	P5.p	P6.p	P7.p	P8.p
(A) Wild-type	1 +	S S	S S	LLTN	TTTT	NTLL	S S
(B) Wild-type	1 -	S S	S S	S S	S S	S S	S S
(C) Wild-type	1 -	-	-	-	-	S S	-
	2 -	-	-	-	-	S S	-
	3 -	-	-	-	-	S S	-
	4 -	-	-	-	-	S S	-
	5 -	-	-	-	-	S S	-
	6 -	-	-	-	-	S S	-
	7 -	-	-	-	-	S S	-
(D) <i>lin-15</i>	1 +	LLTT	LOTO	LLLN	TTTO	NLLL	LOOO
	2 +	LOLL	OTTT	LLLT	TTTT	TLLL	TTTL
	3 +	LTTT	LLTN	LLON	TTTT	NTLL	LTTL
	4 +	TOOT	LLON	LLTT	TTTT	NLLL	OTTT
	5 +	OLLO	TTTT	LLTT	TTTT	NTLL	TTLL
	6 +	LLTN	TTTL	LLON	TTTT	NOLL	OTLL
(E) <i>lin-15</i>	1 -	OTTT	LLON	OTTT	LLTT	NTLL	OTTT
	2 -	LTTL	NOLL	OTTT	NTLL	TTLL	DOTL
	3 -	TLLL	LLLN	OOTO	LLTT	LLL	OOTO
	4 -	LLLN	OTTT	LLLN	TOTT	NOLL	OTOT
	5 -	OLTN	OTTT	LLLN	LTTT	NTLL	OTTT
	6 -	LLLO	OTTO	LLOT	TTTT	NOLL	LTTL
	7 -	LTOL	LLOO	LLLT	OTTO	NTLL	OTTT
	8 -	TTTT	DLON	TOOL	LLTN	TOTO	DDDD
(F) <i>lin-15</i>	1 -	-	-	-	-	LTTL	-
	2 -	-	-	-	-	LOOL	-
	3 -	-	-	-	-	LLOL	-
	4 -	-	-	-	-	OOTL	-
	5 -	-	-	-	-	OTOO	-
	6 -	-	-	-	-	LOTO	-
	7 -	-	-	-	-	LOOO	-
	8 -	-	-	-	-	DDDD	-
(G) <i>lin-15</i>	1 +	-	-	-	-	TTTT	-
	2 +	-	-	-	-	LOOL	-
	3 +	-	-	-	-	DDDD	-
(H) <i>lin-15</i>	1 -	-	-	-	-	LOLN	LTOL
	2 -	-	-	-	-	LLOO	LOTL
	3 -	-	-	-	-	OTLL	TOTL
	4 -	-	-	-	-	TTLL	LLLL
	5 -	-	-	-	-	OTTO	OLLL
	6 -	-	-	-	-	LTTL	NOLL
	7 -	-	-	-	-	LLOO	LLOT
	8 -	-	-	-	-	TTDL	TTOO
	9 -	-	-	-	-	LLOL	LTLL

Table 1 continued

Genotype	AC	P3.p	P4.p	P5.p	P6.p	P7.p	P8.p
(I) <i>lin-15</i>	1	-	OTTT	-	-	LTIT	-
	2	-	TTTT	-	-	LOOL	-
	3	-	TLTL	-	-	OTLL	-
	4	-	TTTT	-	-	TTTT	-
	5	-	TTTL	-	-	LOLL	-
	6	-	LLLO	-	-	OLOL	-
	7	-	LOTT	-	-	LLLL	-
(J) <i>lin-15</i>	1	+	-	-	-	LTTO	TLLL
	2	+	-	-	-	OTTT	TLLL
	3	+	-	-	-	OOTO	TLLL
	4	+	-	-	-	LOTT	TLLL
	5	+	-	-	-	LTTO	TLLL
	6	+	-	-	-	OTTT	TLLL
	7	+	-	-	-	TOTT	TLLL
	8	+	-	-	-	OTTT	NOLL
	9	+	-	-	-	LOTT	TLLL
	10	+	-	-	-	TTTO	TLLL
	11	+	-	-	-	OTTO	LTOO
	12	+	-	-	-	TTTT	TLLL
	13	+	-	-	-	TTTO	LLLL
	14	+	-	-	-	LLTT	TOLL

SH89

Genotype	ac	P3.p	P4.p	P5.p	P6.p	P7.p	P8.p	#
A. Wild type	1 +	S S ^a	S S	LLTN	TTTT	NTLL	S S	*
B. Wild type	1 - ^b	S S ^a	S S	S S	S S	S S	S S	*
C. <i>lin-12(0)</i>	1 ++	S S	S S	TTTT	TTTT	S S	S S	1
	2 ++	S S	S S	TTTT	TTTT	NT S	S S	1
	3 ++	S	S TN	TTTT	TTTT	TTOL	S S	1
	4 ++	S	S TN	TTTT	TTTT	TTTO	S S	1
	5 ++	S	LLTN	TTTT	TTTT	TTTO	S S	1
	6 +++	S	S TN	TTTT	TTTT	TT S	S S	1
	7 +++	S	S TN	TTTT	TTTT	TTTO	S S	1
	8 ++	S S	S DD	DDDD	DDDD	TTTT	S S	1
	9 ++	S	S S	DDDD	DDDD	TOOL	S S	1
	10 ++	S	S TT	TTTT	TTTT	TTTT	N? S	1
	11 ++	S	S O?	TTTT	TTTT	TT S	NT S	1
D. <i>lin-12(0)</i>	1 - ^b	S S ^a	S S	S S	S S	S S	S S	12
E. <i>lin-12(d)</i>	1 -	LLTN	LLTN	LLTN	TNLL	NTLL	NTLL	1
	2 -	LLTL	LLTT	LLON	TLLL	NTLL	LLTT	1
	3 -	LLTN	LLTN	LLTN	NTLL	TLLL	LLNT	1
	4 -	LLTT	LLLN	LLTN	NTLL	NLLL	LLTT	1
	5 -	LLOO	LLTN	LLTN	NTLL	LLOO	LLTT	1
	6 -	LLTT	LLOT	LLTN	NTLL	TOLL	TLLL	1
	7 -	LLTN	LLOO	LLTN	NTLL	NTLL	NTLL	1
	8 -	LLTN	LLNT	LLTN	NTLL	LLTN	LLNT	1
	9 -	Oooo	LLTL	LLTN	NTLL	OTTT	TLLL	1
	10 -	Oooo	LLTN	LLTN	TNLL	NTLL	TLLL	1
	11 -	SLSS	LLTN	LLTN	NTLL	LLTN	LLNT	1
F. <i>lin-12(d/0)</i>	1 -	LLOT	LLTN	LLTN	LLNT	NTLL	Oooo	1
	2 -	LLTT	LLTN	LLTN	LLTT	NTLL	TLLL	1
	3 +	LLTN	LLON	LLTN	TTTT	NTLL	LLNT	1
	4 +	OLOO	LLON	LLTN	TTTT	NTLL	LLON	1
	5 +	OLOL	LLTN	LLTN	TTTT	NTLL	Oooo	1
	6 +	OLTO	LLTN	LLTN	TTTT	NTLL	LLTO	1
	7 +	LLTT	LLTN	LLTN	TTTT	NTLL	LLNT	1

Table 2. Vulval Cell Lineages in *Vul* and *Muv* Mutants

Genotype	ac	P3.p	P4.p	P5.p	P6.p	P7.p	P8.p	#
A. <i>lin-3</i>	a1 +	S S ^a	S S	S S	S S	S S	S S	5
	a2 +	S S	S S	S S	S TT	S S	S S	3
	a3 +	S S	S S	S S	OTTT	S S	S S	1
	a4 +	S S	S S	S S	TTTT	S S	S S	1
	a5 +	S S	S S	S TN	TTTT	S S	S S	1
	a6 +	S S	S S	S S	TTTT	NO S	S S	1
<i>lin-7</i>	b1 +	S S	S S	S S	S S	S S	S S	2
	b2 +	S S	S S	S S	S S	TOOO	S S	1
	b3 +	S S	S S	S TT	TTTT	S S	S S	1
	b4 +	S S	S S	LLTN	S S	OO S	S S	1
	b5 +	S S	S S	S TT	TTTT	TT S	S S	1
	b6 +	S S	S S	LOTN	TTTT	NT S	S S	1
<i>lin-2</i>	c1 +	S S	S S	S S	S S	S S	S S	3
	c2 +	S S	S S	S S	TT S	S S	S S	1
	c3 +	S	S S	S S	S TO	S S	S S	1
	c4 +	S	S S	S S	ONOO	S S	S S	1
	c5 +	S S	S S	S TN	S S	NO S	S S	1
	c6 +	S	S S	S S	S TO	NTLO	S S	1
	c7 +	S S	S S	LLTN	TTTT	NTLL	S S	1
B. <i>lin-7</i>	a1 - ^b	S S	S S	S S	S S	S S	S S	5
	a2 -	S	S S	S S	S S	S S	S S	5
<i>lin-10</i>	b1 - ^a	S S	S S	S S	S S	S S	S S	2
	b2 -	S	S S	S S	S S	S S	S S	1
C. <i>lin-15</i>	1 +	TTTT	LLON	LLTT	TTTT	NTLL	LOLL	1
	2 +	TOLL	LLTN	TTTT	TTTT	NTLL	DDLO	1
	3 +	TLLL	LLLL	LLTO	TTTT	NTLL	LLTT	1
	4 +	LLTN	TLLL	LLTN	TTTT	NTLL	LLTT	1
	5 +	OTTN	TTTT	LLLN	TTTO	NTLL	LOOO	1
D. <i>lin-15</i>	1 - ^a	OTTT	LLOT	LLON	TTTT	(NTLL) ^e		1
	2 -	TTTT	LLOL	LTOO	LTTT	LLLL	LOOL	1
	3 -	TTTO	LLDD	LLLN	LTTO	NLLL	LTTL	1
	4 -	LOLT	TTTL	LLOT	TTTT	NLLL	LTTT	1

Table 3. Vulval Cell Lineages in Double Mutants

Genotype	ac	P3.p	P4.p	P5.p	P6.p	P7.p	P8.p	#	
A. <i>lin-12(0); lin-15</i>	1	+++	LTTL	LLLL	LTTT	TTTT	TLLL	LLOO	1
	2	++++	LOOL	LLLO	TOOO	OOTT	LLLL	LOOT	1
	3	++++	DOTO	OTOL	OLL	OTOT	TTTT	LLLO	1
B. <i>lin-12(0); lin-15</i>	1	- ^a	LDTL	LLDL	LLOL	LDOL	LLLL	LTTL	1
C. <i>lin-12(d); lin-2</i>	a1	-	LLTO	LLTN	LLTN	OOLL	NTLL	LLTT	1
	a2	-	LLOT	LLTT	LLTN	TTLL	TTLL	LLTO	1
<i>lin-7; lin-12(d)</i>	b1	-	LLOT	LLON	LLTN	TTLL	NTLL	OTOL	1
	b2	-	LLOT	LLTT	LLTN	NTLL	OOLL	LLOO	1
	b3	-	LLTN	LLTT	LLTN	LLTN	NTLL	LOTT	1
<i>lin-10; lin-12(d)</i>	c1	-	LLTO	LLOO	LLTN	LLOT	NTLL	TOOL	1
	c2	-	LLTO	LLTT	LLTN	LLTT	NTLL	NOOL	1
	c3	-	LOON	LLTN	LLTN	ONOL	NTLL	TTLL	1
	c4	-	LLON	LLTN	LLTN	LLTN	NTLL	NTLL	1
	c5	-	LLTN	LLTN	LLTN	LLOT	NTLL	LLOO	1
<i>lin-12(d); lin-3</i>	d1	-	LLTT	LLTN	LLON	LLNO	DTLL	NTLL	1
D. <i>lin-12(d/0); lin-3</i>	a1	-	LLTN	LLTN	LOOO	LLTN	OOLL	LLTT	1
	a2	-	LOLO	LLTO	LLTN	TNLL	NTLL	NOLL	1
	a3	+	DLLL	LLON	LLON	LLTT	NTLL	LLOO	1
	a4	+	S	LLOO	LLTN	LLNT	NTLL	LLNT	1
	a5	+	LOLL	NOLL	LLTT	NTLL	LLTT	LLOO	1
<i>lin-7; lin-12(d/0)</i>	b1	-	LLNT	LLTN	LLTN	TNLL	NTLL	LLTN	1
	b2	+	LOLO	LLTT	LLTN	LOTN	NTLL	LOOO	1
	b3	+	LLON	LLOO	LLTN	LLOT	NTLL	LLNL	1
	b4	+	LLOO	LLOT	LLTN	NTLL	NTLL	LLTN	1
	b5	+	S LT	LLOO	LLTN	NTLL	LLOO	LLTO	1
<i>lin-10; lin-12(d/0)</i>	c1	-	LLOL	LLOO	LLTN	LLNT	NTLL	OTLL	1
	c2	+	LLOO	LLOO	LLTT	TTLL	NTLL	LLTT	1
E. <i>lin-12(0); lin-3</i>	a1	+++	S	S S	S TT	TTTT	S S	S S	1
	a2	+++	S	S S	S S	TTTT	S S	S S	1
	a3	++	S	S S	S S	TTSS	S S	S S	1
	a4	++	S	S S	S S	S TT	S S	S S	1
<i>lin-7; lin-12(0)</i>	b1	++	S	S S	S S	S S	S S	S S	2
	b2	+++	S	S S	S S	S S	S S	S S	1
	b3	++	S S	S S	S S	S S	S S	S S	1
	b4	+++	S S	S S	S S	TTTT	S S	S S	1
	b5	++	S S	S S	S S	OTTT	S S	S S	1
<i>lin-10; lin-12(0)</i>	c1	++	S	S TO	OTOO	S S	S S	S S	1
	c2	++	S	S S	S ??	S OO	S S	S S	1
	c3	++	S S	S S	S O?	S S	S S	S S	1
	c4	++	S	S S	S S	TT??	S S	S S	1
	c5	++	S	S S	S S	S S	S S	S S	2
	c6	++	S S	S S	S S	S S	S S	S S	1
<i>lin-12(0); lin-2</i>	d1	++	S	S OT	TTTT	TTTT	NTLL	S S	1
	d2	+++	S S	S S	S OO	S TT	TT S	S S	1
	d3	++	S	LT TT	TTTT	TTDT	DD S	S S	1
	d4	++	S	S OT	TTTT	TTTT	S S	S S	1
	d5	++	S	S S	S T?	TTTT	?? S	S S	1
	d6	++	S S	S S	????	????	S S	S S	1
F. <i>lin-12(d); lin-15</i>	1	-	LLTN	LLTN	OTTT	LTTO	OOLL	LTTT	1
	2	-	LLTN	LLON	OOTO	OTTT	TTLL	LNTO	1
	3	-	OLON	LLTN	LLON	TTTT	OOLL	TTTT	1

(continued)

Table 3. Continued

Genotype	ac	P3.p	P4.p	P5.p	P6.p	P7.p	P8.p	#	
	4	-	LLTN	LLTN	LLON	TTTL	TTTO	NOLL	1
	5	-	OTDT	LLTN	LLON	TTTT	NOLD	TTTT	1
	6	-	LOTN	LLTN	LLOO	LLTO	NTLL	LLTT	1
G. <i>lin-12(d/0); lin-15</i>	1	-	LLTT	LTOT	LLTO	OOTO	LOLL	LTOO	1
	2	-	OOOT	LLLN	LLOO	TTTT	TLLL	LTOL	1
H. <i>lin-12(d/0); lin-15</i>	1	+	LLL?	TTTO	LLLT	TTTT	TOLL	LLTL	1
	2	+	LOTT	LTFO	OLTL	TTTL	OOLL	LTTT	1

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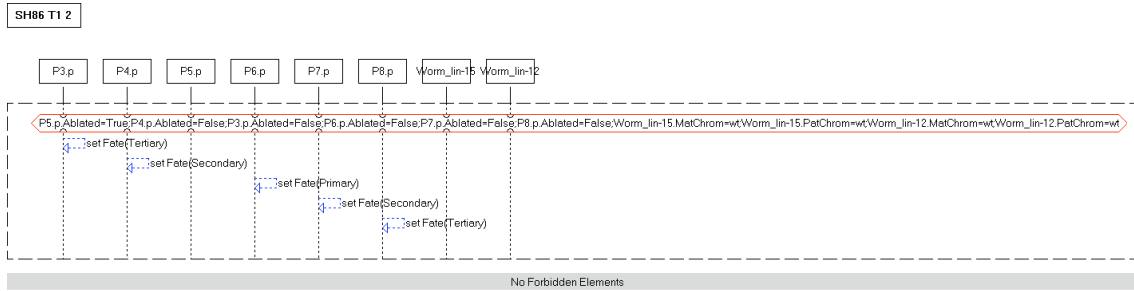
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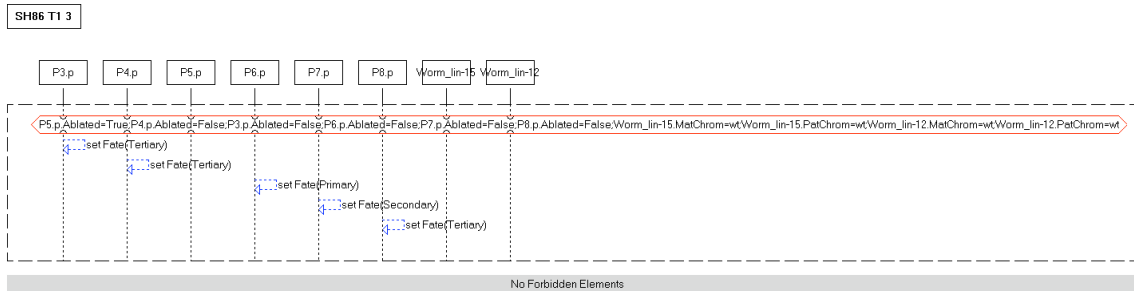
Use Case: SH86 EXP

Scenarios:

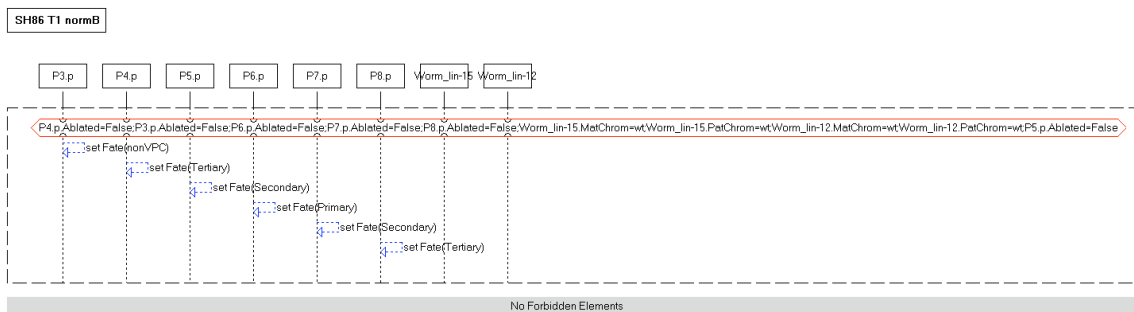
LSC: SH86 T1 2



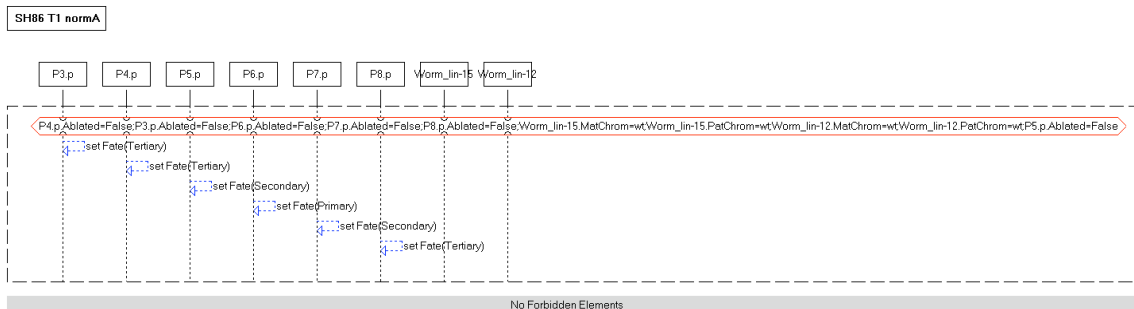
LSC: SH86 T1 3



LSC: SH86 T1 normB

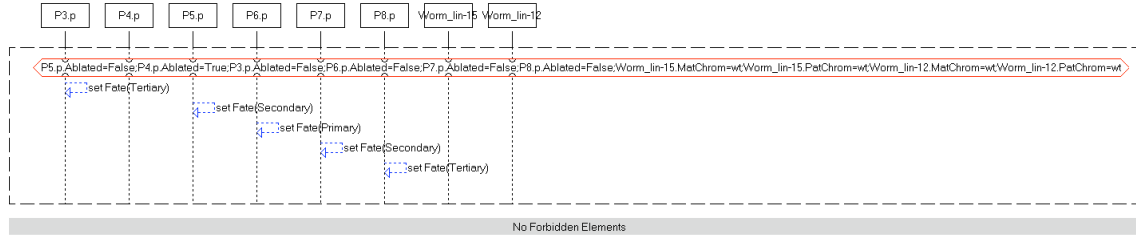


LSC: SH86 T1 normA



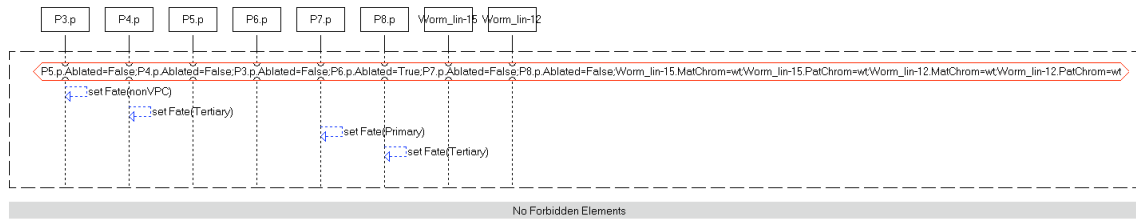
LSC: SH86 T1 1

SH86 T1 1



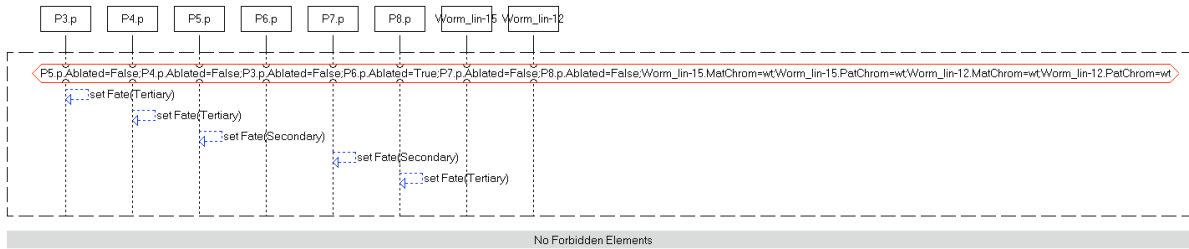
LSC: SH86 T1 4

SH86 T1 4



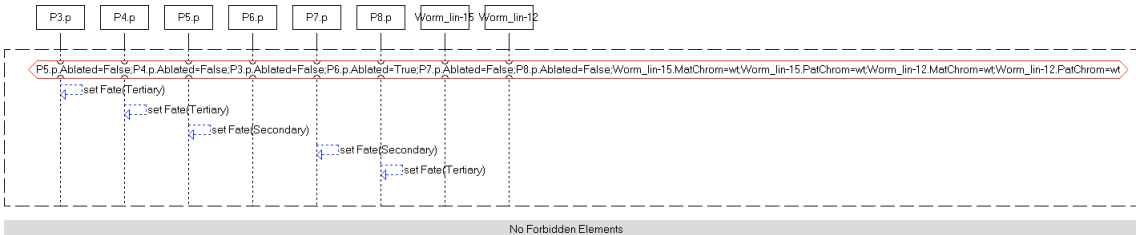
LSC: SH86 T1 5

SH86 T1 5



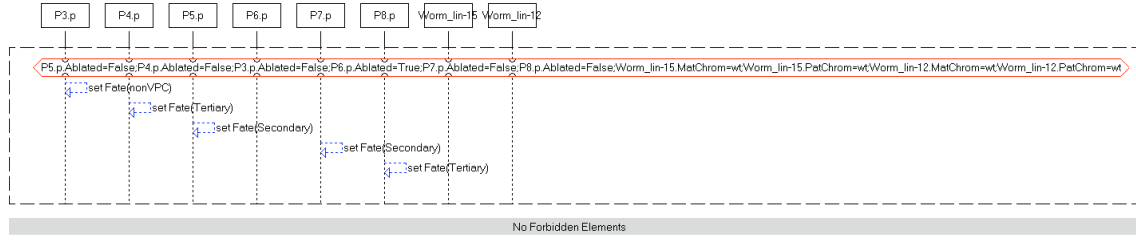
LSC: SH86 T1 6

SH86 T1 6



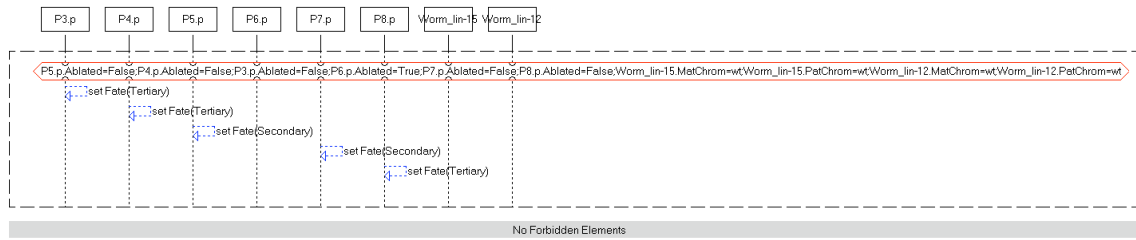
LSC: SH86 T1 7

SH86 T1 7



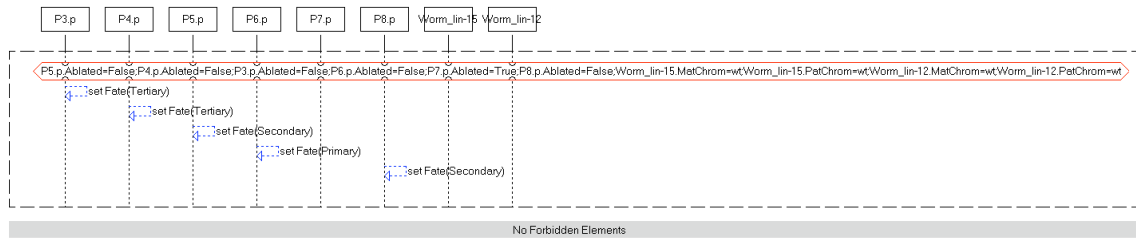
LSC: SH86 T1 8

SH86 T1 8



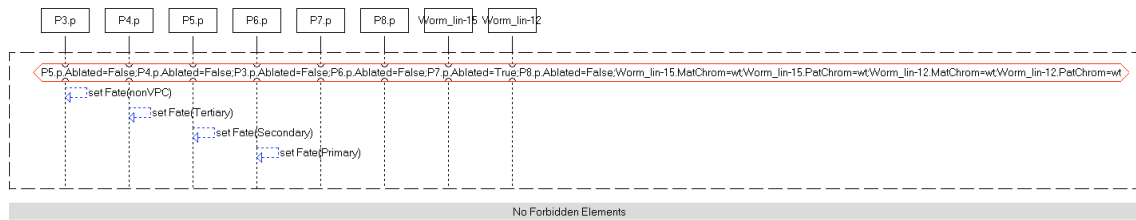
LSC: SH86 T1 9

SH86 T1 9

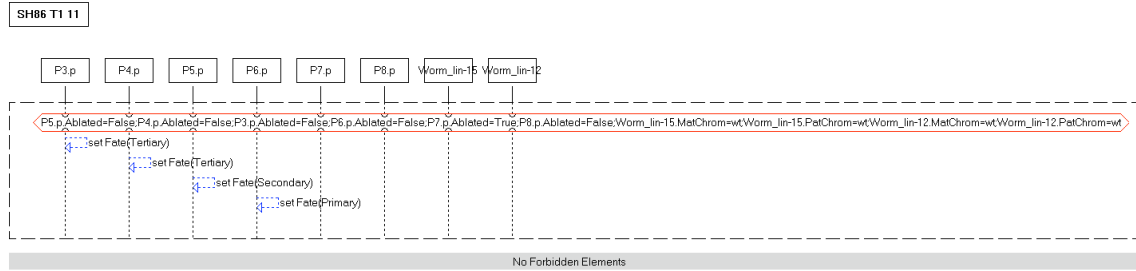


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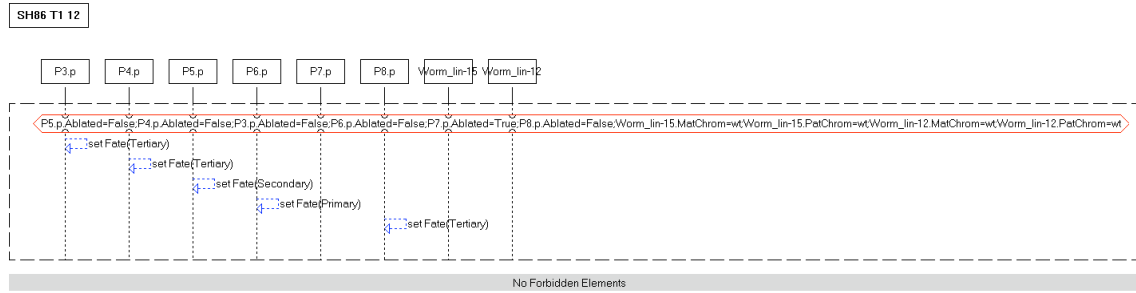
SH86 T1 10



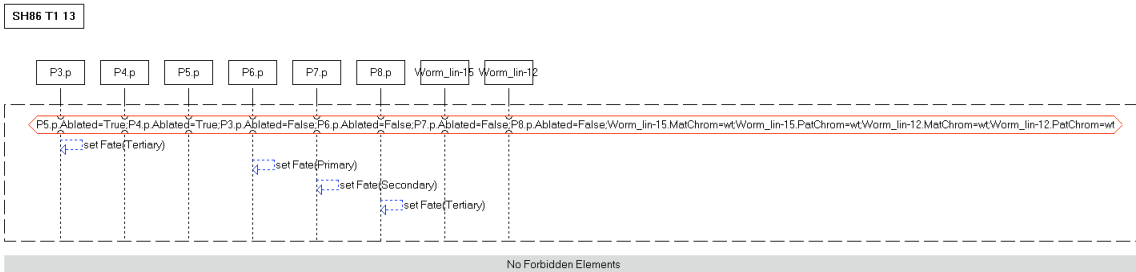
LSC: SH86 T1 11



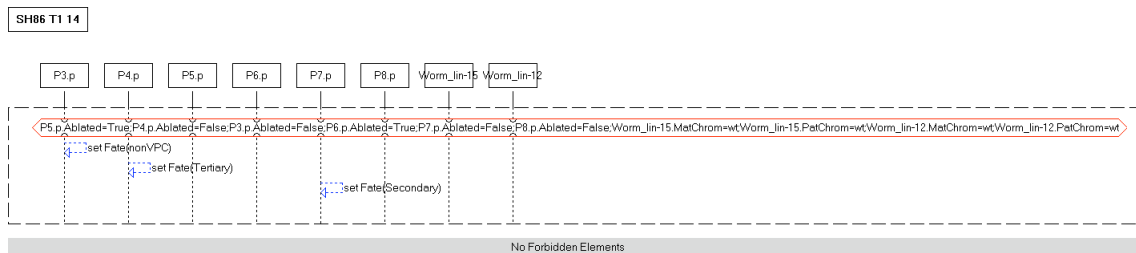
LSC: SH86 T1 12



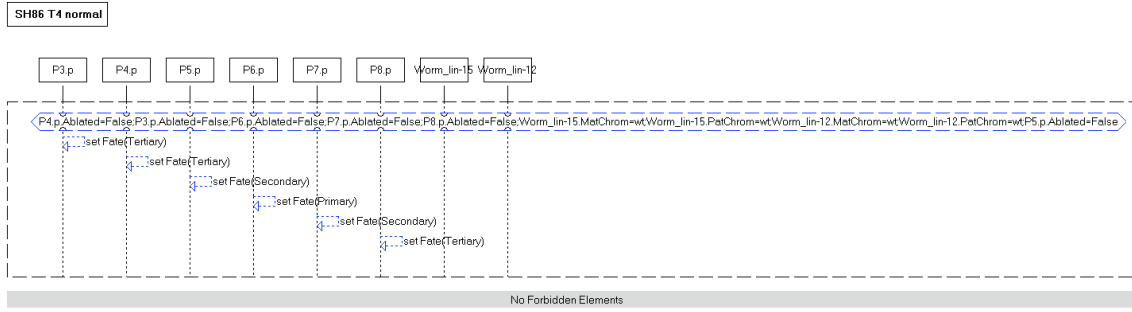
LSC: SH86 T1 13



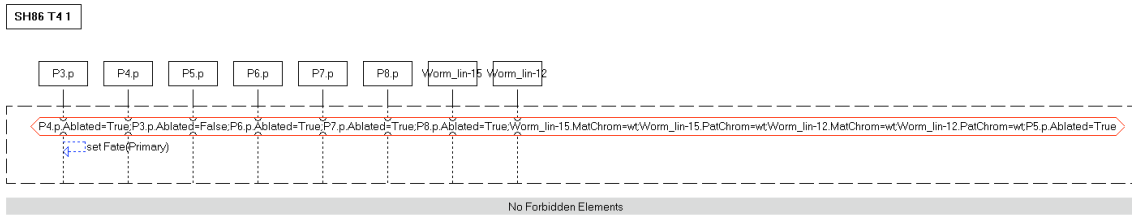
LSC: SH86 T1 14



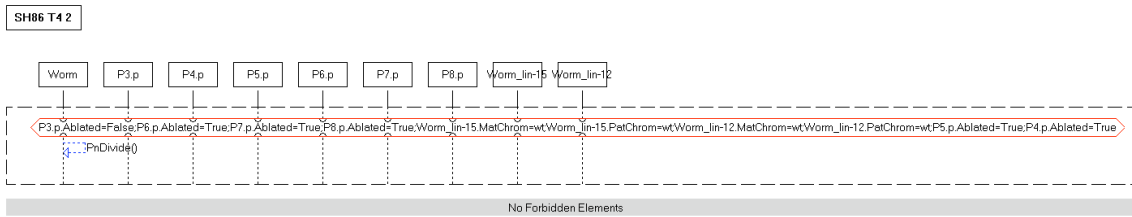
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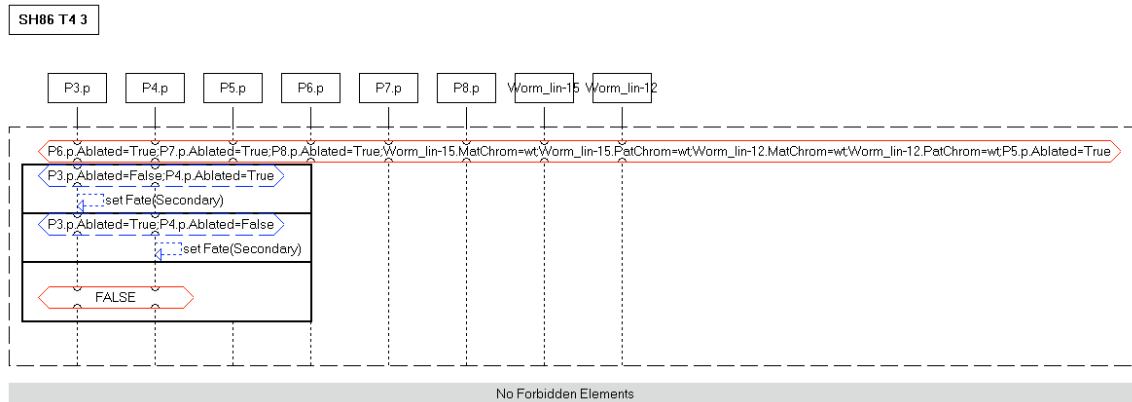
LSC: SH86 T4 1



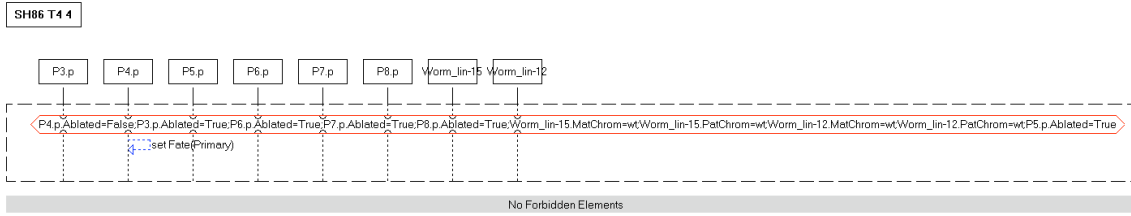
LSC: SH86 T4 2



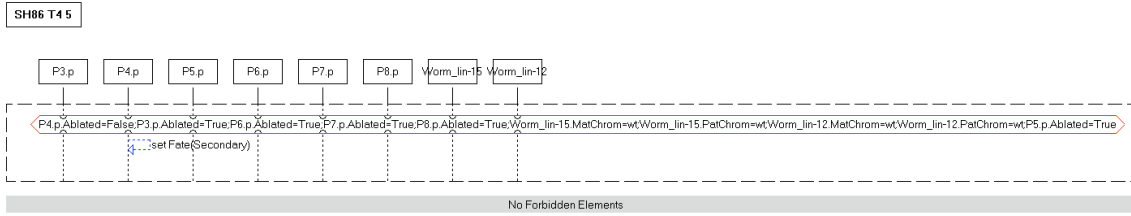
LSC: SH86 T4 3



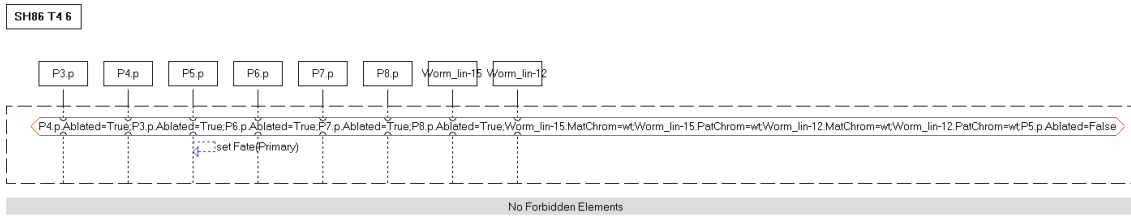
LSC: SH86 T4 4



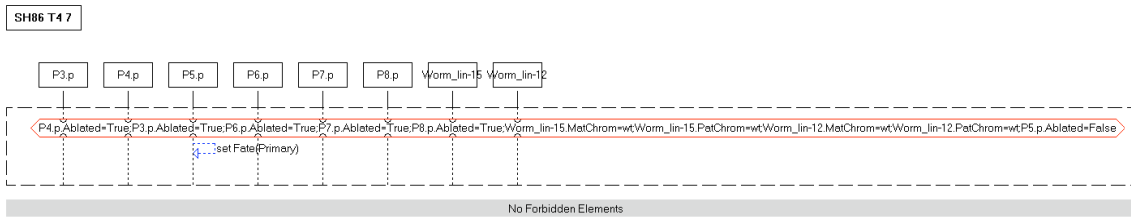
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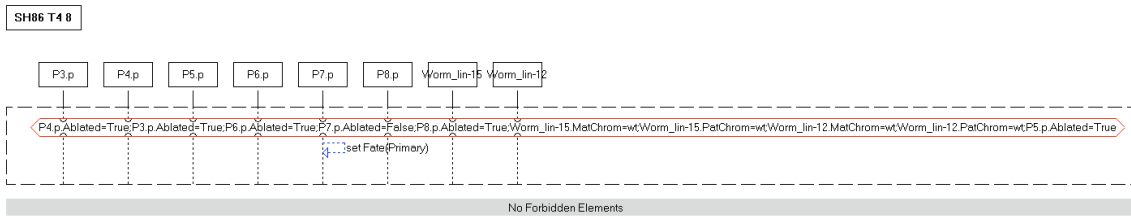
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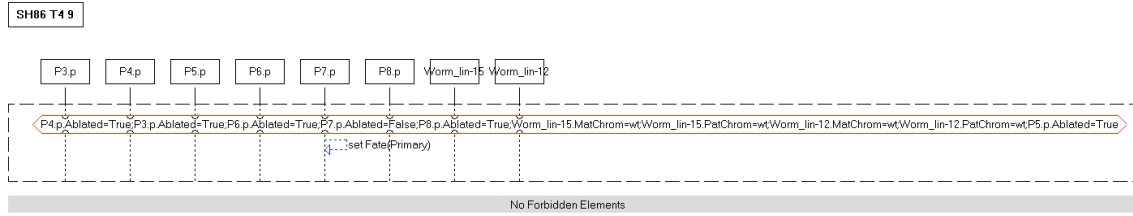
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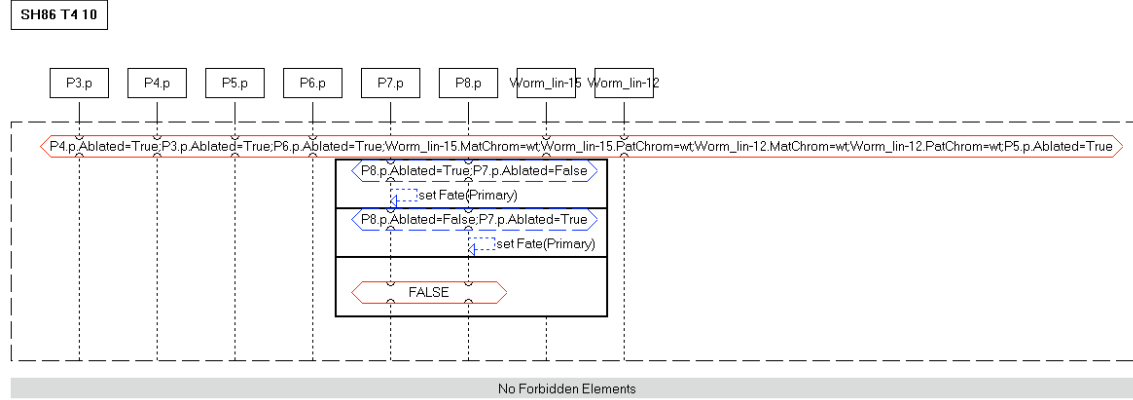
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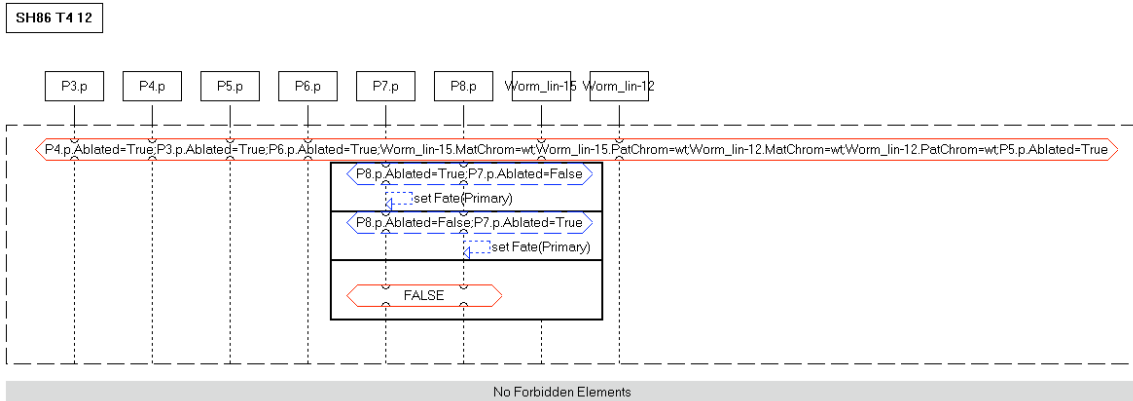
LSC: SH86 T4 9



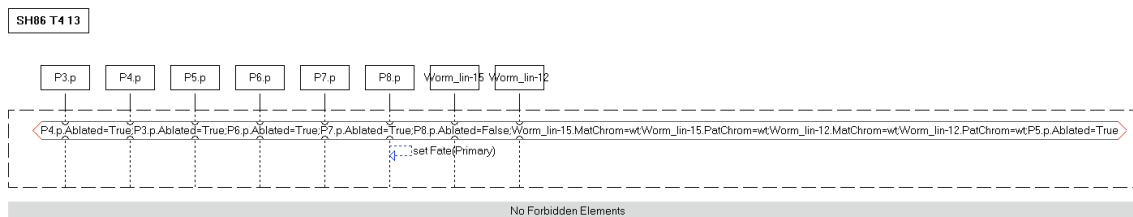
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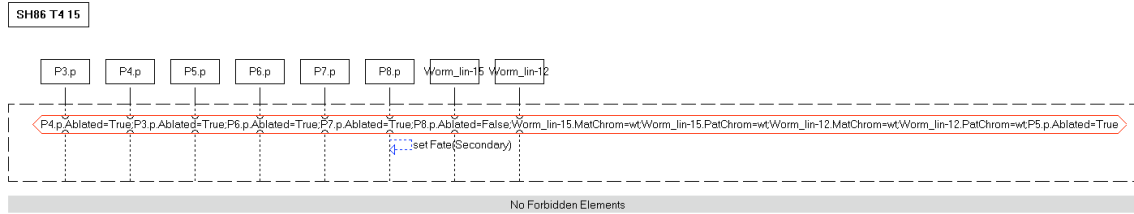
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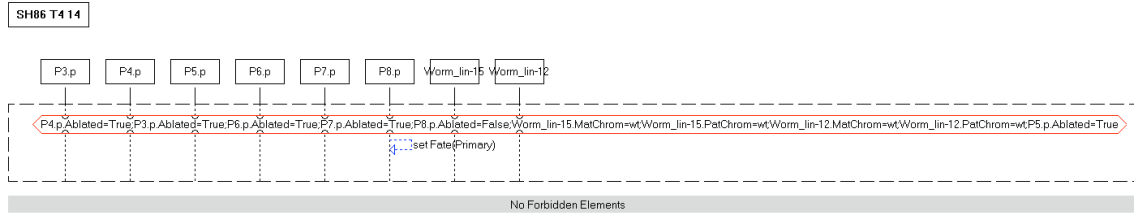
LSC: SH86 T4 13



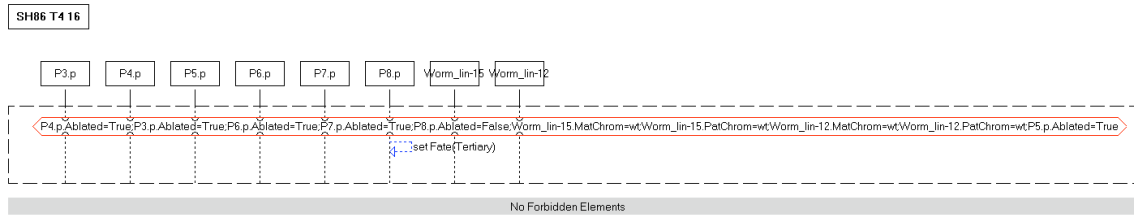
LSC: SH86 T4 15



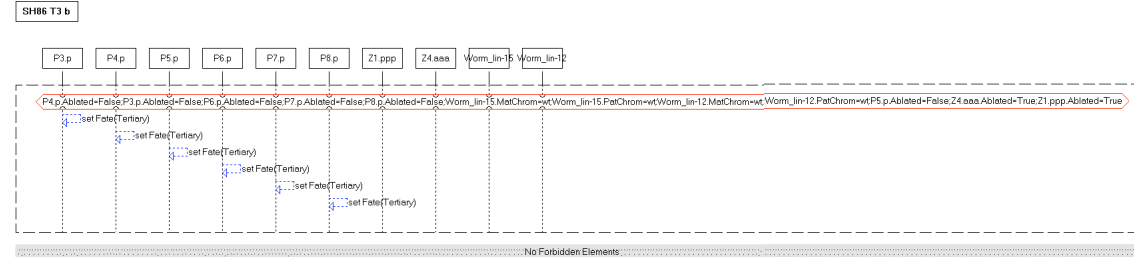
LSC: SH86 T4 14



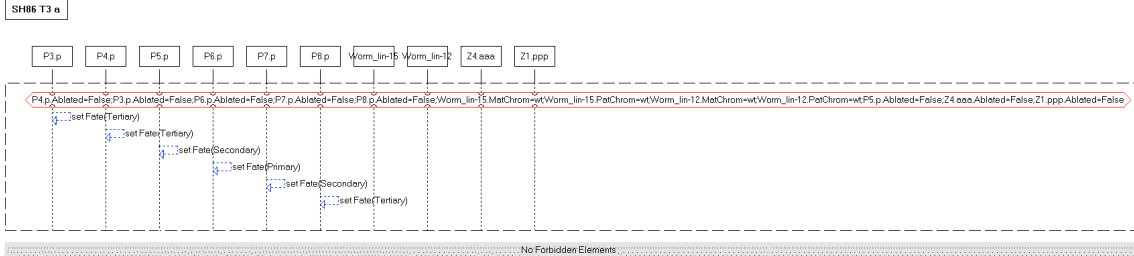
LSC: SH86 T4 16



LSC: SH86 T3 b

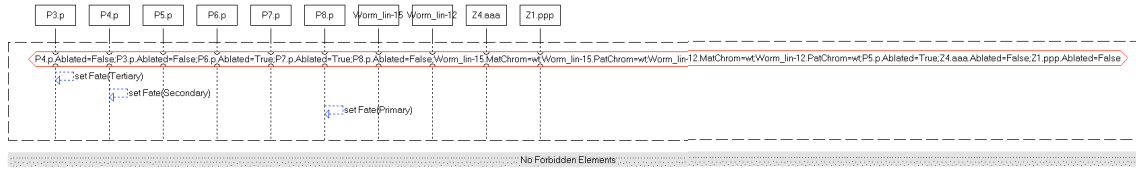


LSC: SH86 T3 a



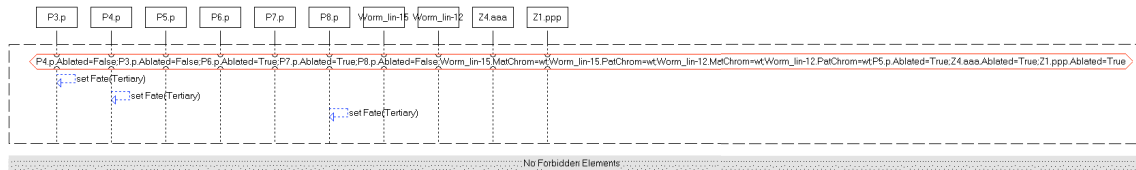
LSC: SH86 T3 c 1

SH86 T3 c 1



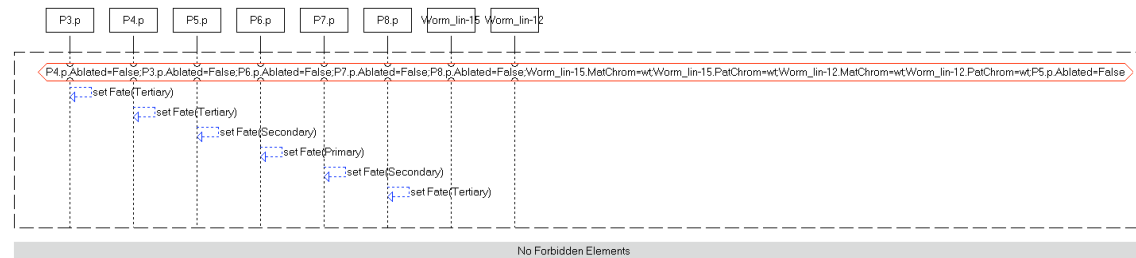
LSC: SH86 T3 d

SH86 T3 d



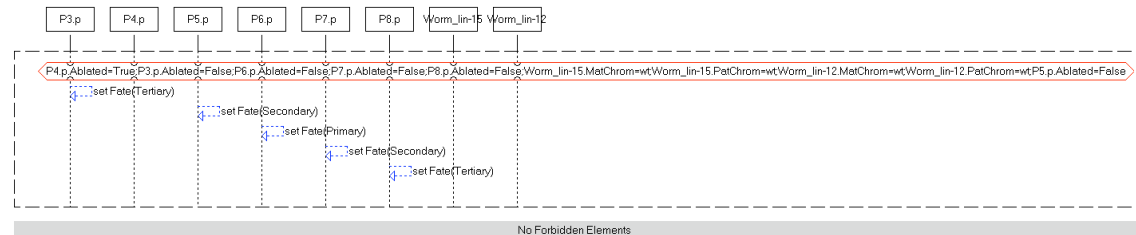
LSC: SH86 T5 1

SH86 T5 1



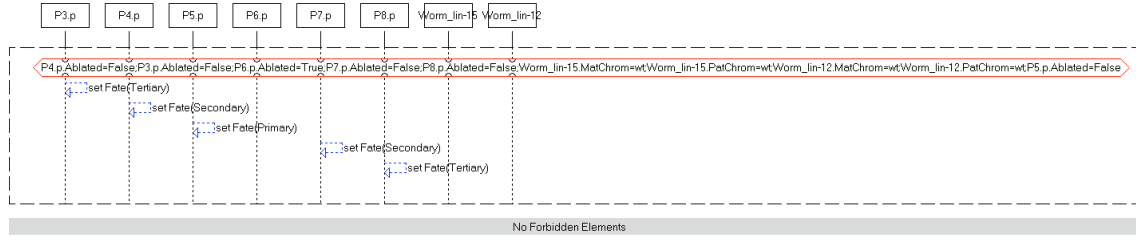
LSC: SH86 T5 2

SH86 T5 2



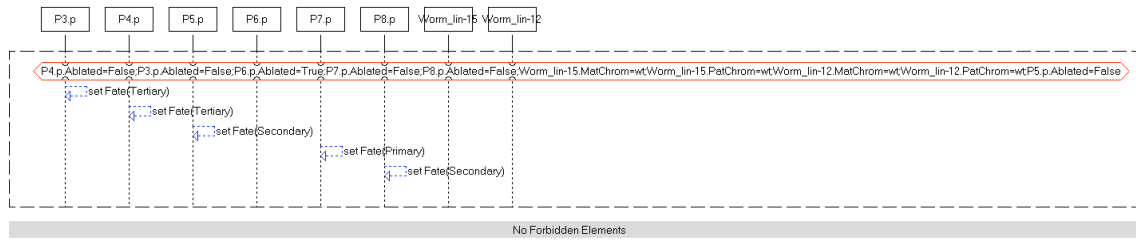
LSC: SH86 T5 3

SH86 T5 3



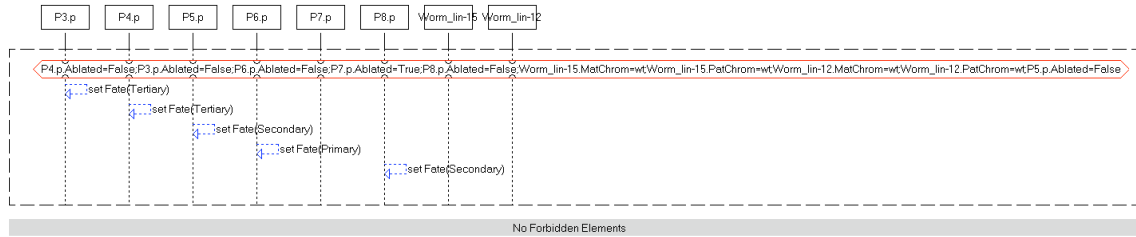
LSC: SH86 T5 4

SH86 T5 4



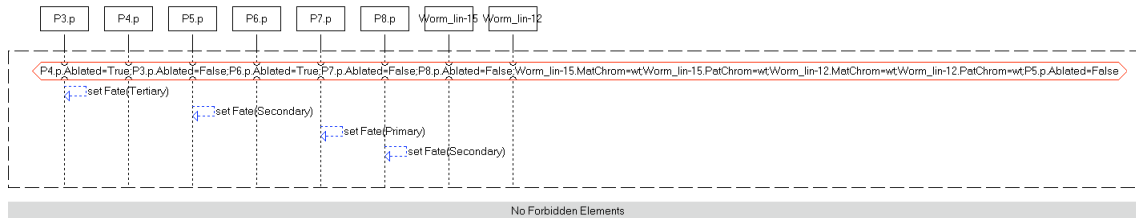
LSC: SH86 T5 5

SH86 T5 5



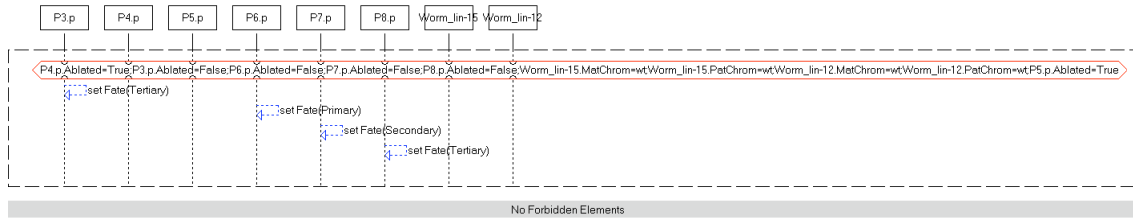
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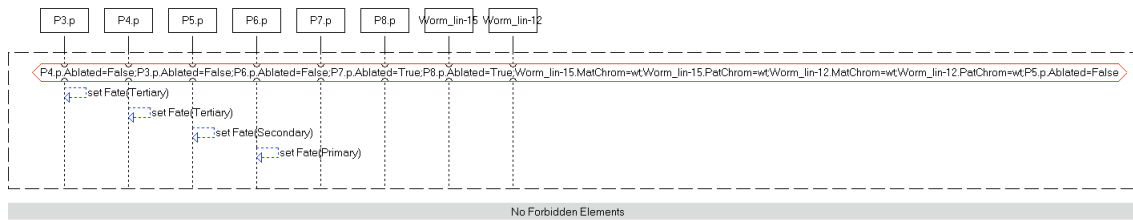
LSC: SH86 T5 7

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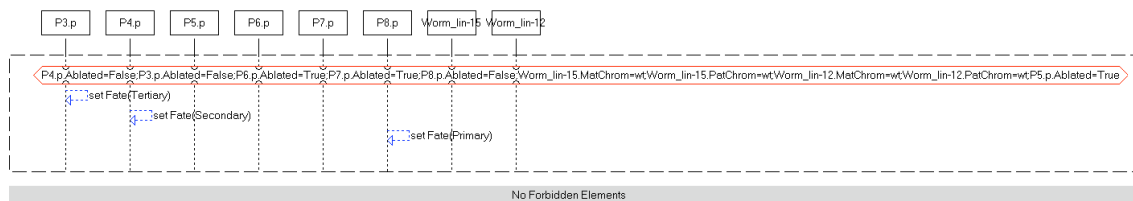
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SH86 T5 8



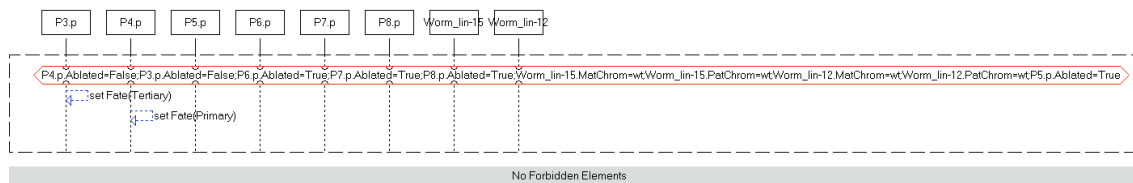
LSC: SH86 T5 9

SH86 T5 9



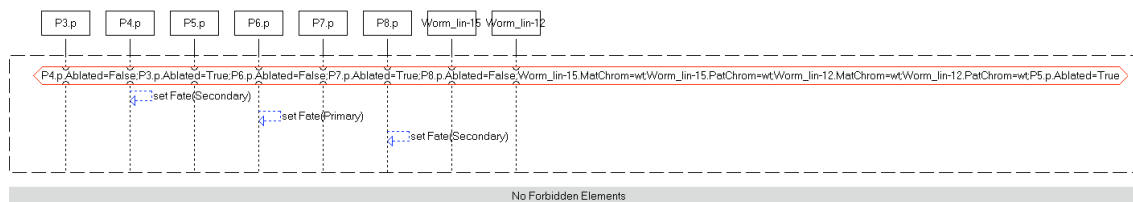
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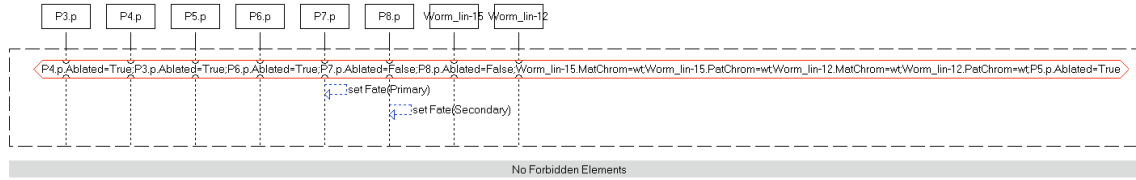
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SH86 T5 11



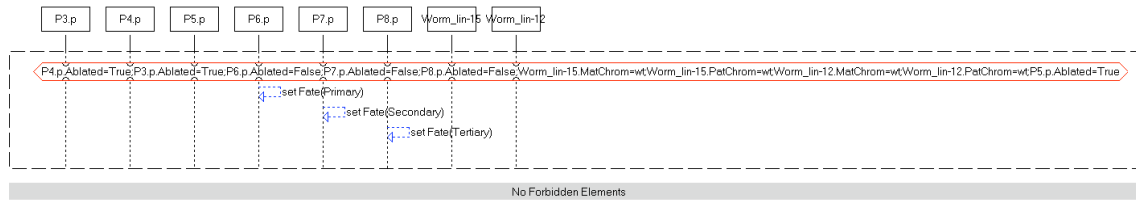
LSC: SH86 T5 13

SH86 T5 13



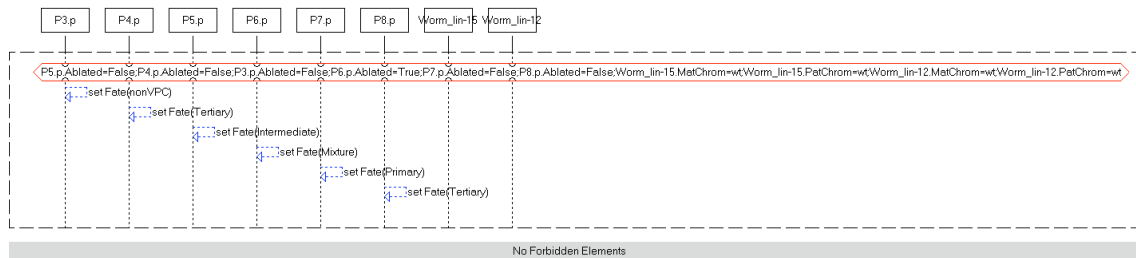
LSC: SH86 T5 10

SH86 T5 10



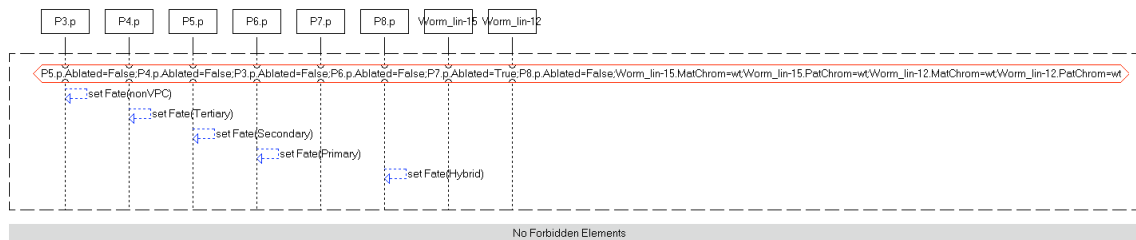
LSC: SH86 T1 4 mix

SH86 T1 4 mix

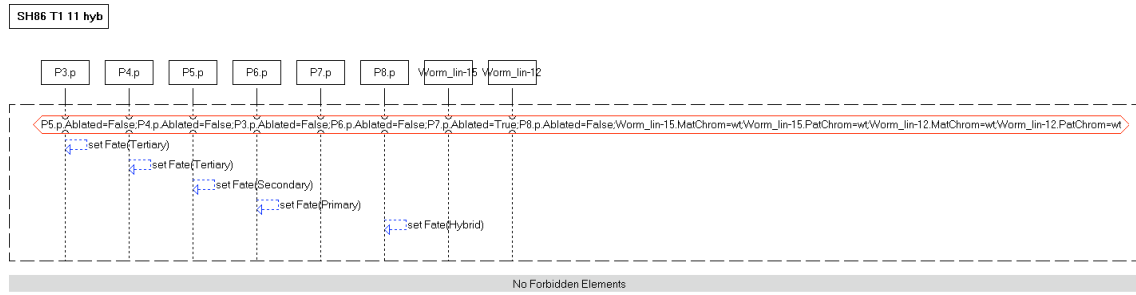


LSC: SH86 T1 10 mix

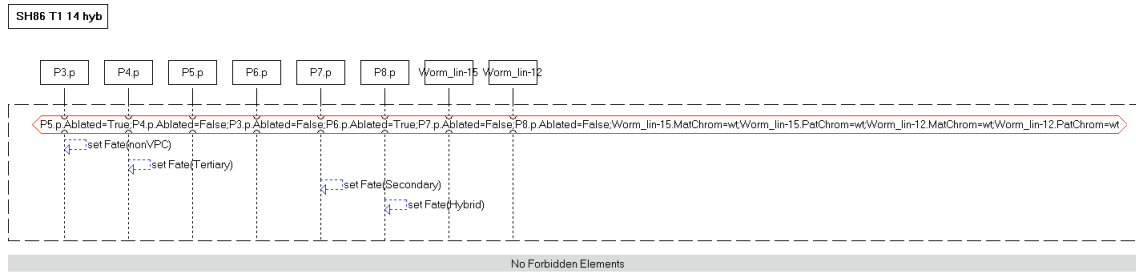
SH86 T1 10 mix



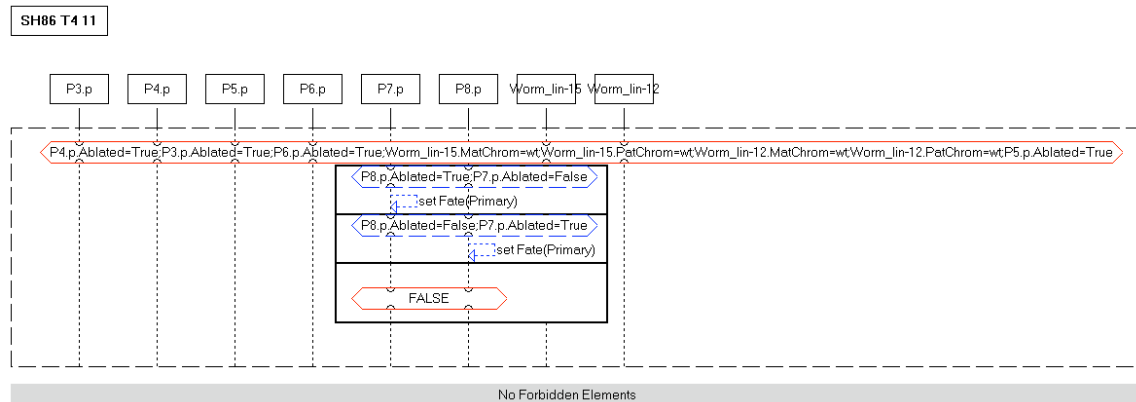
LSC: SH86 T1 11 hyb



LSC: SH86 T1 14 hyb



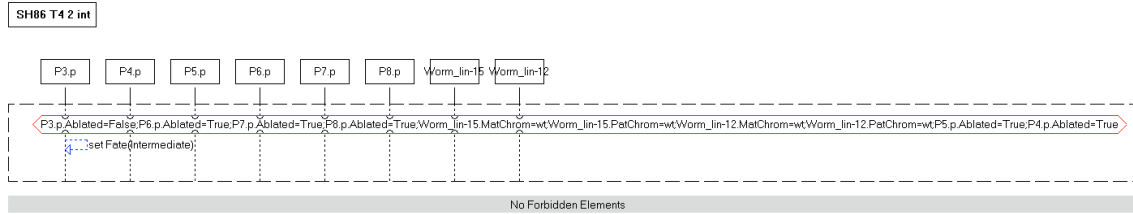
LSC: SH86 T4 11



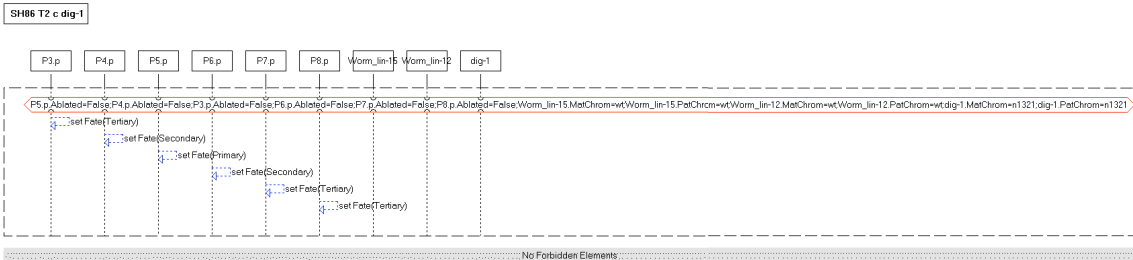
LSC: SH86 T3 c



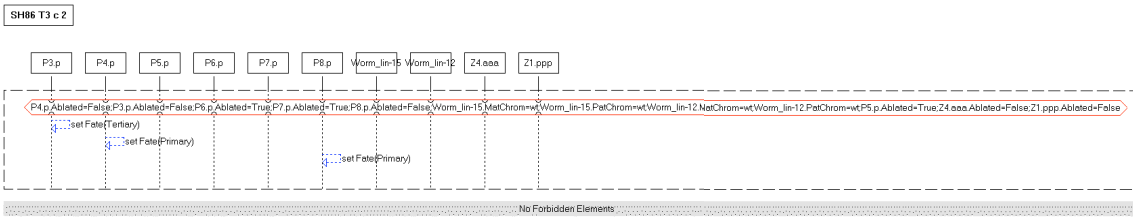
LSC: SH86 T4 2 int



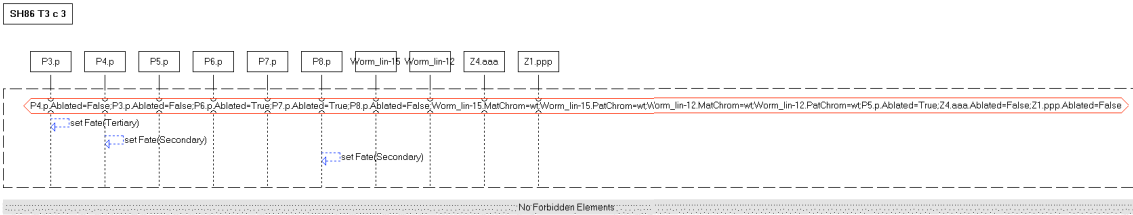
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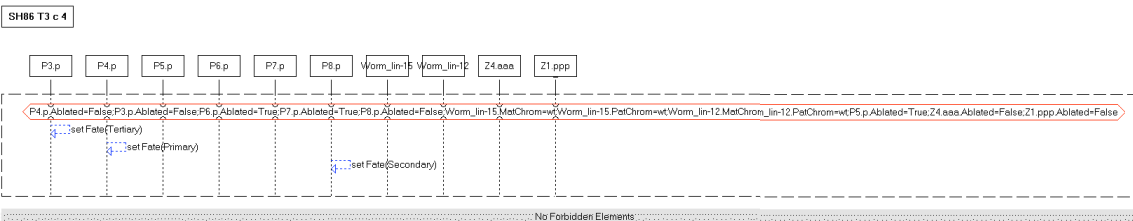
LSC: SH86 T3 c 2



LSC: SH86 T3 c 3

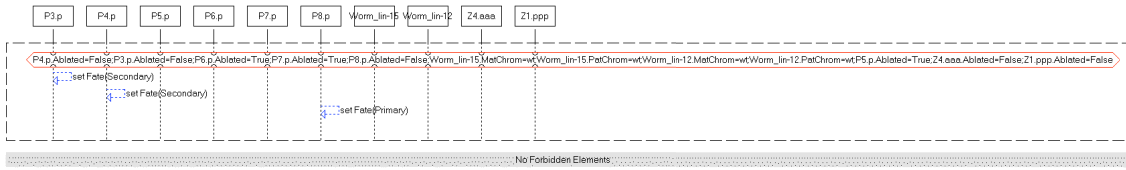


LSC: SH86 T3 c 4



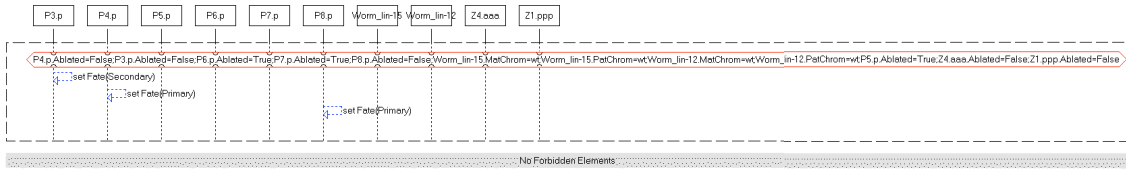
LSC: SH86 T3 c 5

SH86 T3 c 5



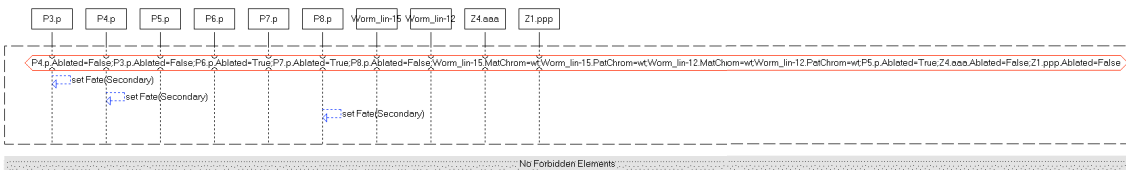
LSC: SH86 T3 c 6

SH86 T3 c 6



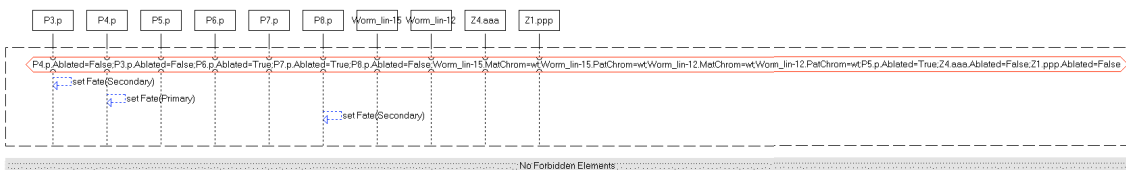
LSC: SH86 T3 c 7

SH86 T3 c 7



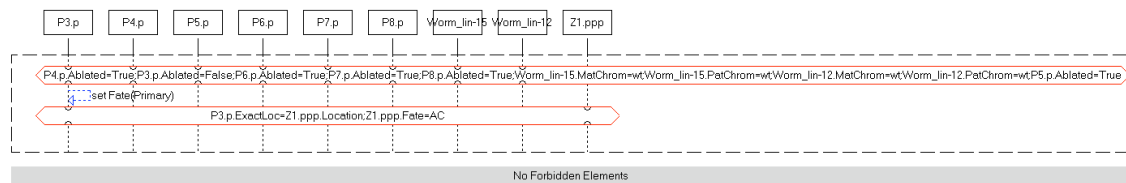
LSC: SH86 T3 c 8

SH86 T3 c 8

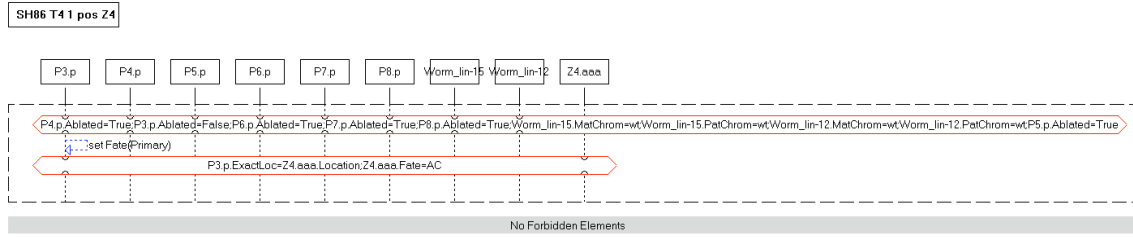


LSC: SH86 T4 1 pos Z1

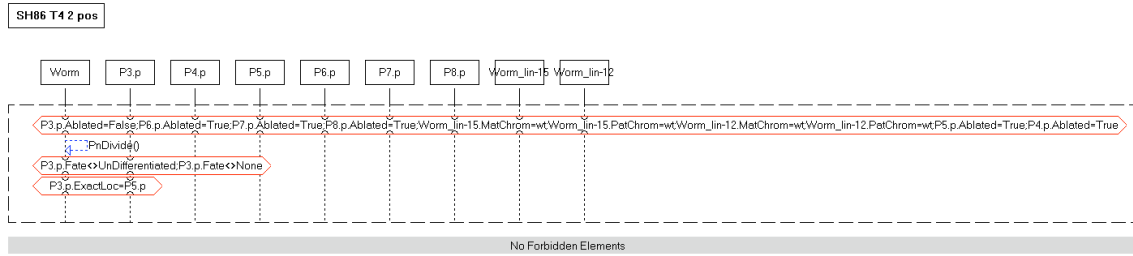
SH86 T4 1 pos Z1



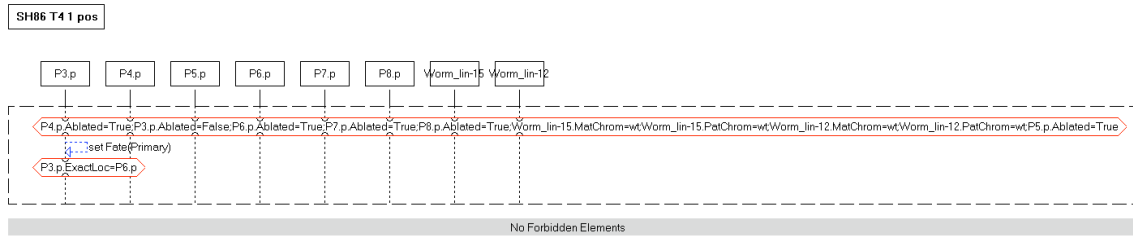
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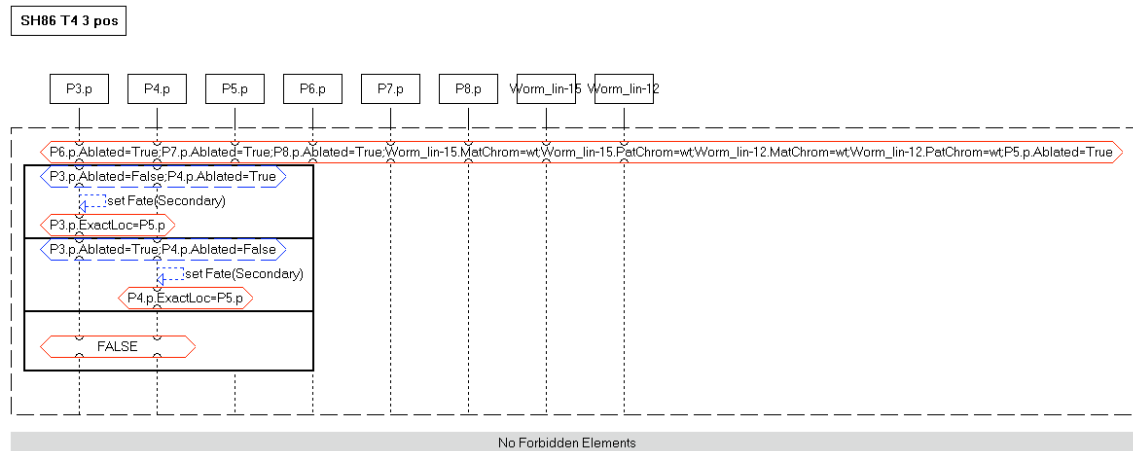
LSC: SH86 T4 2 pos



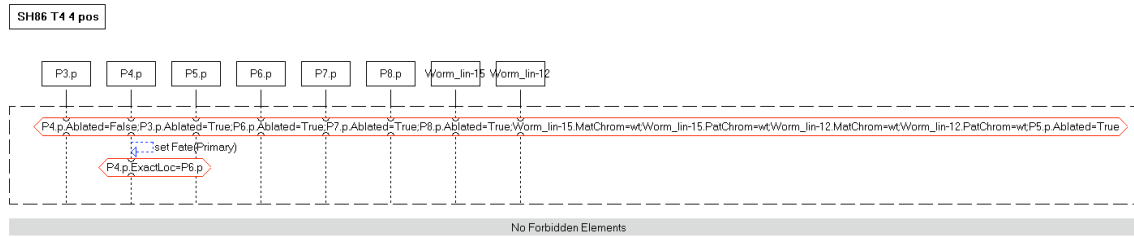
LSC: SH86 T4 1 pos



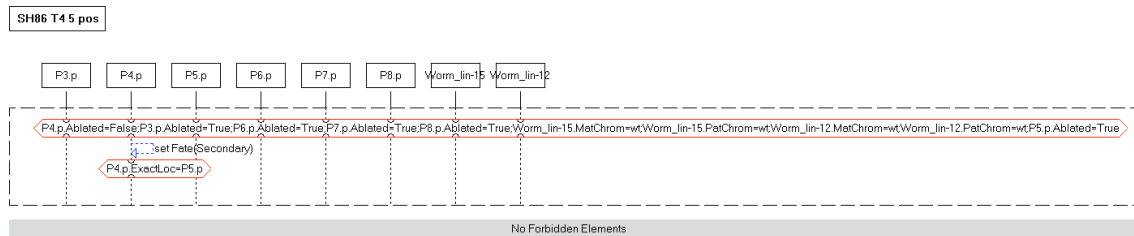
LSC: SH86 T4 3 pos



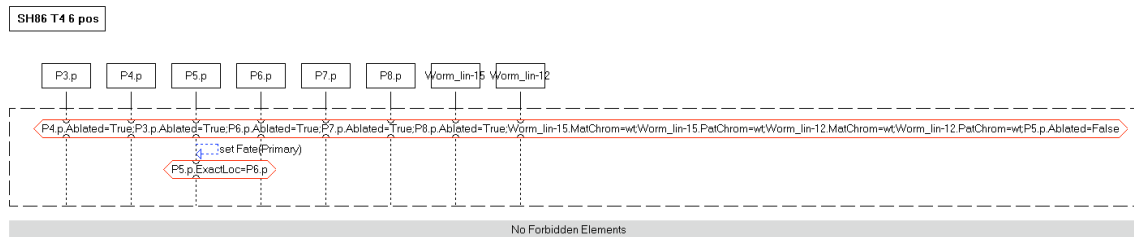
LSC: SH86 T4 4 pos



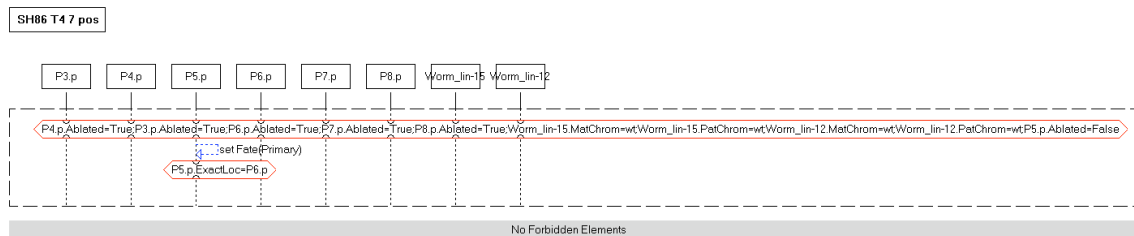
LSC: SH86 T4 5 pos



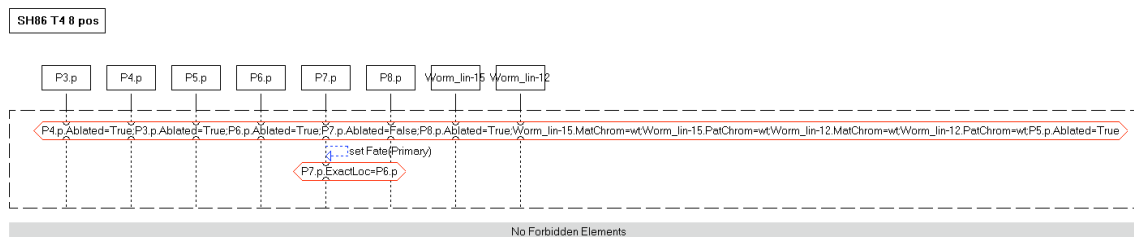
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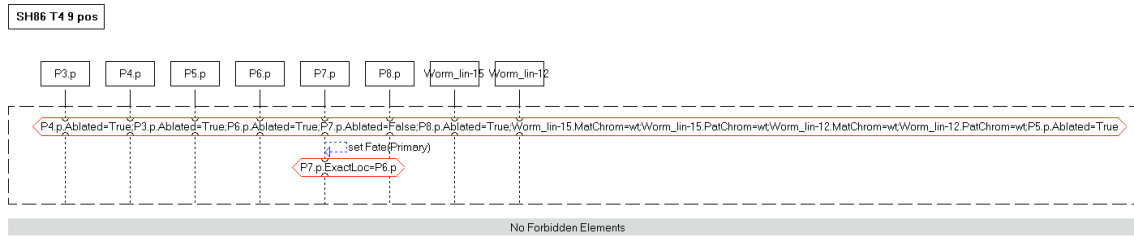
LSC: SH86 T4 7 pos



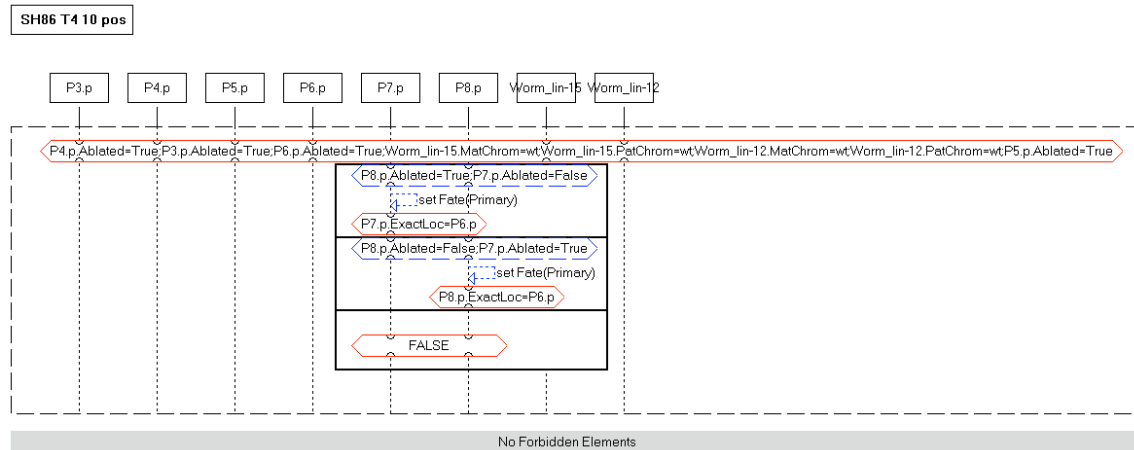
LSC: SH86 T4 8 pos



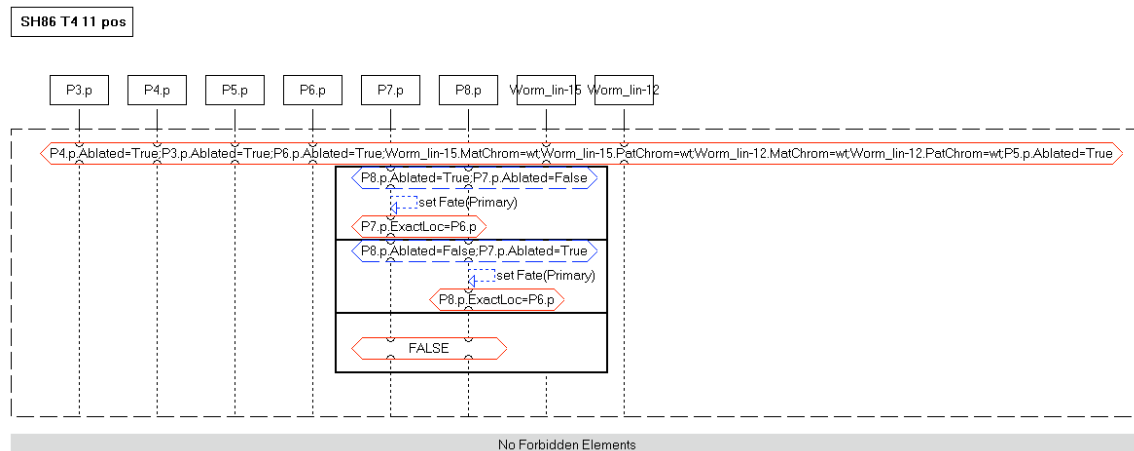
LSC: SH86 T4 9 pos



LSC: SH86 T4 10 pos

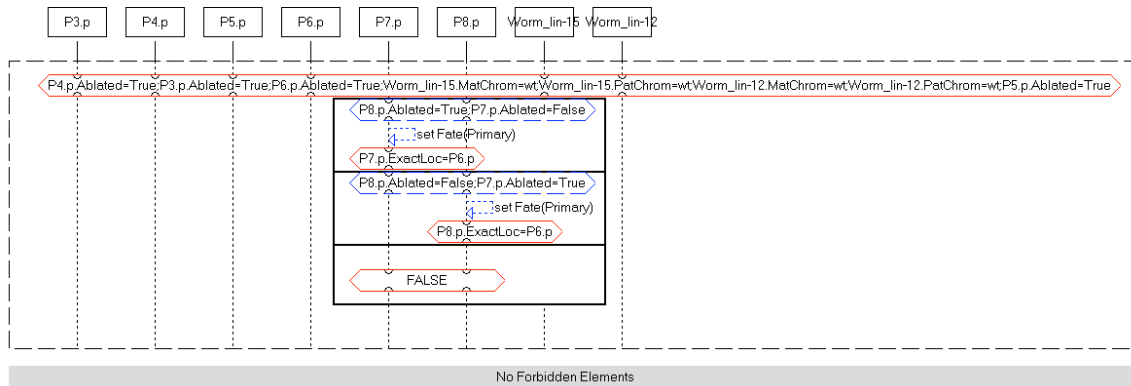


LSC: SH86 T4 11 pos



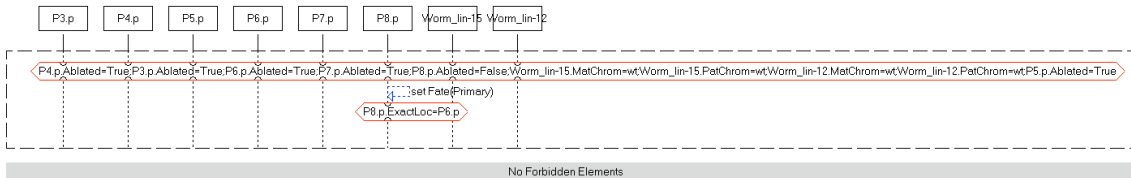
LSC: SH86 T4 12 pos

SH86 T4 12 pos



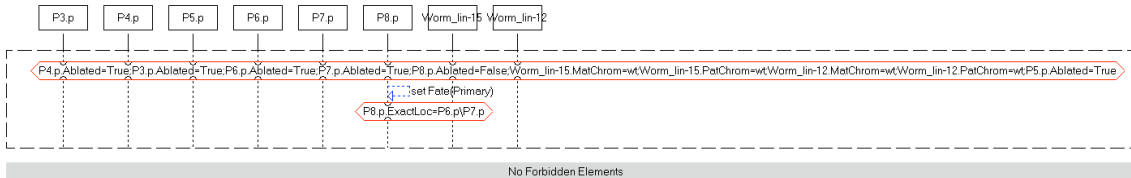
LSC: SH86 T4 13 pos

SH86 T4 13 pos



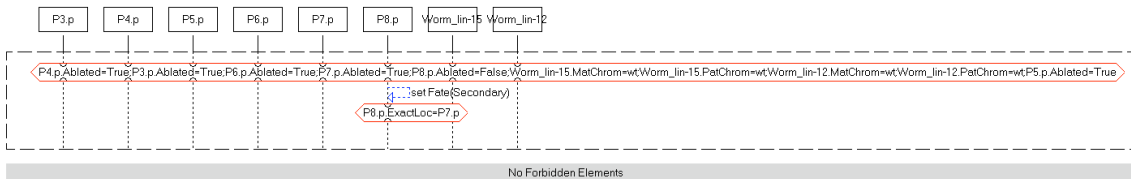
LSC: SH86 T4 14 pos

SH86 T4 14 pos

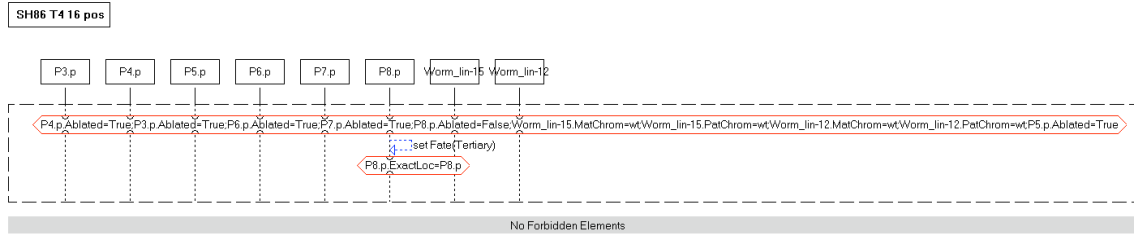


LSC: SH86 T4 15 pos

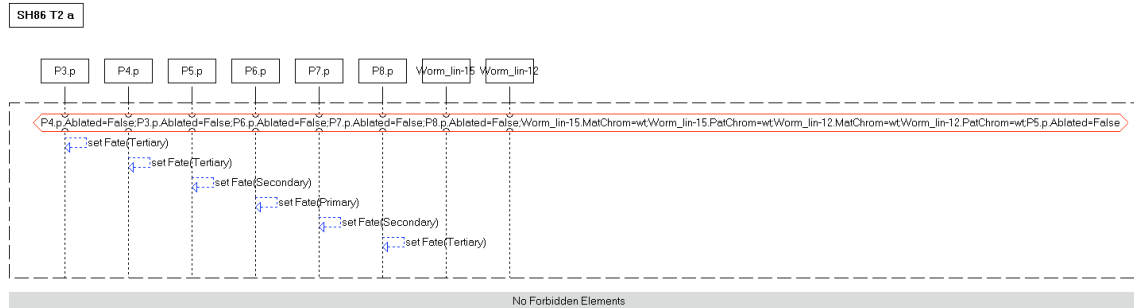
SH86 T4 15 pos



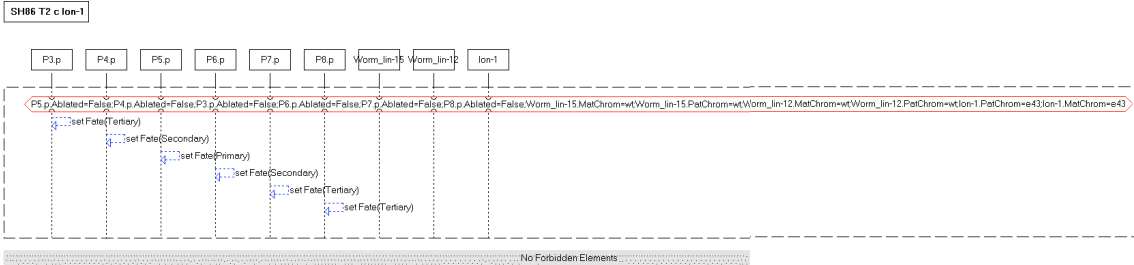
LSC: SH86 T4 16 pos



LSC: SH86 T2 a



LSC: SH86 T2 c Ion-1

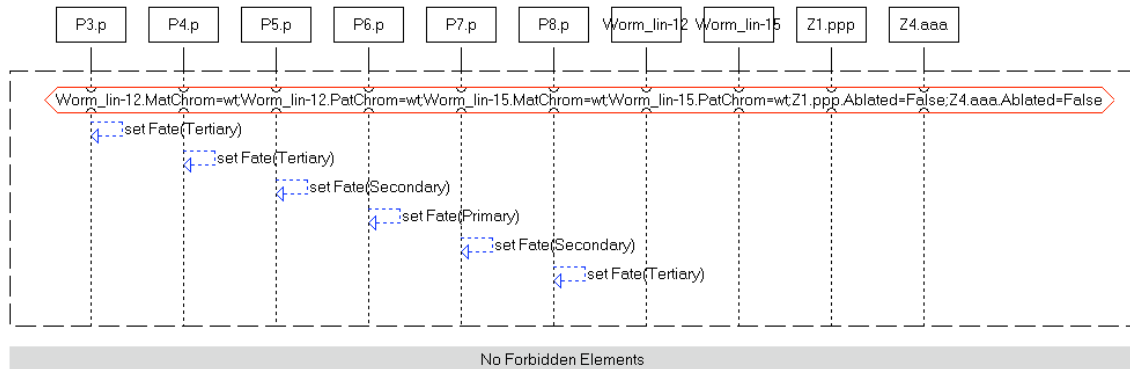


Use Case: SH89 EXP

Scenarios:

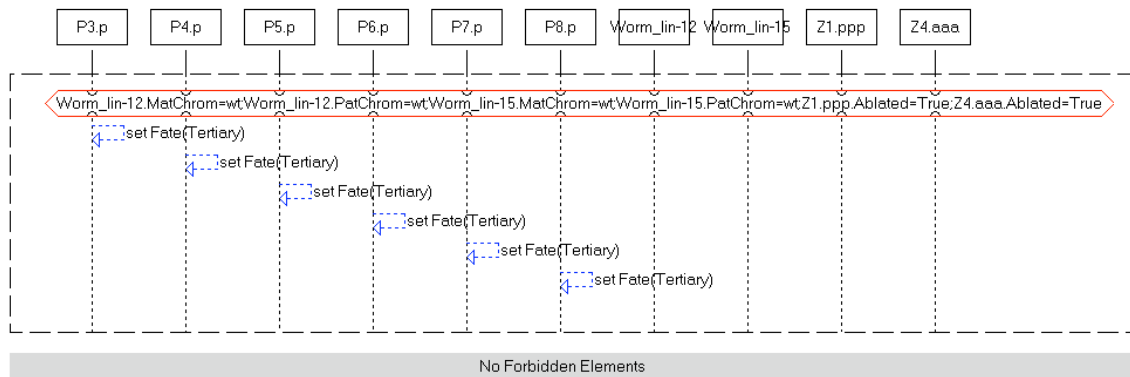
LSC: SH89 T1A

SH89 T1A



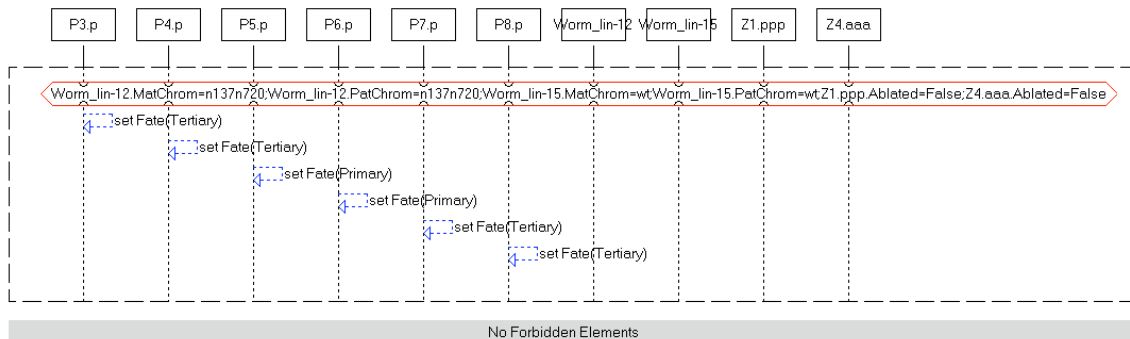
LSC: SH89 T1B

SH89 T1B



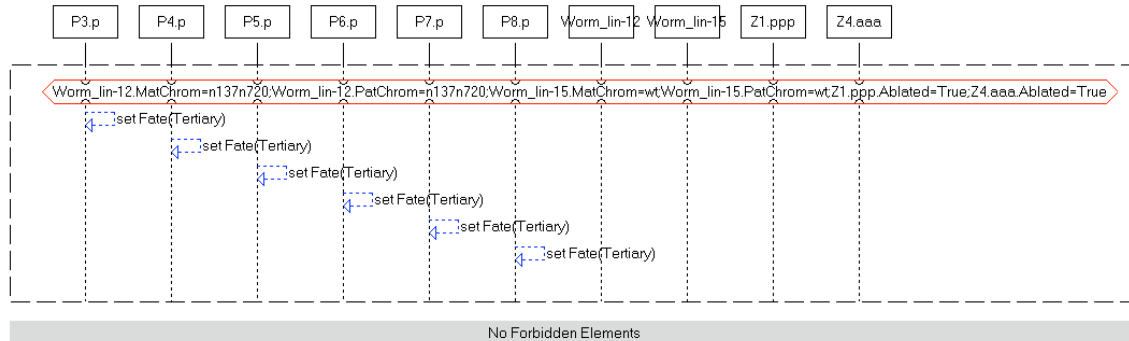
LSC: SH89 T1C 1

SH89 T1C 1



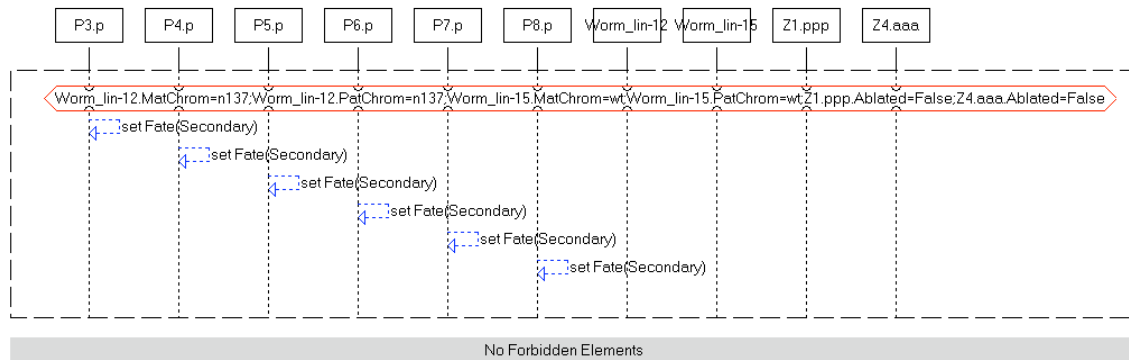
LSC: SH89 T1D

SH89 T1D



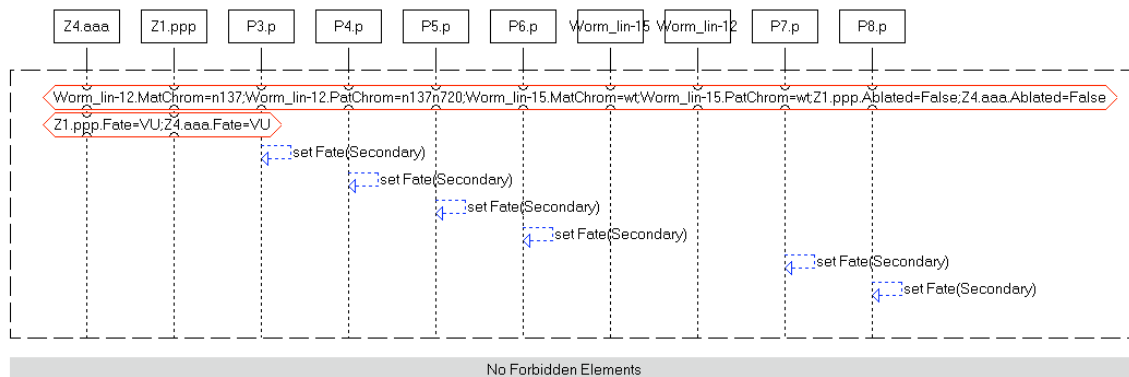
LSC: SH89 T1E 1-8, 10

SH89 T1E 1-8, 10



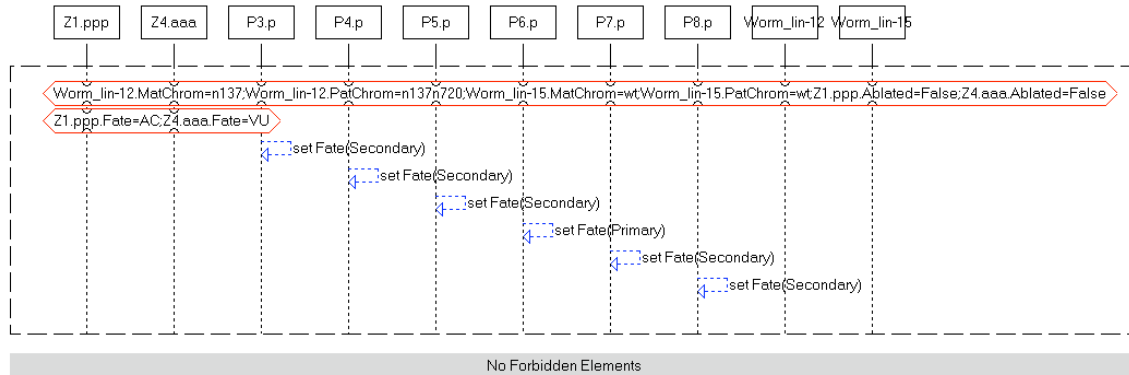
LSC: SH89 T1F 1,2

SH89 T1F 1,2



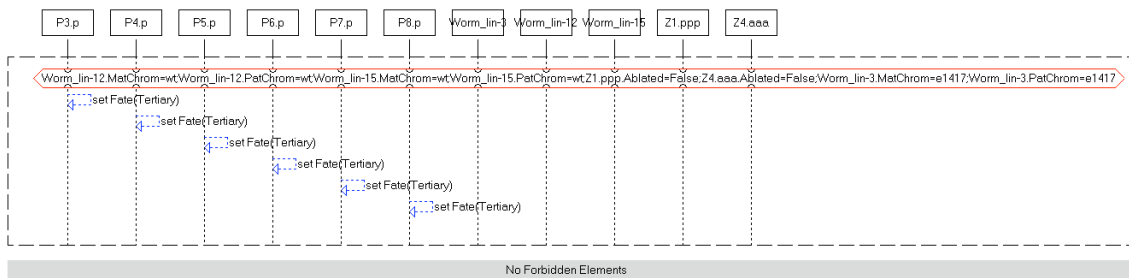
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SH89 T1F 3,4,6,7 Z1



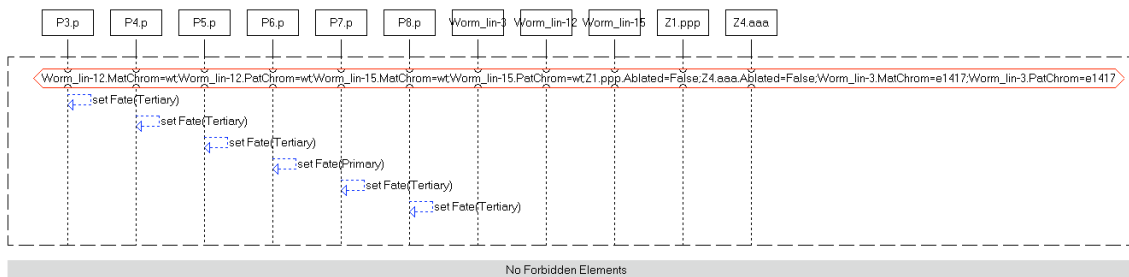
LSC: SH89 T2A a1

SH89 T2A a1



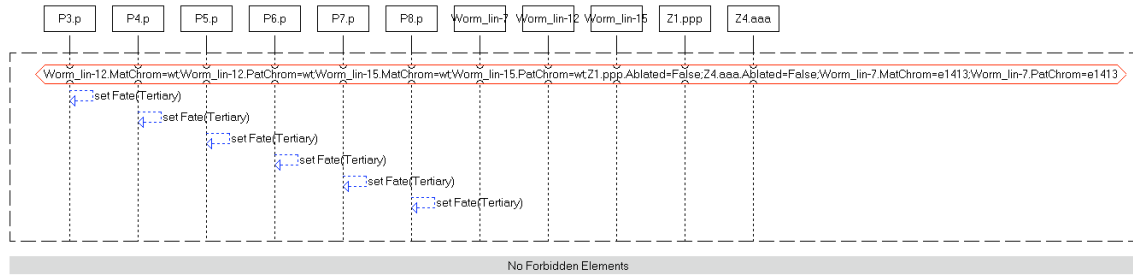
LSC: SH89 T2A a3

SH89 T2A a3



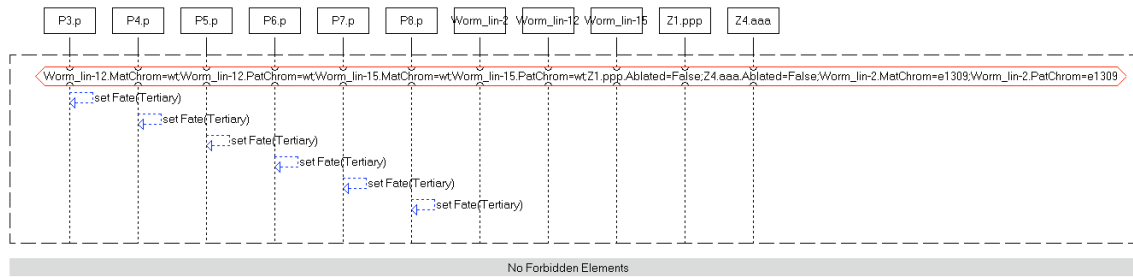
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SH89 T2A b1



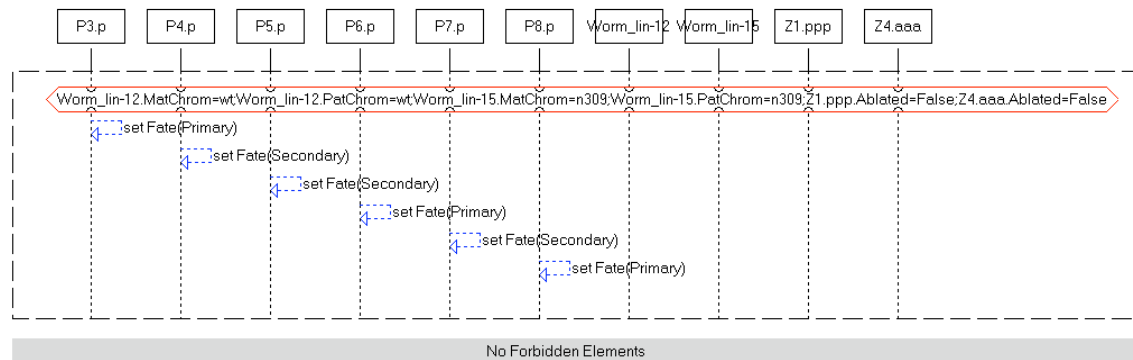
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SH89 T2A c1



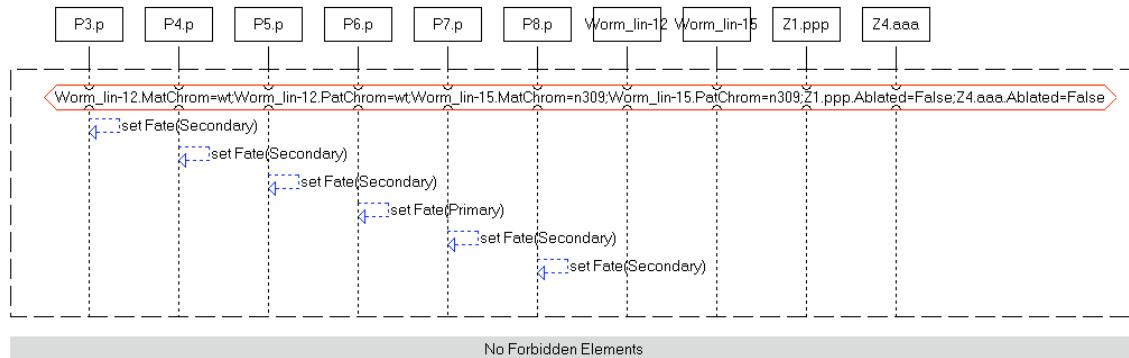
LSC: SH89 T2C 1

SH89 T2C 1



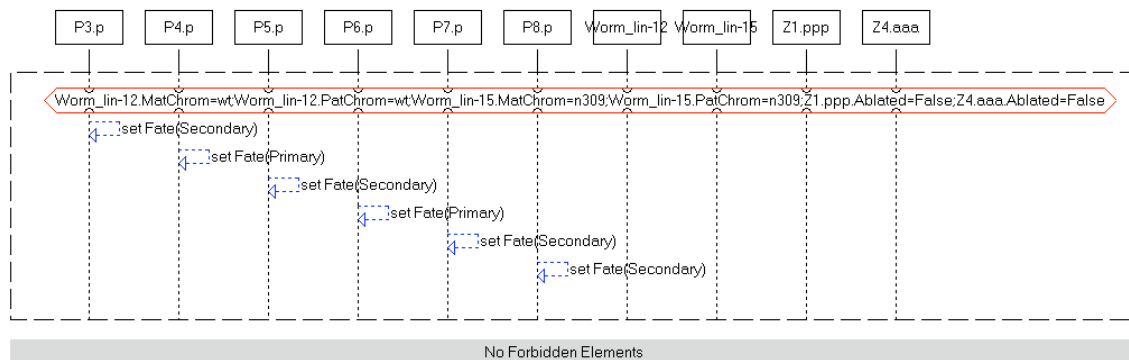
LSC: SH89 T2C 2

SH89 T2C 2



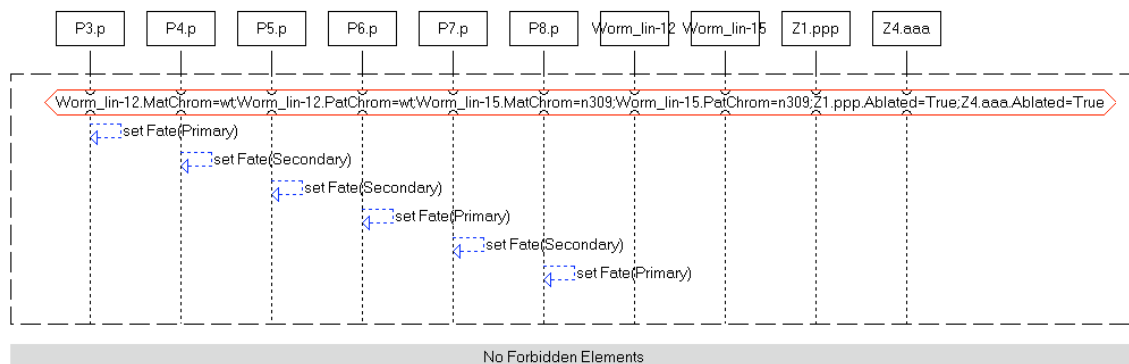
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SH89 T2C 3



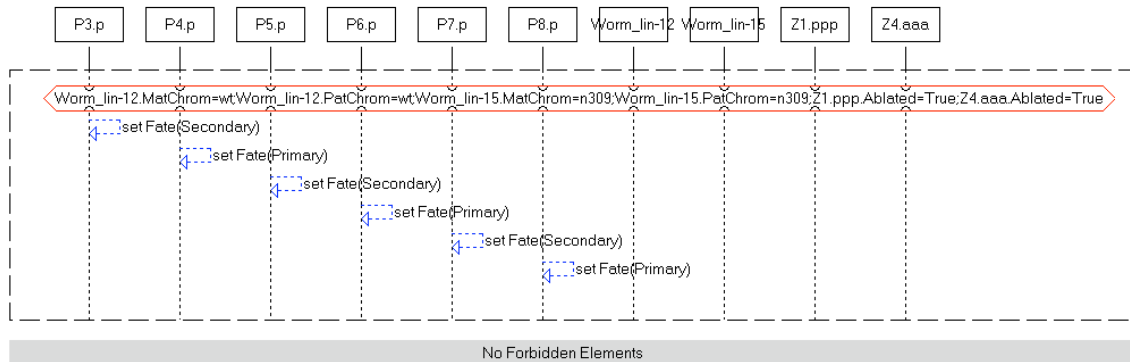
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SH89 T2D 3



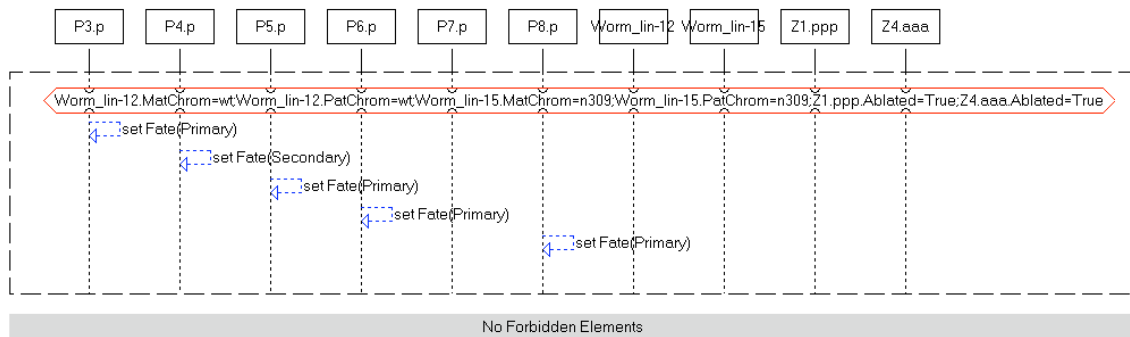
LSC: SH89 T2D 4

SH89 T2D 4



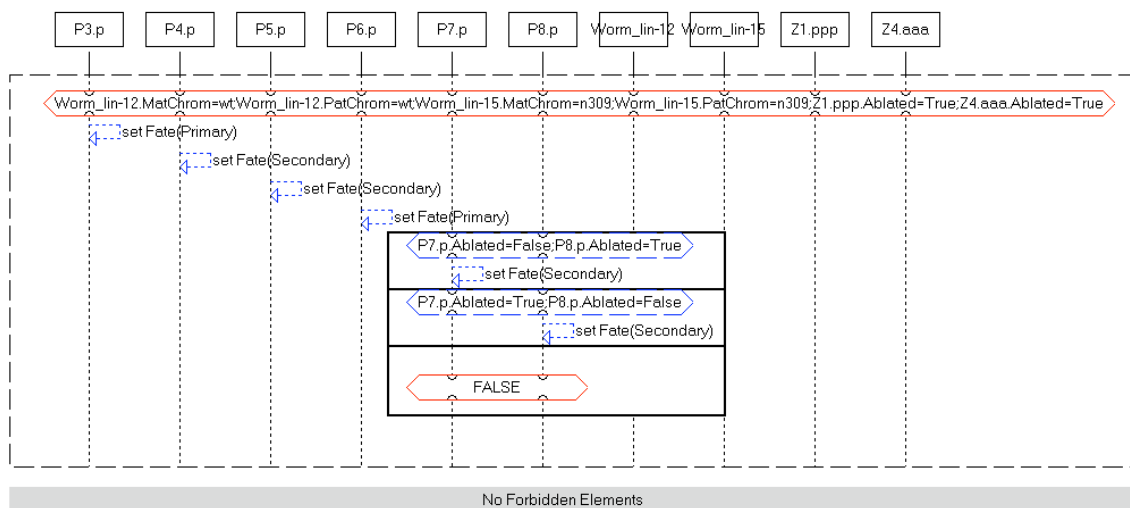
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SH89 T2D 2



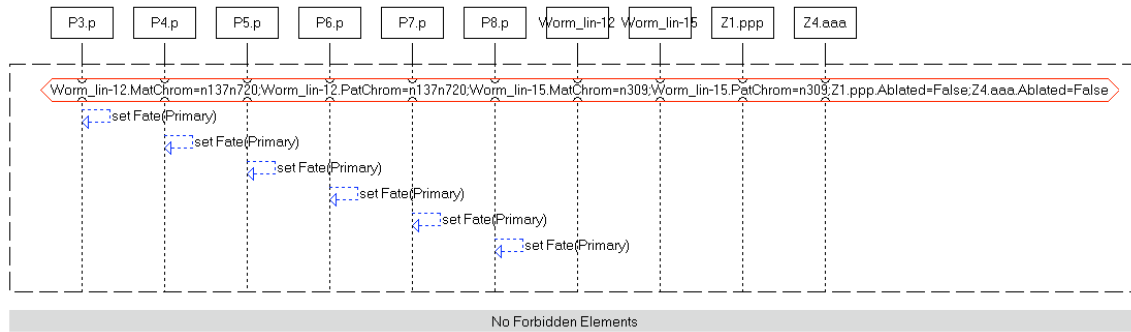
LSC: SH89 T2D 1

SH89 T2D 1



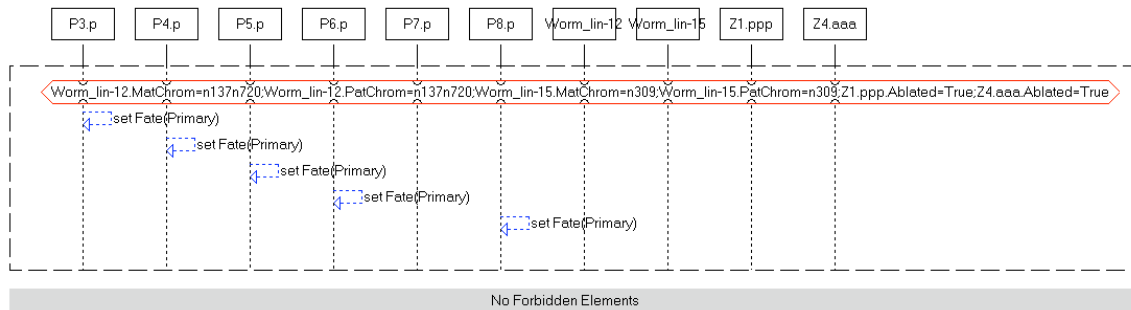
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SH89 T3A



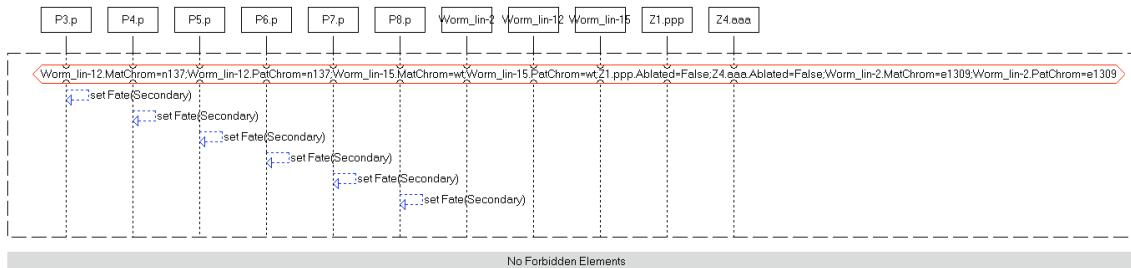
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SH89 T3B



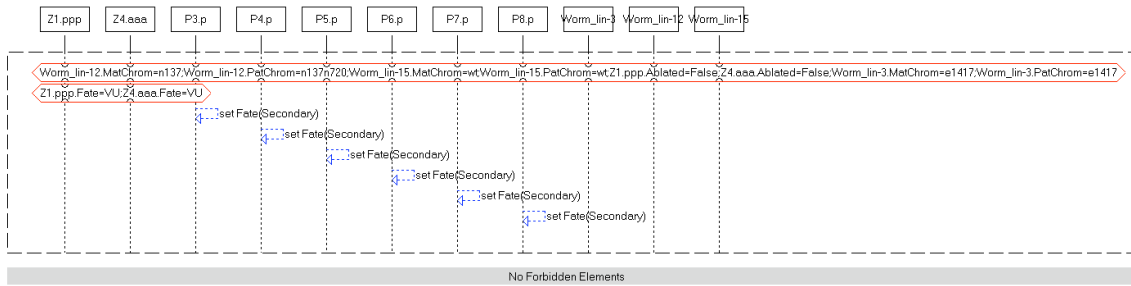
LSC: SH89 T3C a

SH89 T3C a



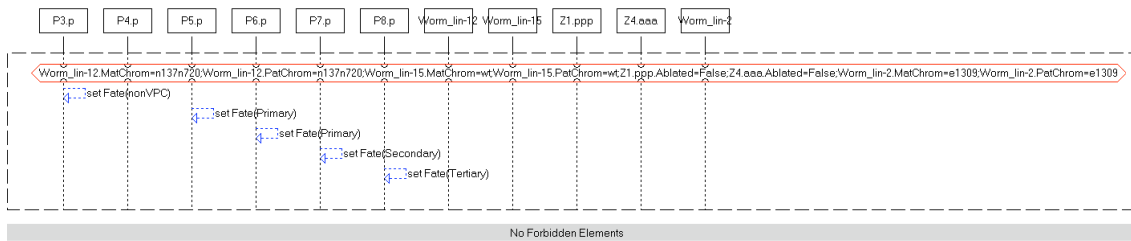
LSC: SH89 T3D a1

SH89 T3D a1



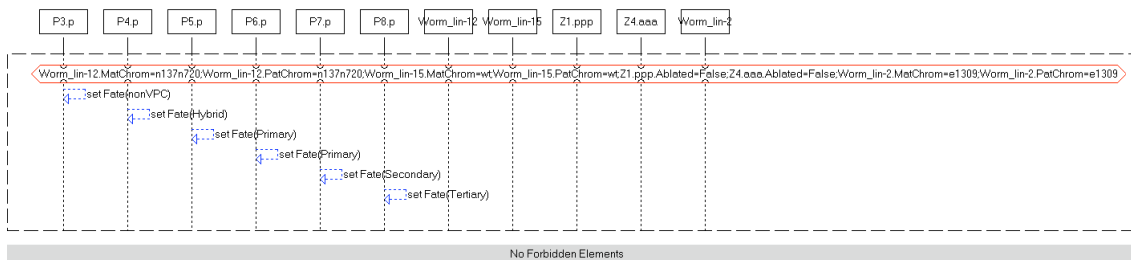
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SH89 T3E d1



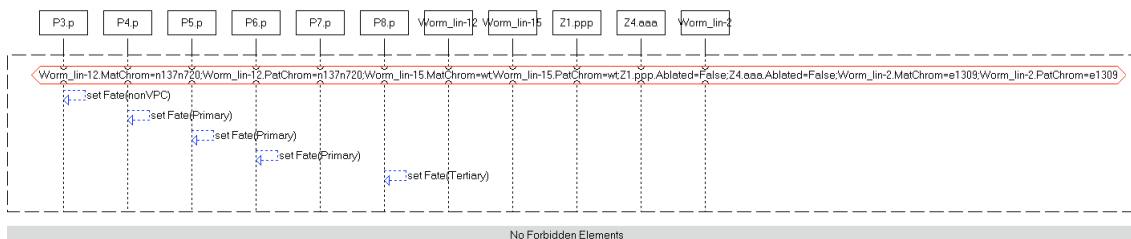
LSC: SH89 T3E d1 hyb

SH89 T3E d1 hyb



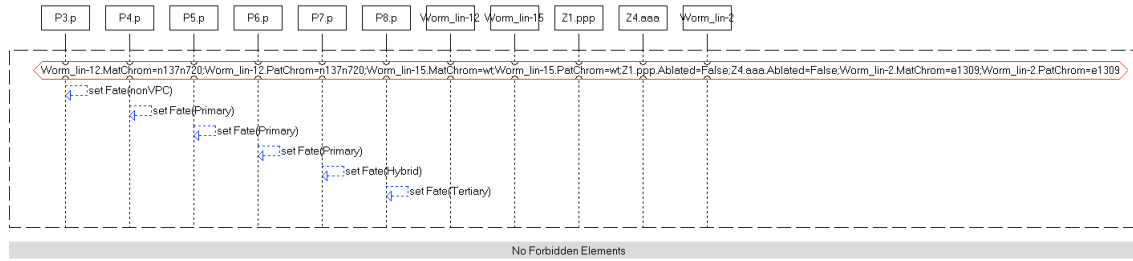
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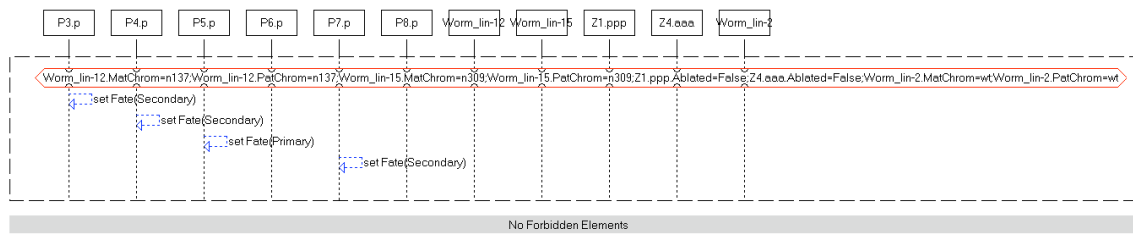
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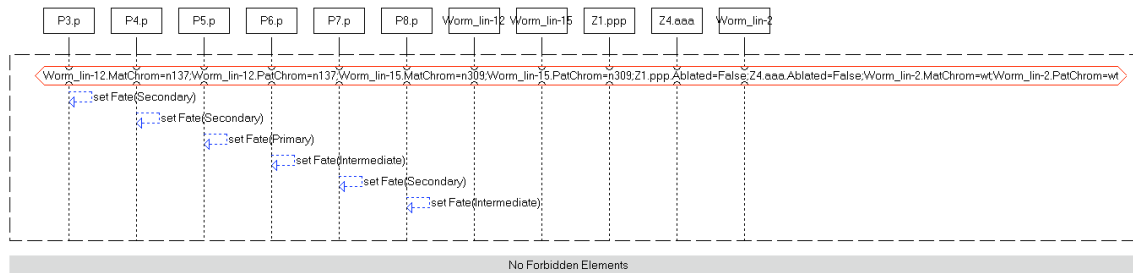
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SH89 T3F 1



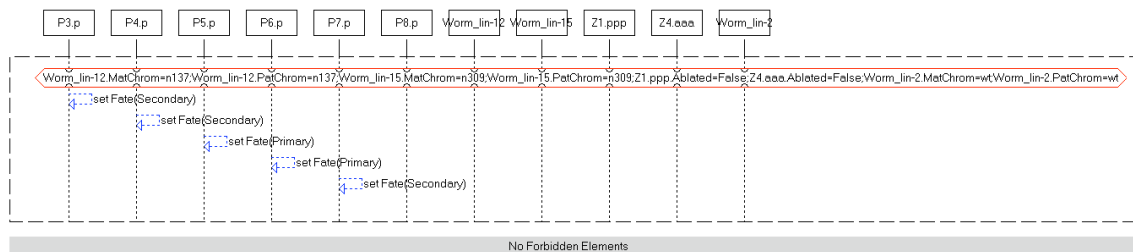
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SH89 T3F 1 int



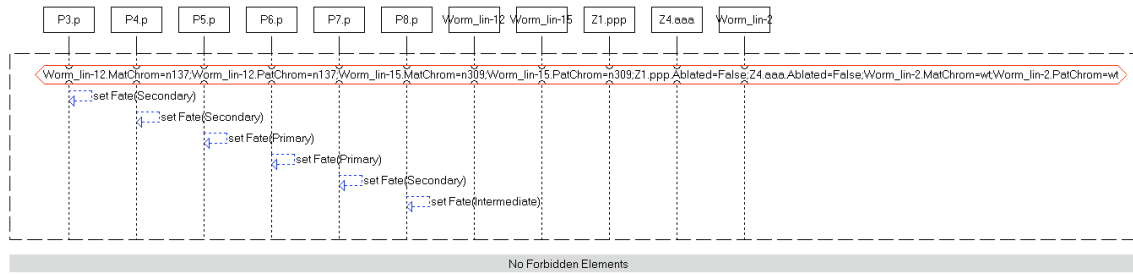
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SH89 T3F 2



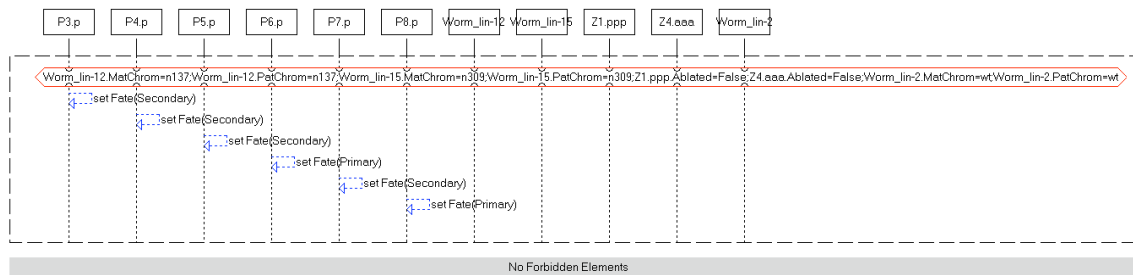
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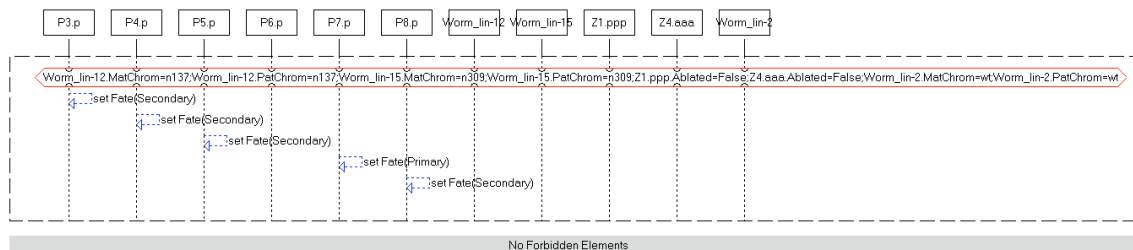
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SH89 T3F 3



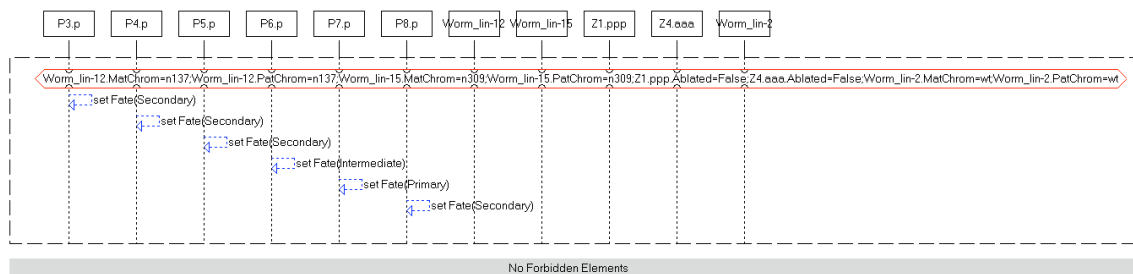
LSC: SH89 T3F 4

SH89 T3F 4



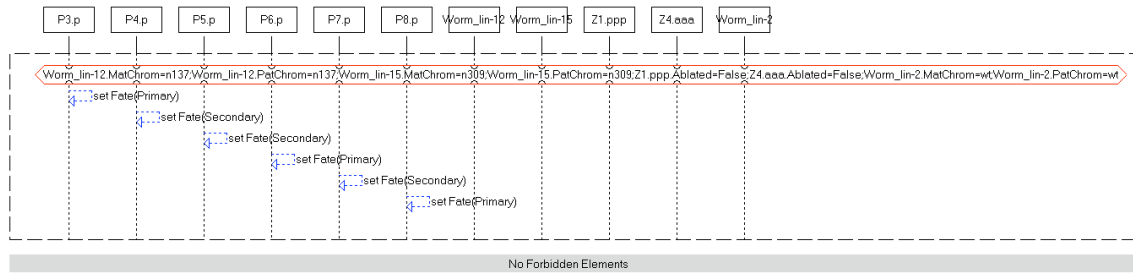
LSC: SH89 T3F 4 int

SH89 T3F 4 int



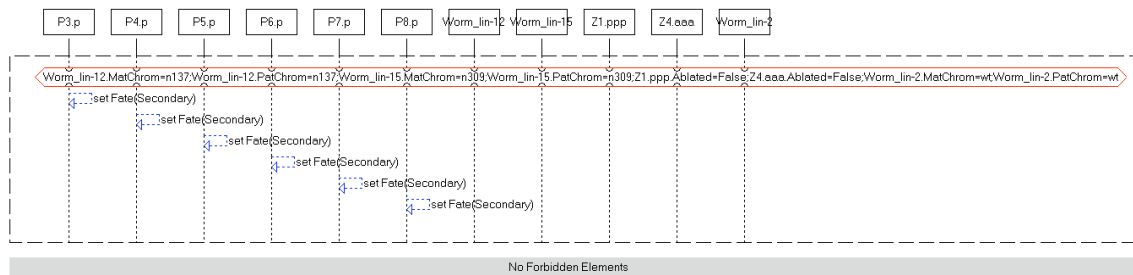
LSC: SH89 T3F 5

SH89 T3F 5



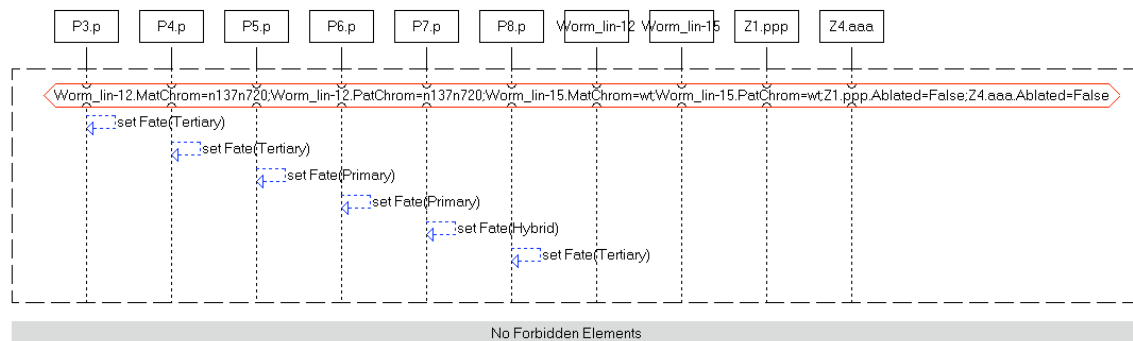
LSC: SH89 T3F 6

SH89 T3F 6



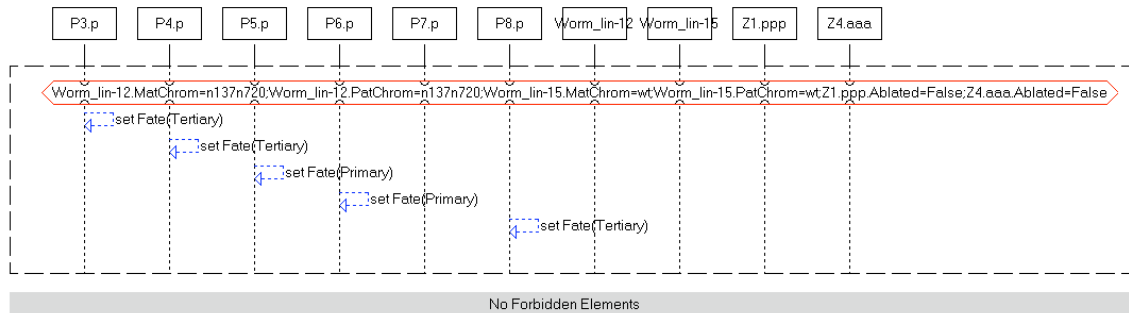
LSC: SH89 T1C 2 hyb

SH89 T1C 2 hyb



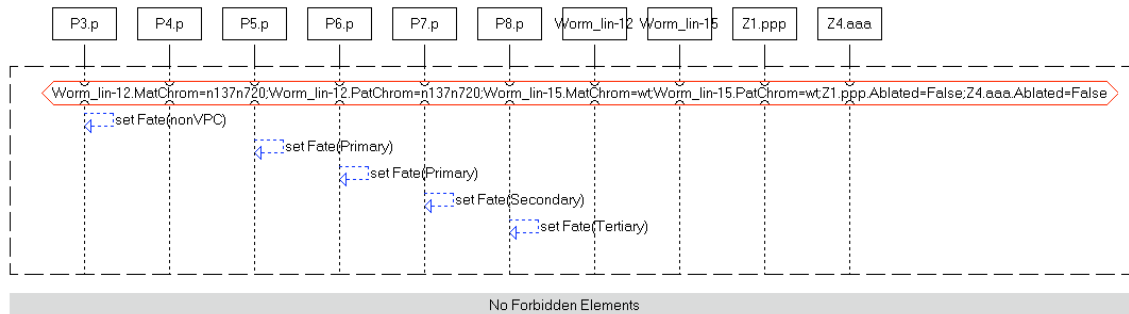
LSC: SH89 T1C 2

SH89 T1C 2



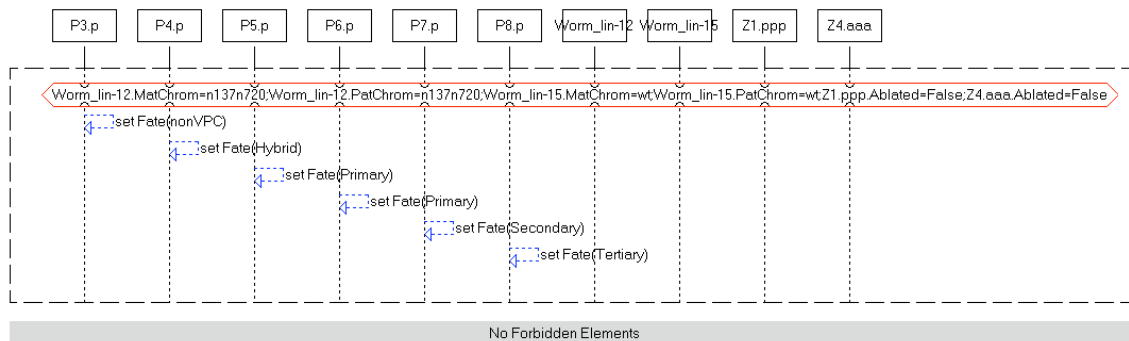
LSC: SH89 T1C 3

SH89 T1C 3



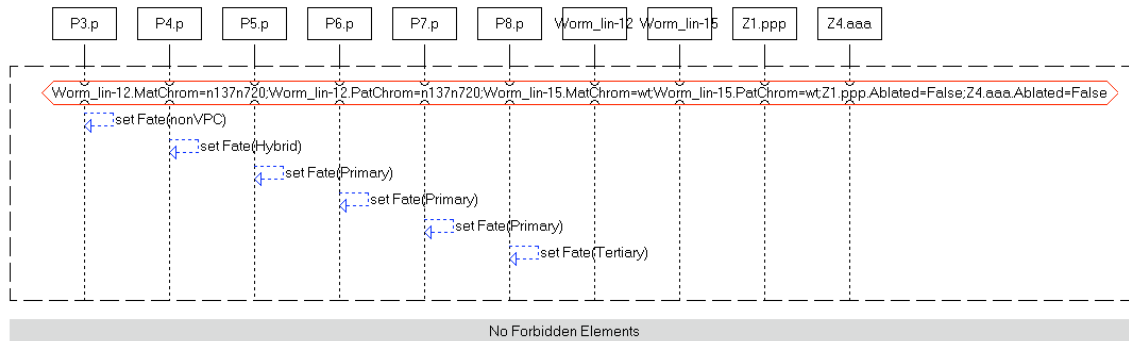
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SH89 T1C 3 hyb



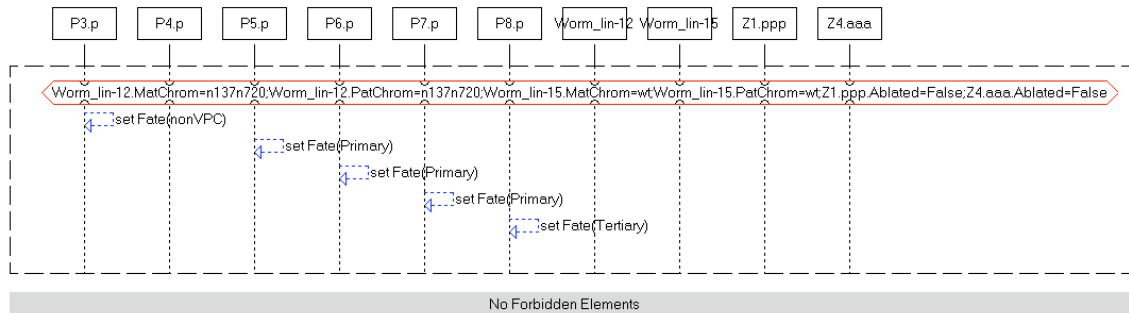
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SH89 T1C 4 hyb



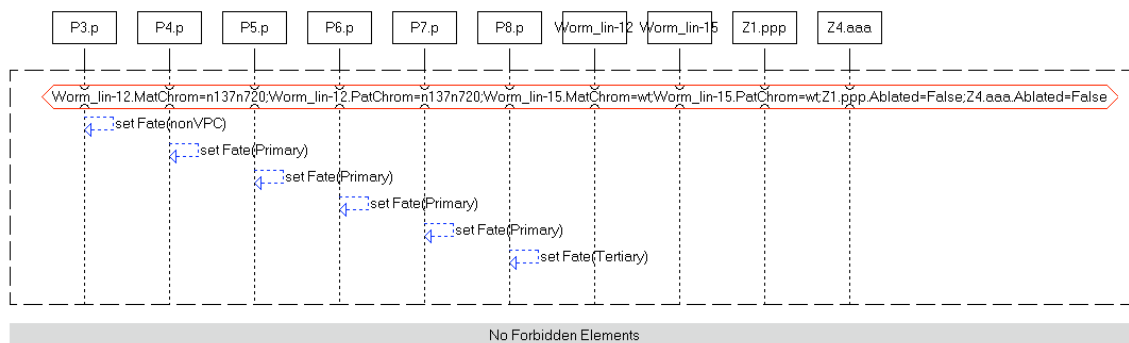
LSC: SH89 T1C 4

SH89 T1C 4



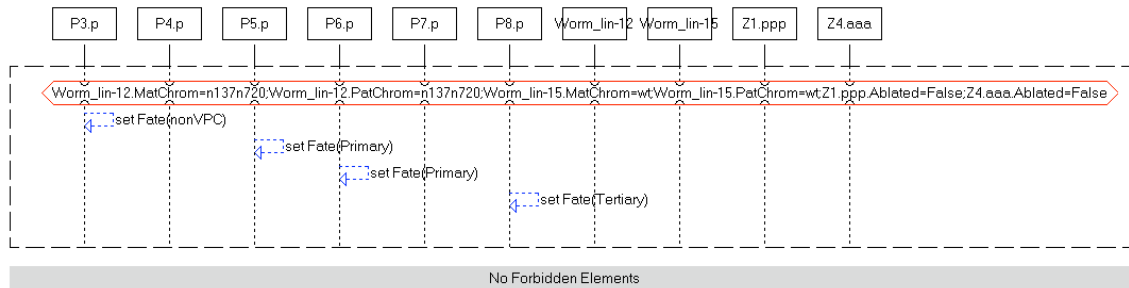
LSC: SH89 T1C 5

SH89 T1C 5



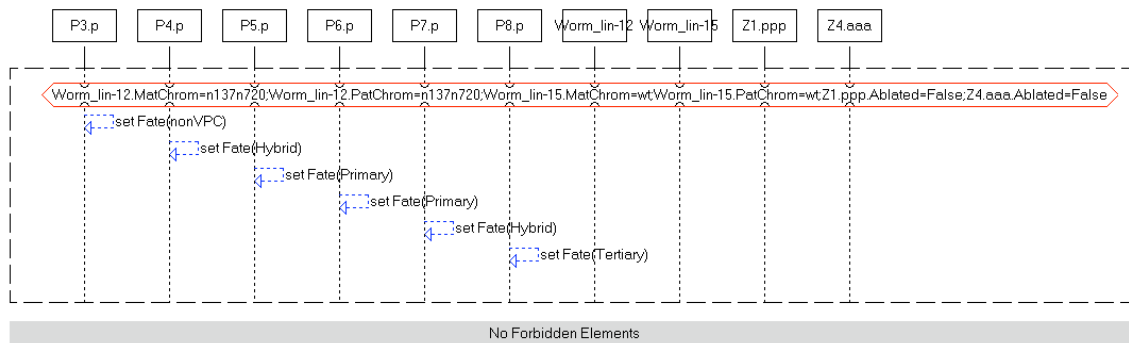
LSC: SH89 T1C 6

SH89 T1C 6



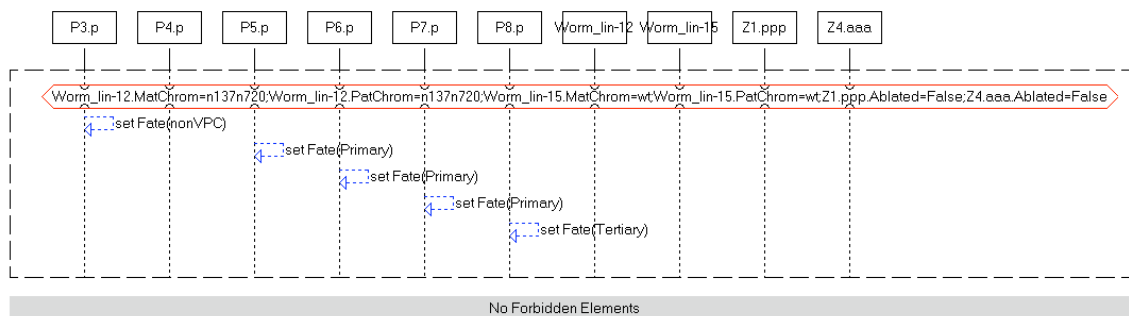
LSC: SH89 T1C 6 hyb

SH89 T1C 6 hyb



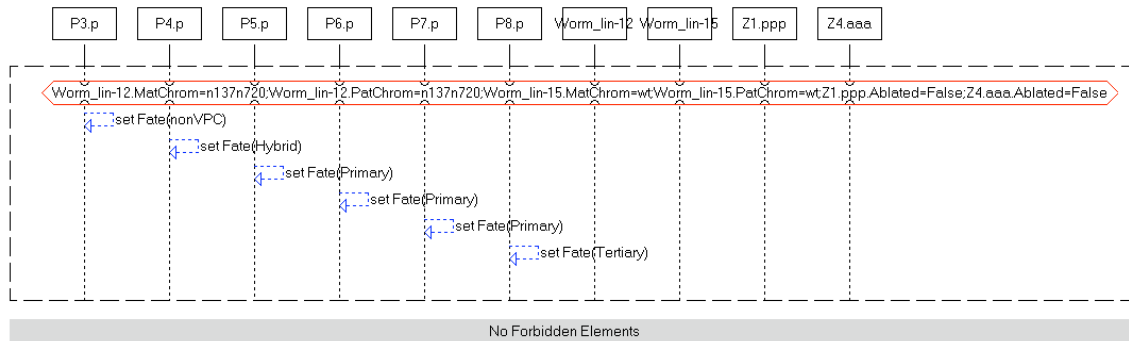
LSC: SH89 T1C 7

SH89 T1C 7



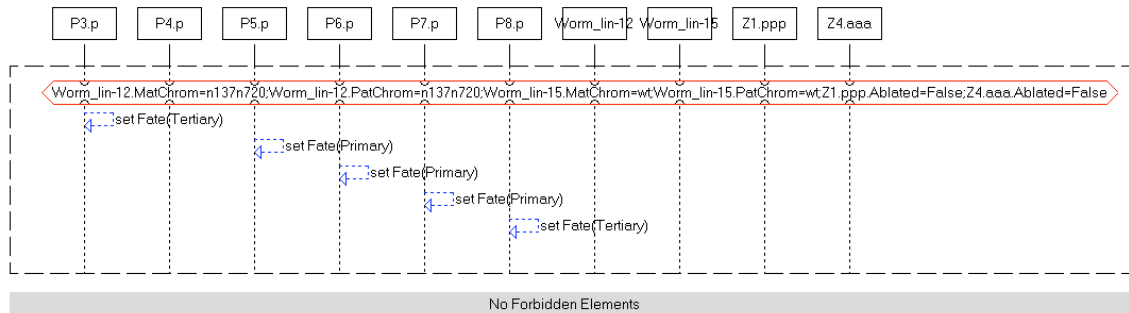
LSC: SH89 T1C 7 hyb

SH89 T1C 7 hyb



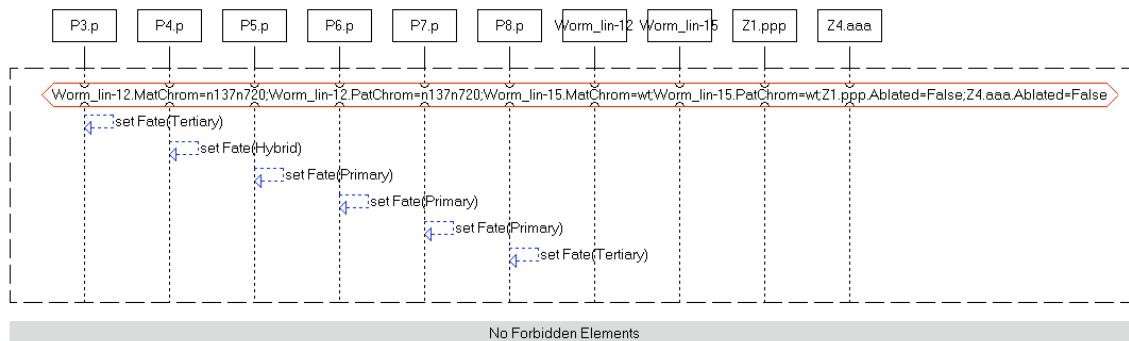
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SH89 T1C 8



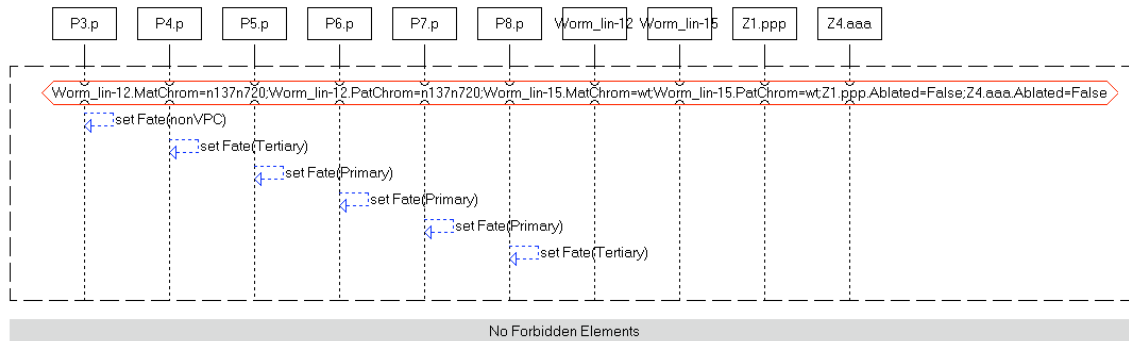
LSC: SH89 T1C 8 hyb

SH89 T1C 8 hyb



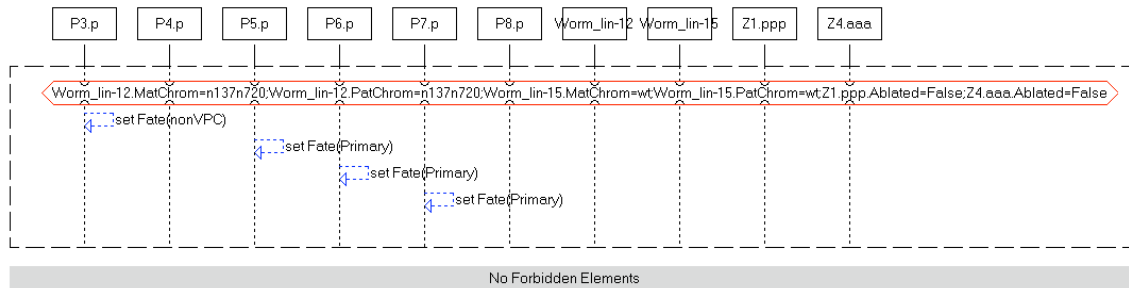
LSC: SH89 T1C 9

SH89 T1C 9



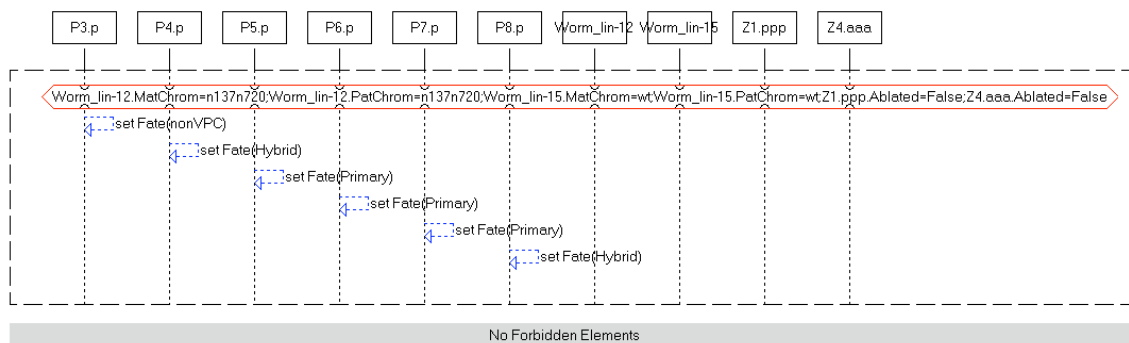
LSC: SH89 T1C 10

SH89 T1C 10



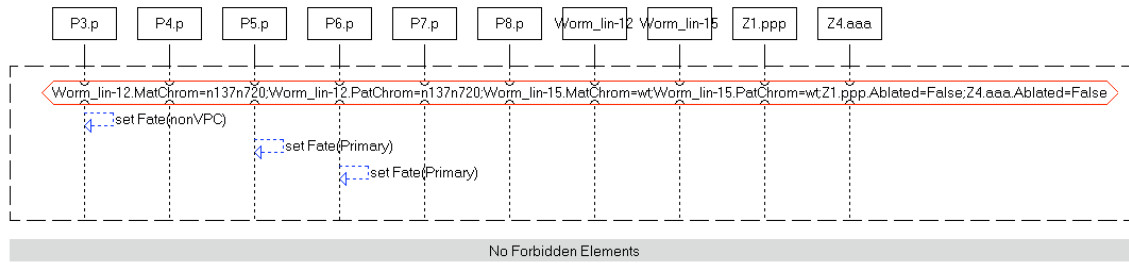
LSC: SH89 T1C 10 hyb

SH89 T1C 10 hyb



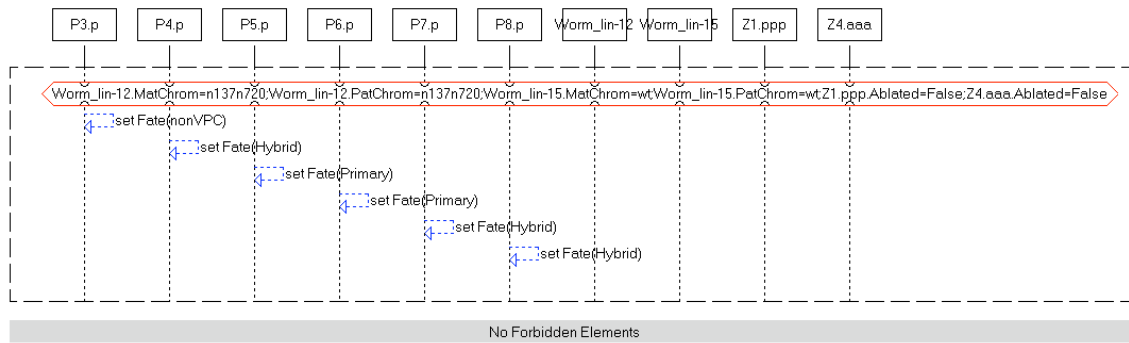
LSC: SH89 T1C 11

SH89 T1C 11



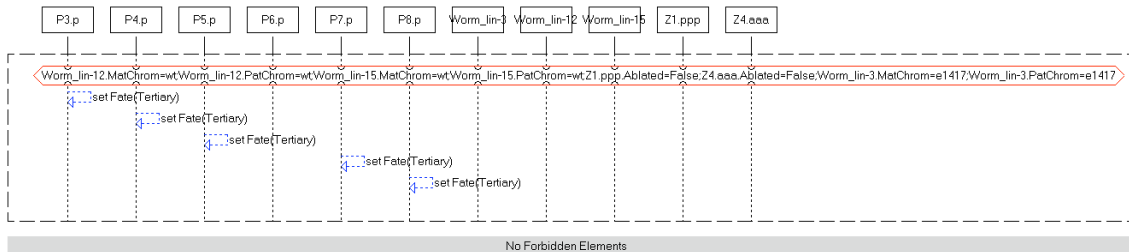
LSC: SH89 T1C 11 hyb

SH89 T1C 11 hyb



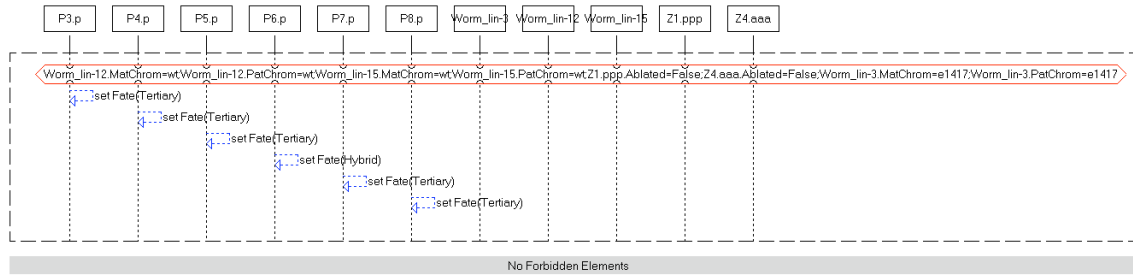
LSC: SH89 T2A a2

SH89 T2A a2



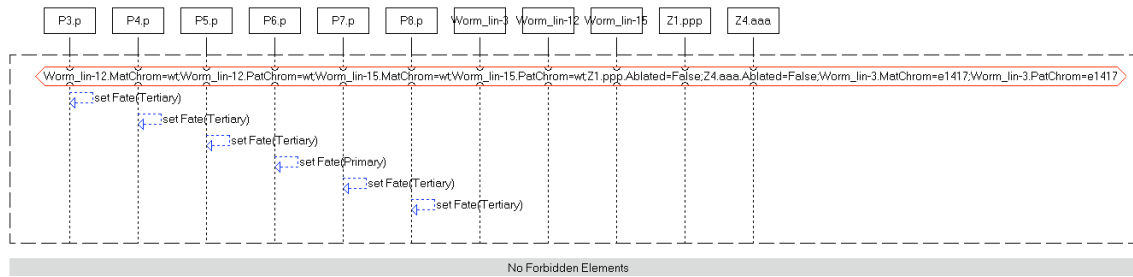
LSC: SH89 T2A a2 hyb

SH89 T2A a2 hyb



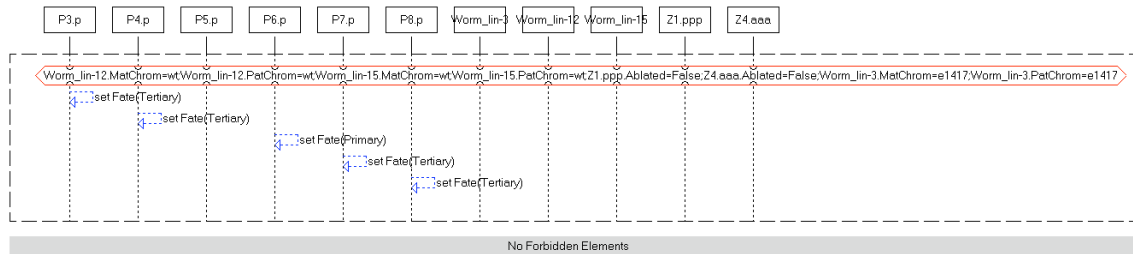
LSC: SH89 T2A a4

SH89 T2A a4



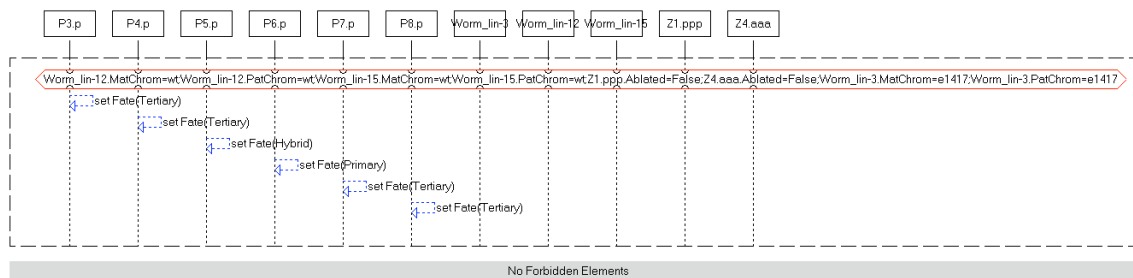
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SH89 T2A a5

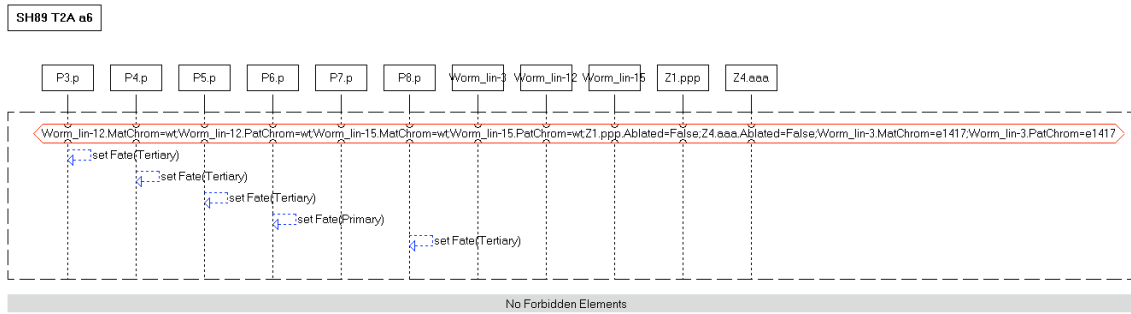


LSC: SH89 T2A a5 hyb

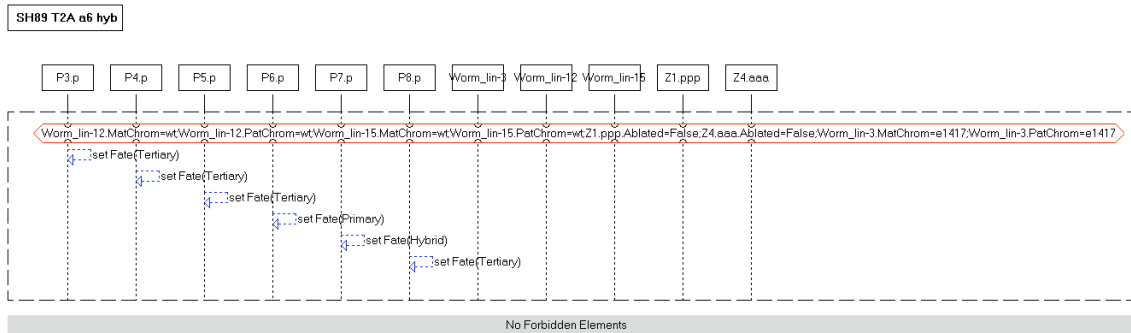
SH89 T2A a5 hyb



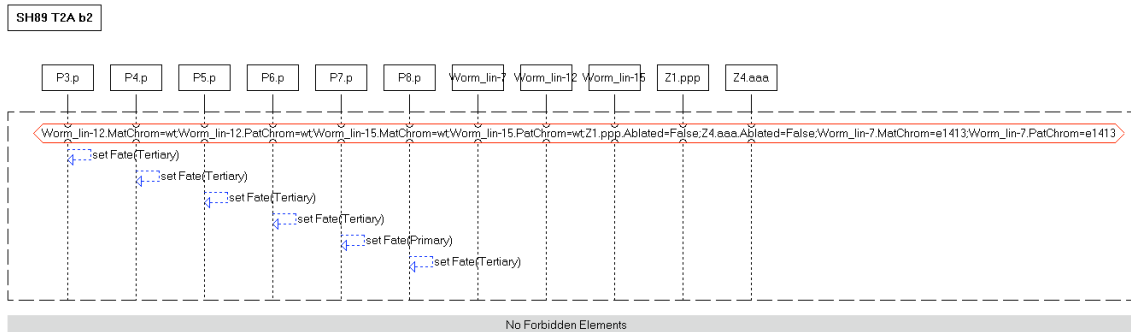
LSC: SH89 T2A a6



LSC: SH89 T2A a6 hyb

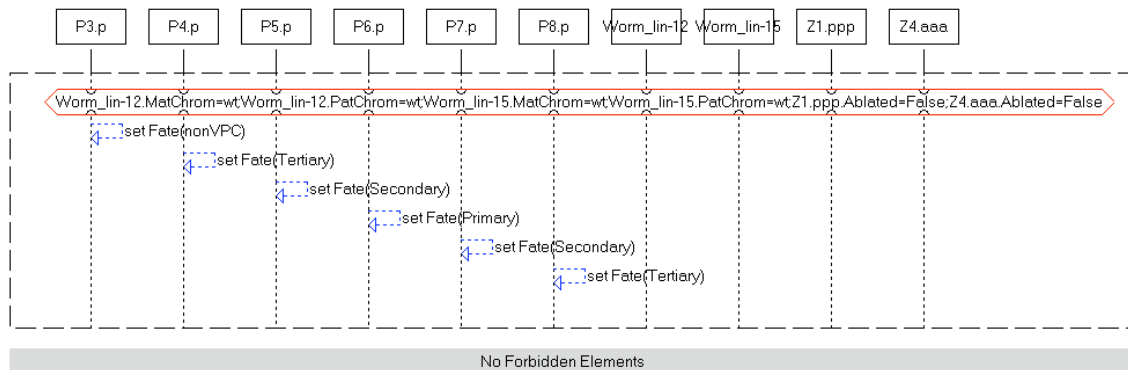


LSC: SH89 T2A b2



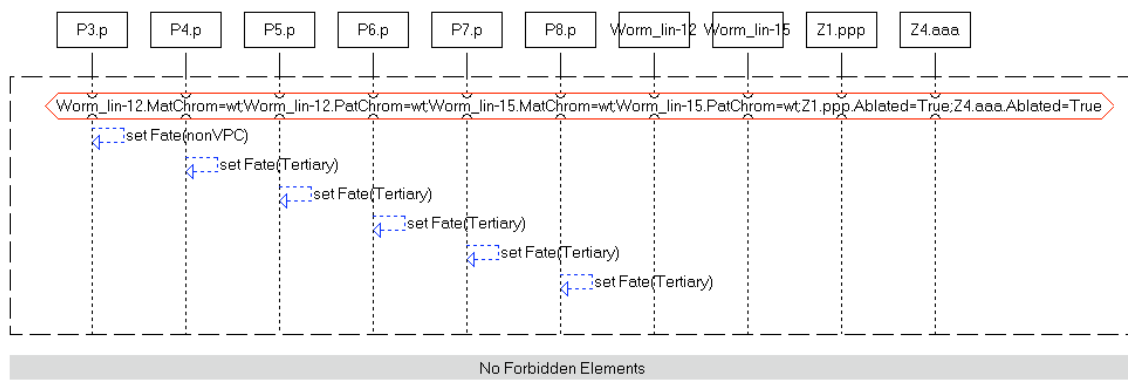
LSC: SH89 T1A nonVPC

SH89 T1A nonVPC



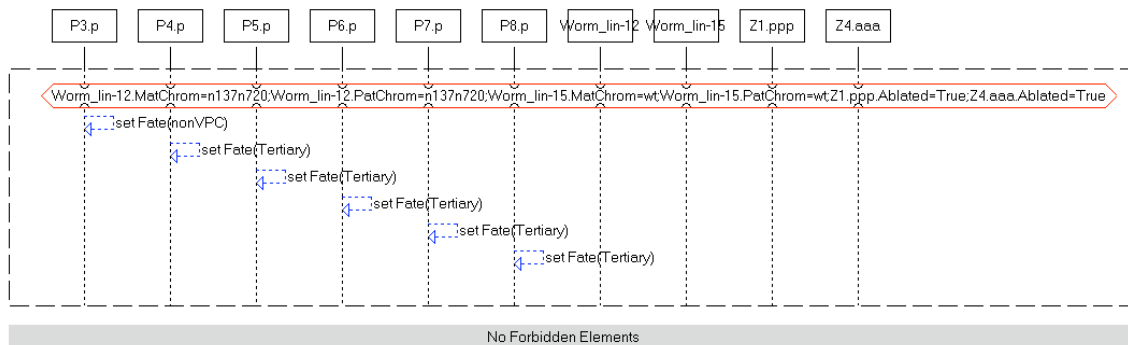
LSC: SH89 T1B nonVPC

SH89 T1B nonVPC



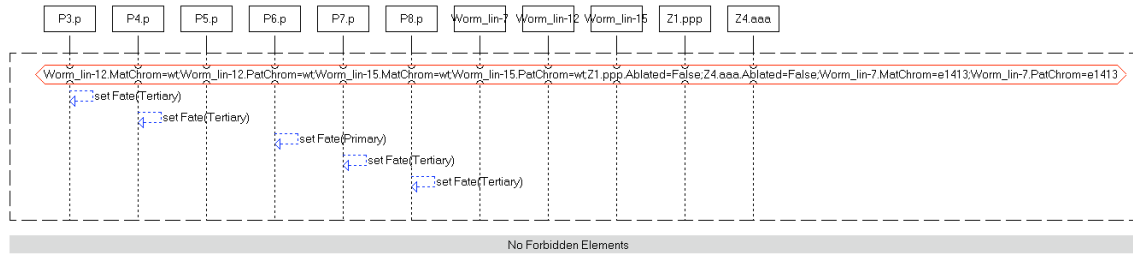
LSC: SH89 T1D nonVPC

SH89 T1D nonVPC



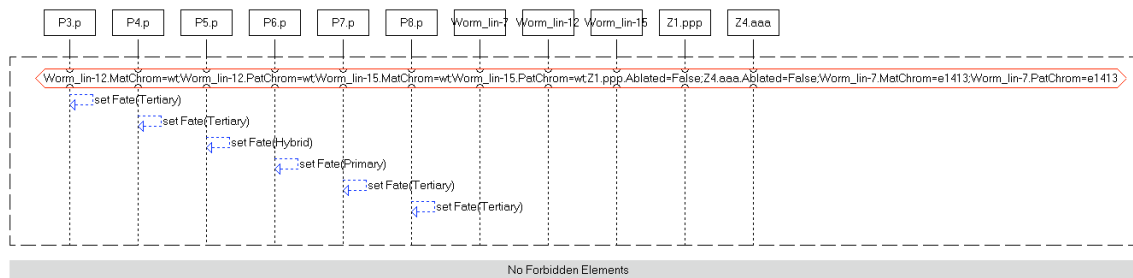
LSC: SH89 T2A b3

SH89 T2A b3



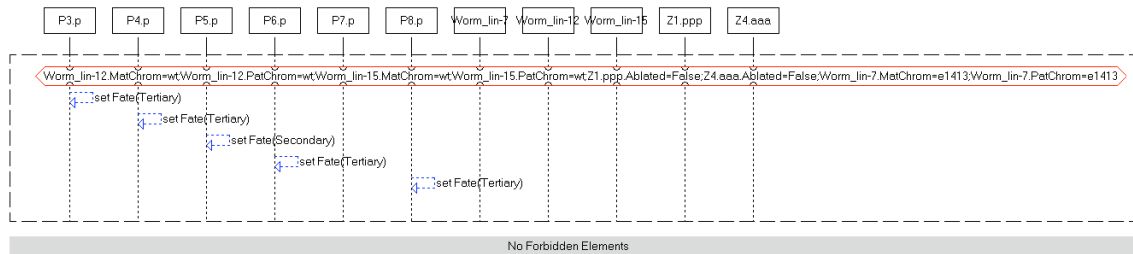
LSC: SH89 T2A b3 hyb

SH89 T2A b3 hyb



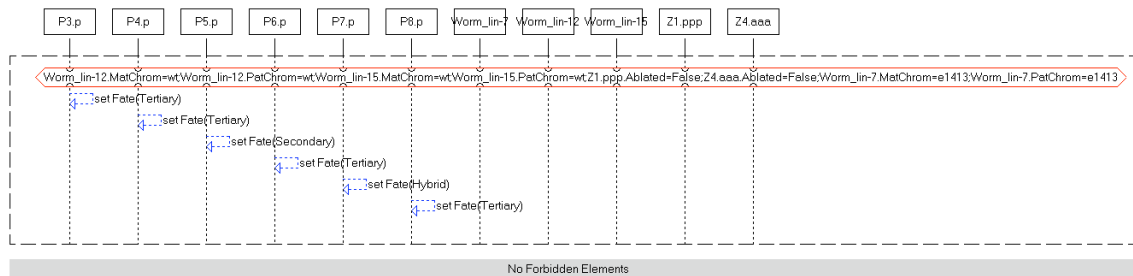
LSC: SH89 T2A b4

SH89 T2A b4



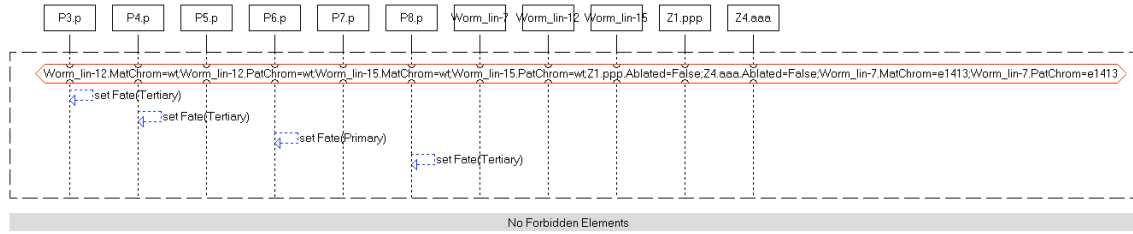
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SH89 T2A b4 hyb



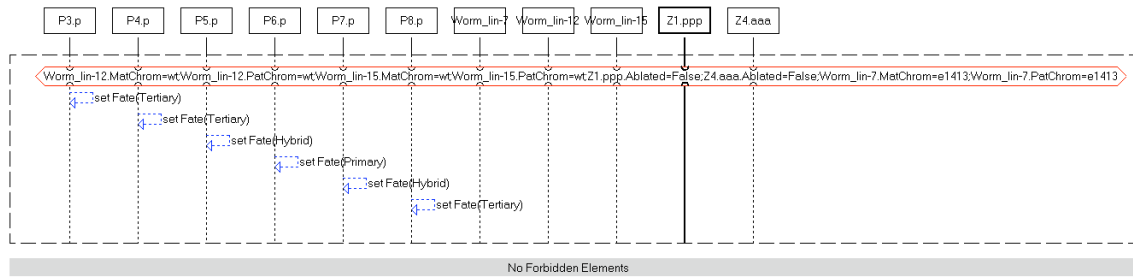
LSC: SH89 T2A b5

SH89 T2A b5



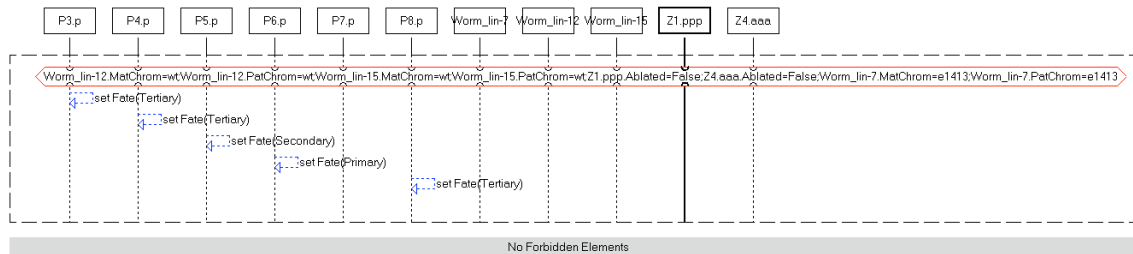
LSC: SH89 T2A b5 hyb

SH89 T2A b5 hyb



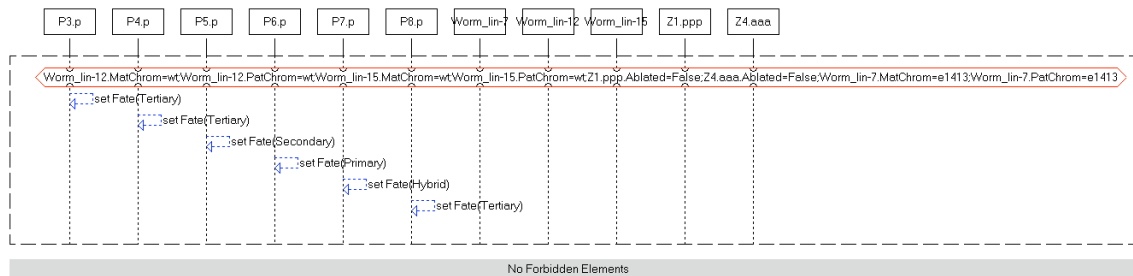
LSC: SH89 T2A b6

SH89 T2A b6



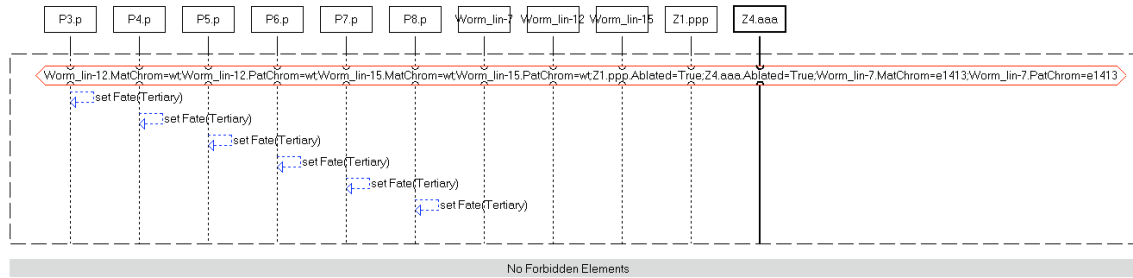
LSC: SH89 T2A b6 hyb

SH89 T2A b6 hyb



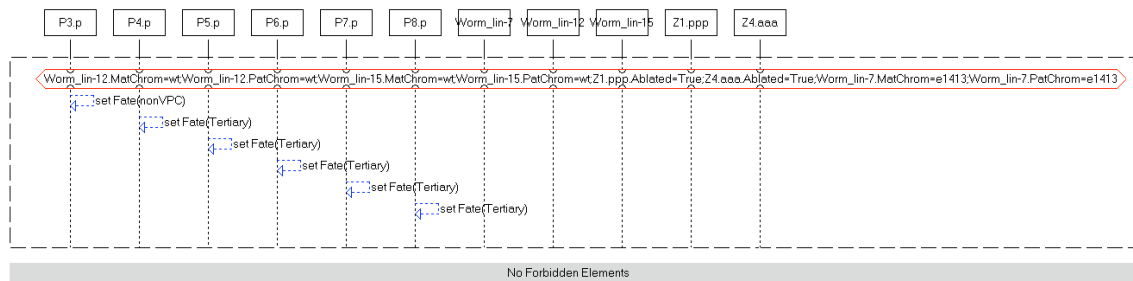
LSC: SH89 T2B a1

SH89 T2B a1



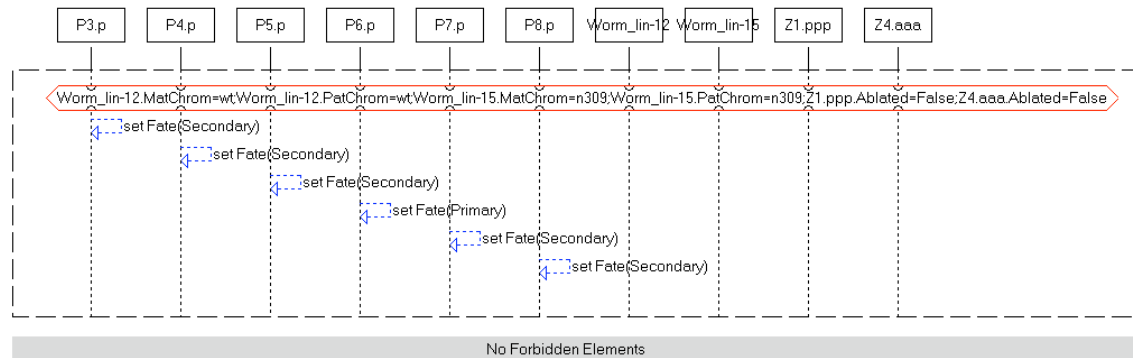
LSC: SH89 T2B a2

SH89 T2B a2



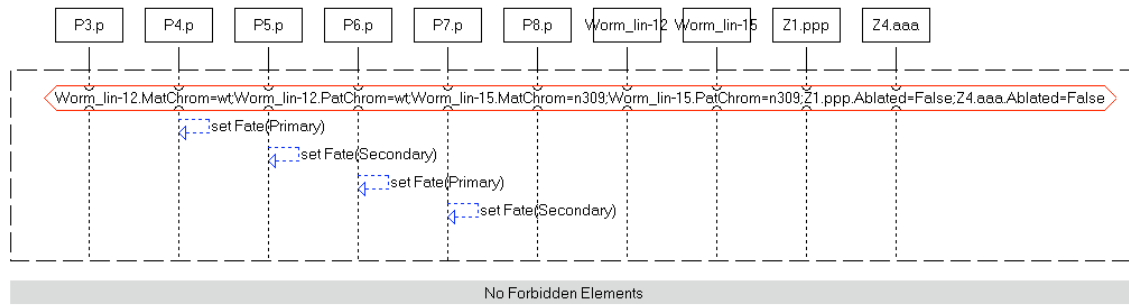
LSC: SH89 T2C 4

SH89 T2C 4



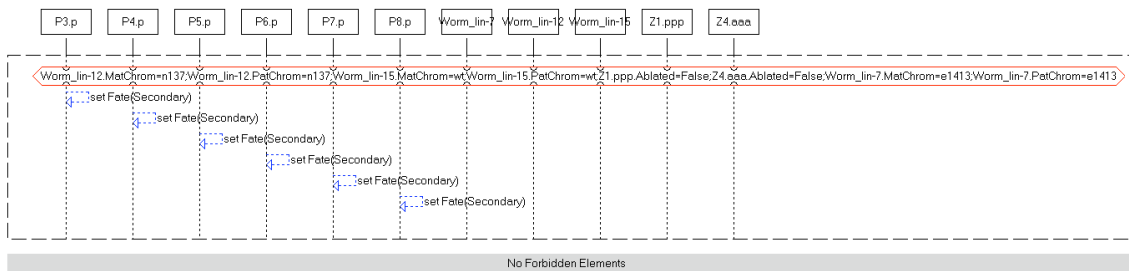
LSC: SH89 T2C 5

SH89 T2C 5



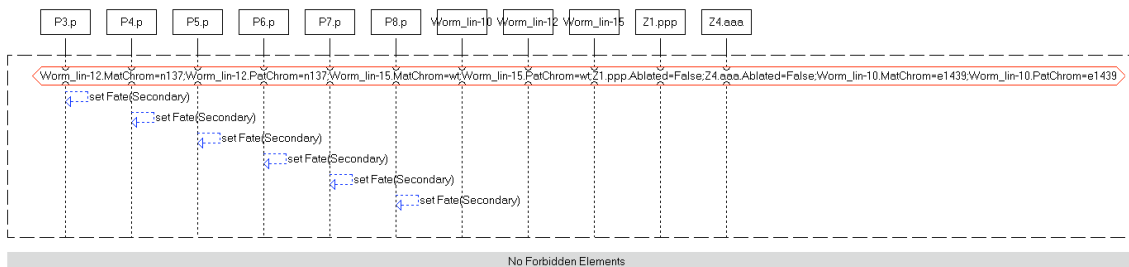
LSC: SH89 T3C b

SH89 T3C b



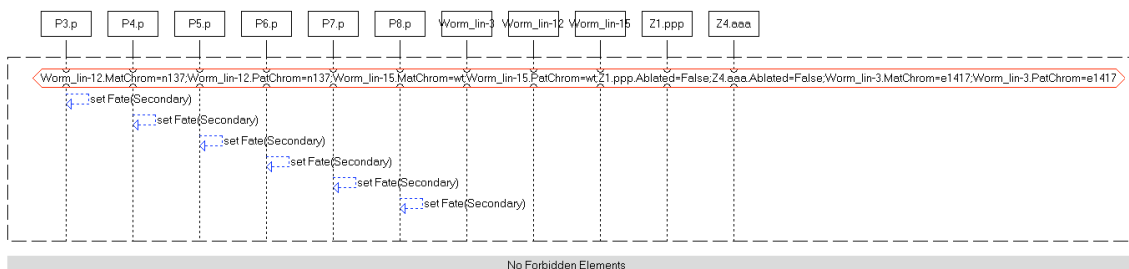
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SH89 T3C c



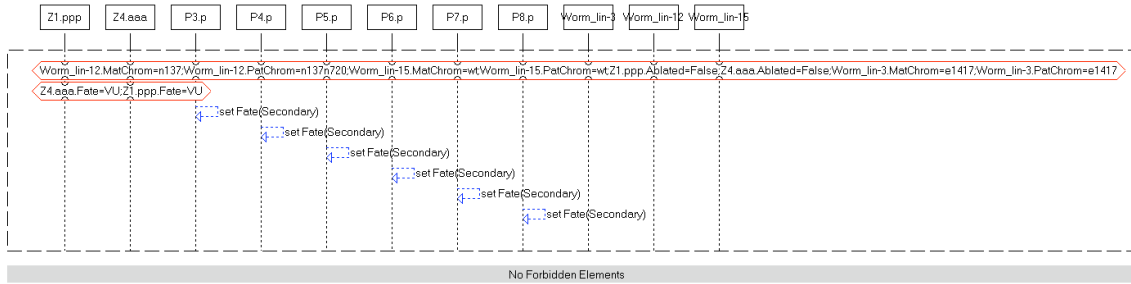
LSC: SH89 T3C d

SH89 T3C d



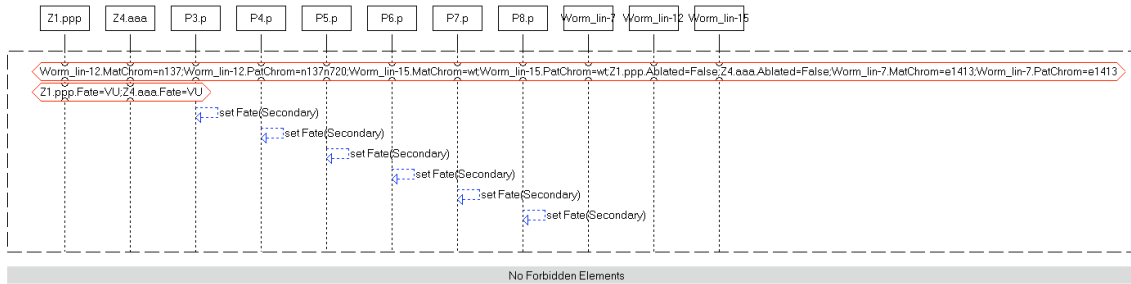
LSC: SH89 T3D a2

SH89 T3D a2



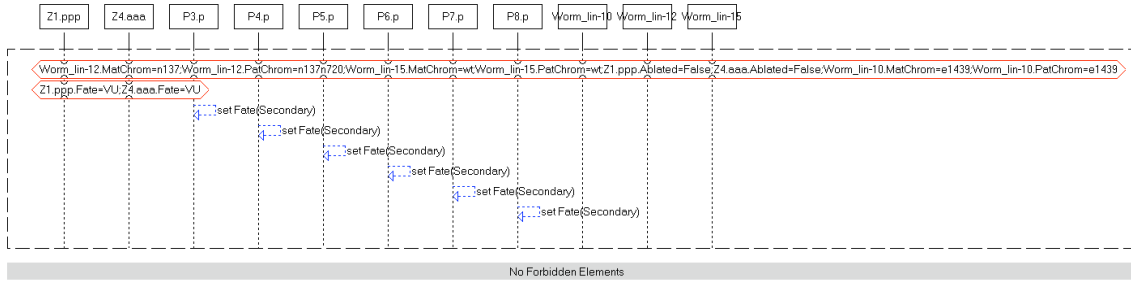
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SH89 T3D b1



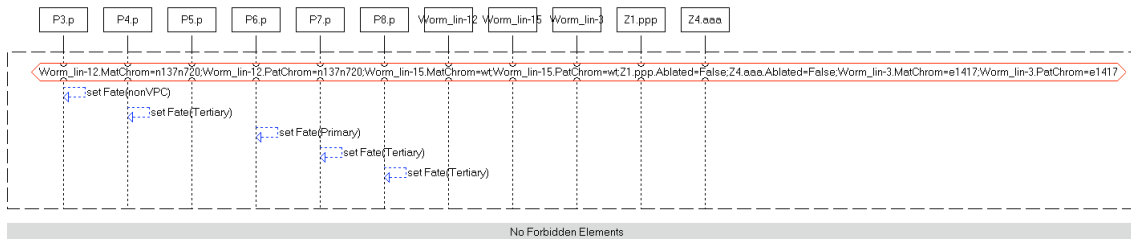
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SH89 T3D c1

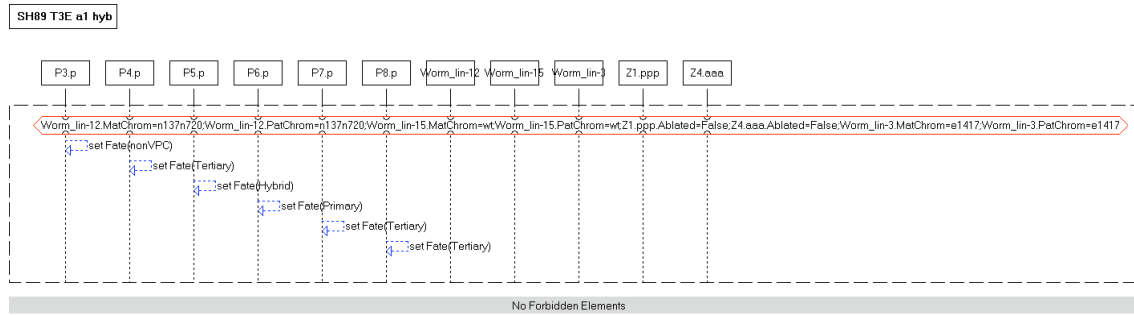


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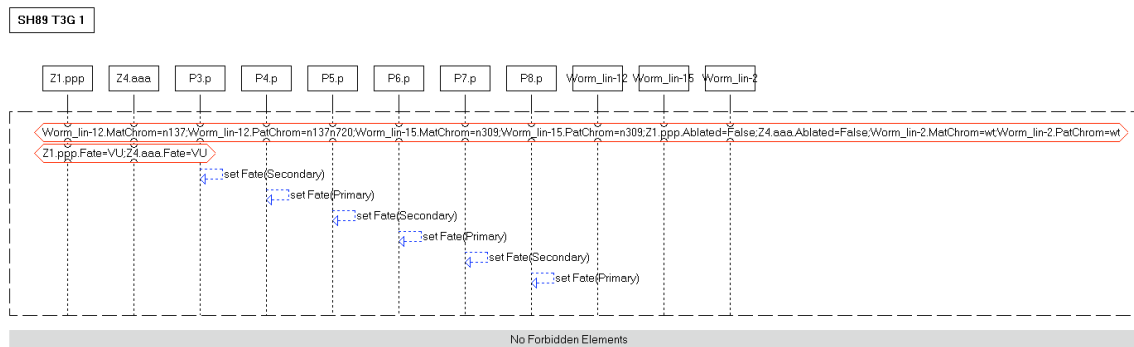
SH89 T3E a1



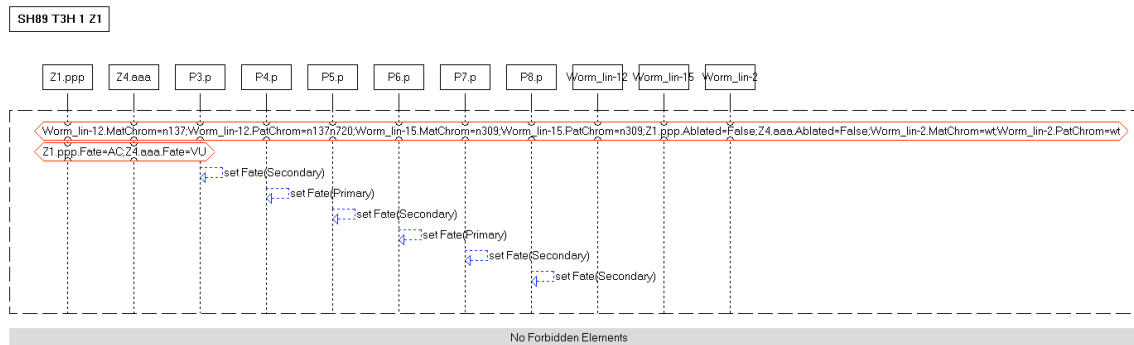
LSC: SH89 T3E a1 hyb



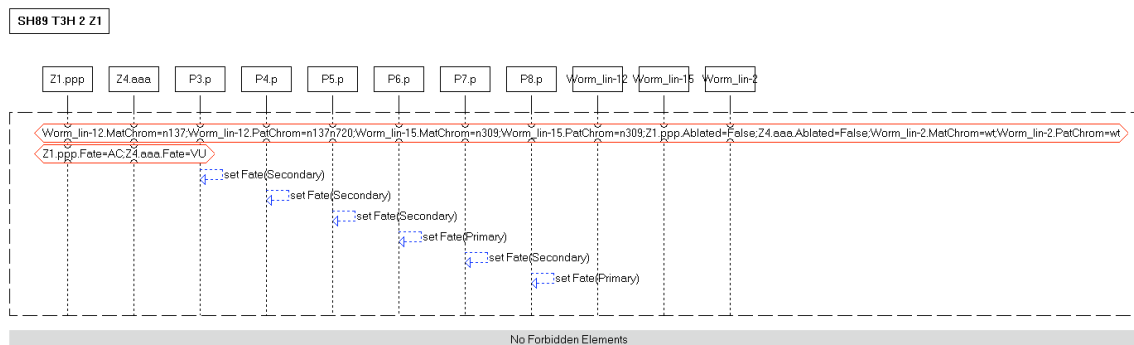
LSC: SH89 T3G 1



LSC: SH89 T3H 1 Z1

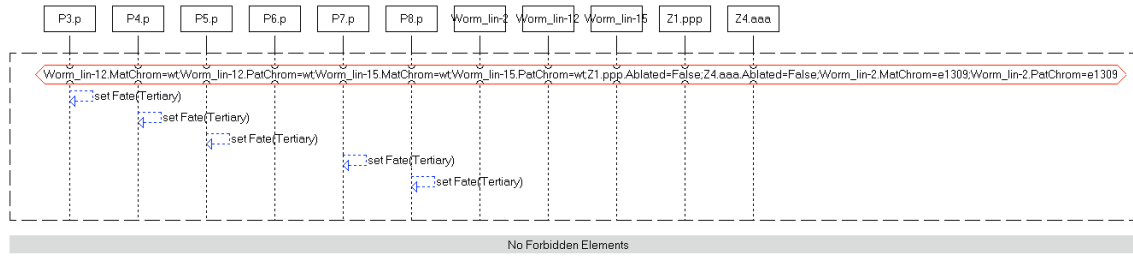


LSC: SH89 T3H 2 Z1



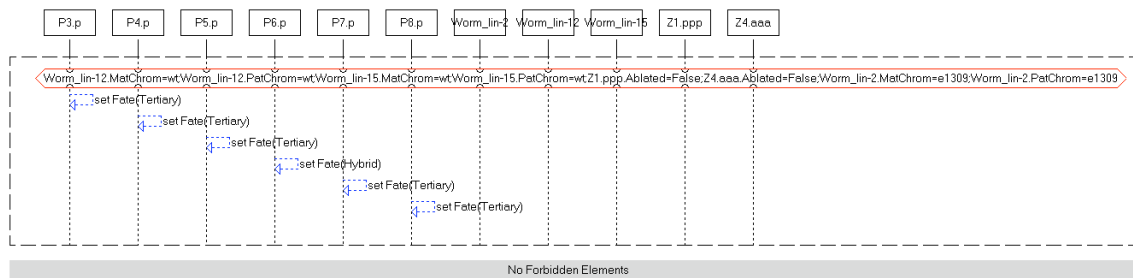
LSC: SH89 T2A c2

SH89 T2A c2



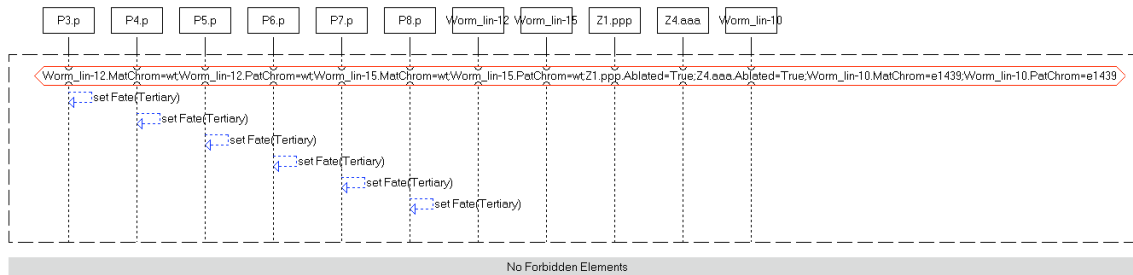
LSC: SH89 T2A c2 hyb

SH89 T2A c2 hyb



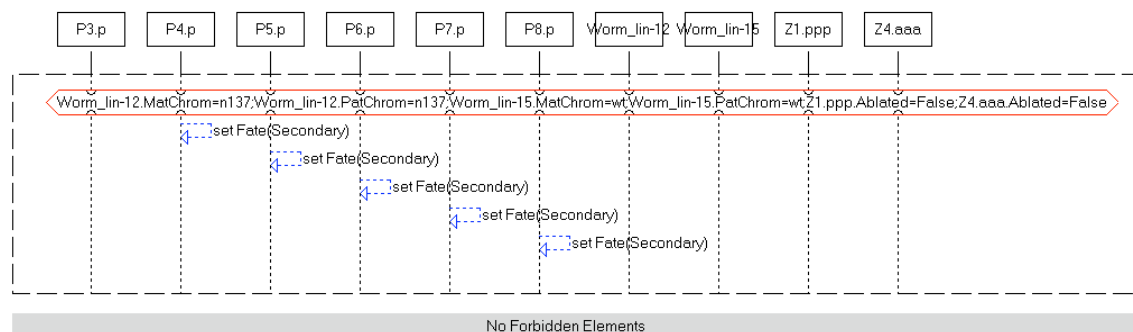
LSC: SH89 T2B b1

SH89 T2B b1



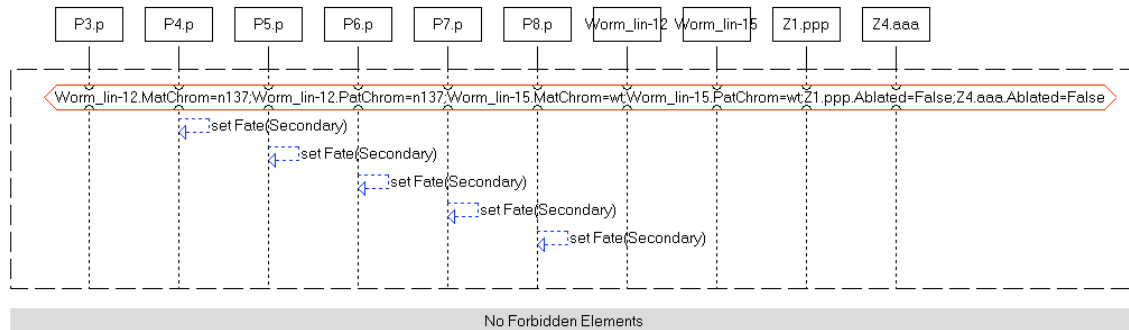
LSC: SH89 T1E 11

SH89 T1E 11



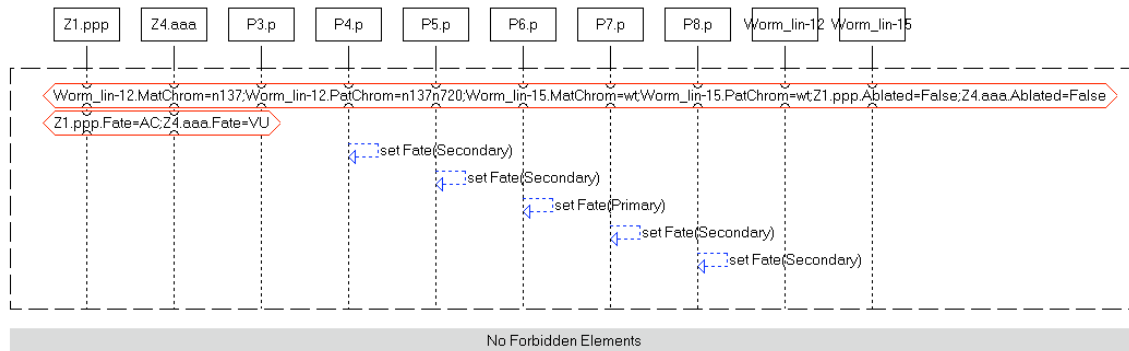
LSC: SH89 T1E 9

SH89 T1E 9



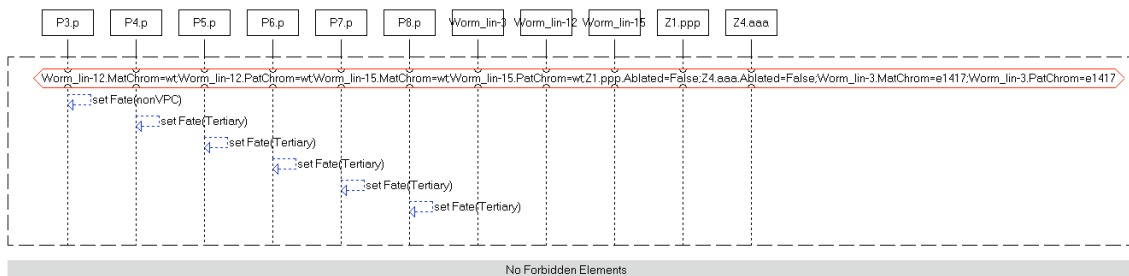
LSC: SH89 T1F 5 Z1

SH89 T1F 5 Z1



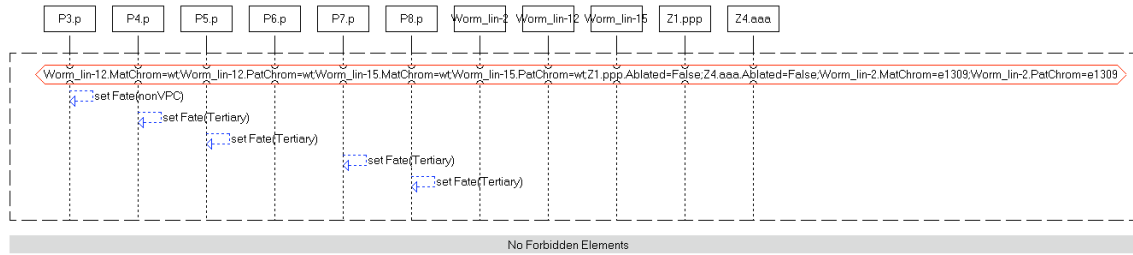
LSC: SH89 T2A a1 nonVPC

SH89 T2A a1 nonVPC



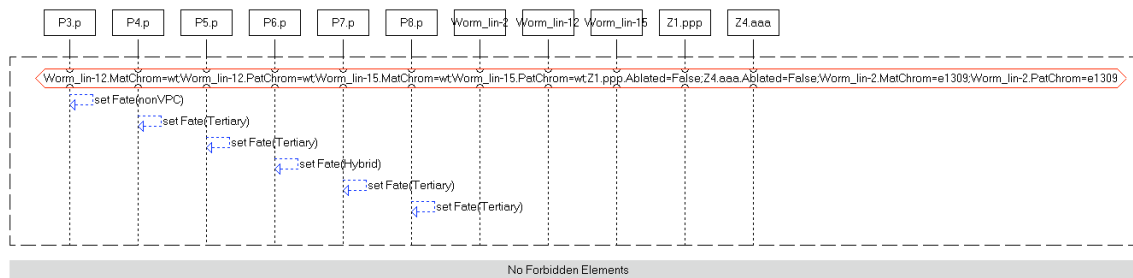
LSC: SH89 T2A c3

SH89 T2A c3



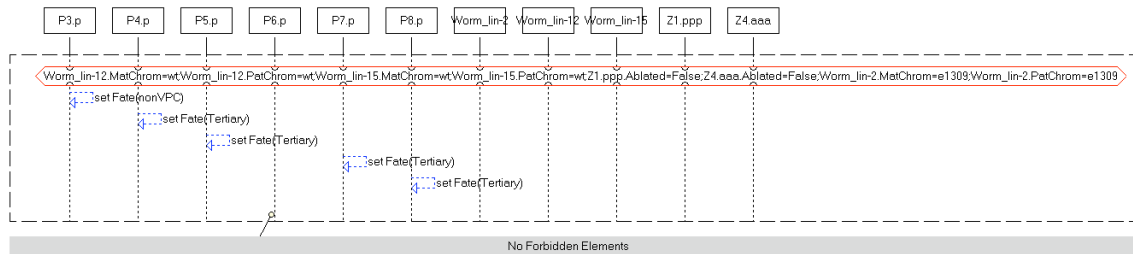
LSC: SH89 T2A c3 hyb

SH89 T2A c3 hyb



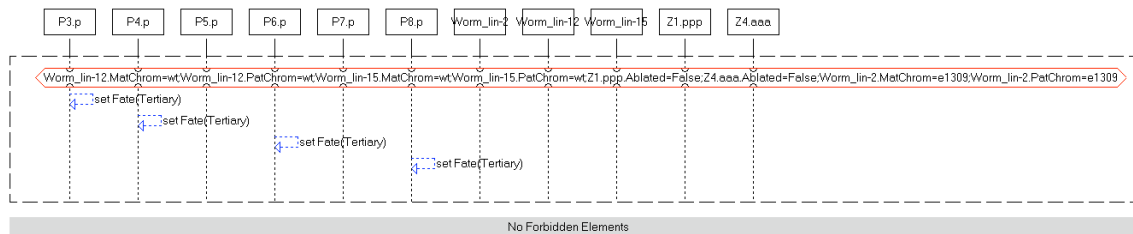
LSC: SH89 T2A c4

SH89 T2A c4



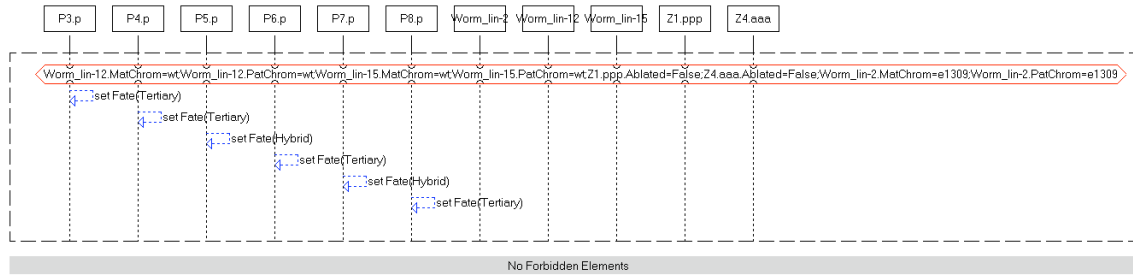
LSC: SH89 T2A c5

SH89 T2A c5



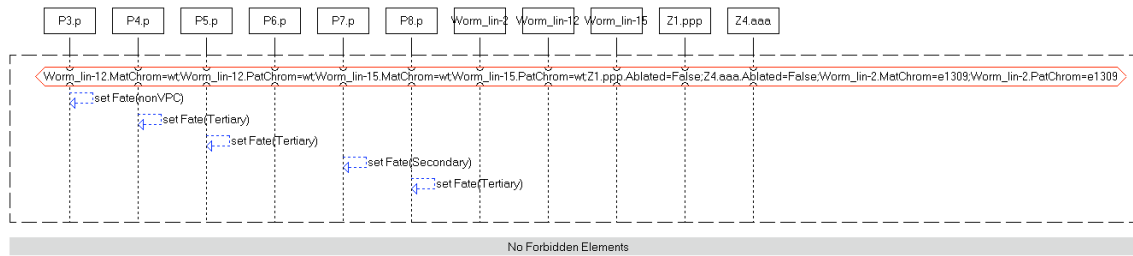
LSC: SH89 T2A c5 hyb

SH89 T2A c5 hyb



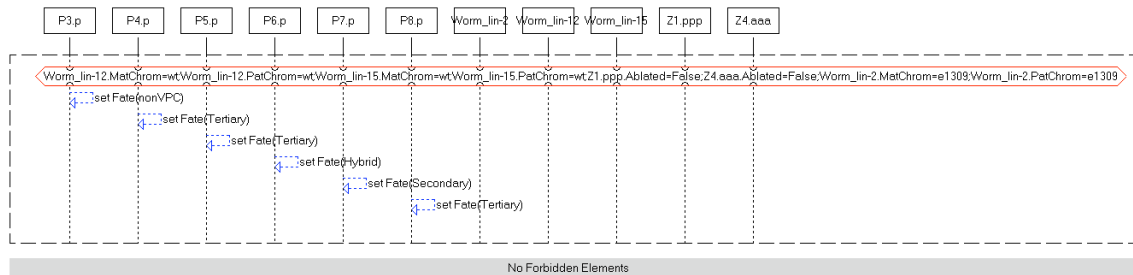
LSC: SH89 T2A c6

SH89 T2A c6



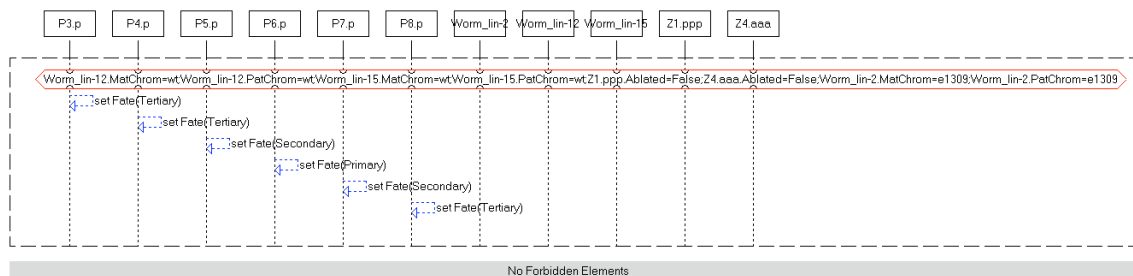
LSC: SH89 T2A c6 hyb

SH89 T2A c6 hyb



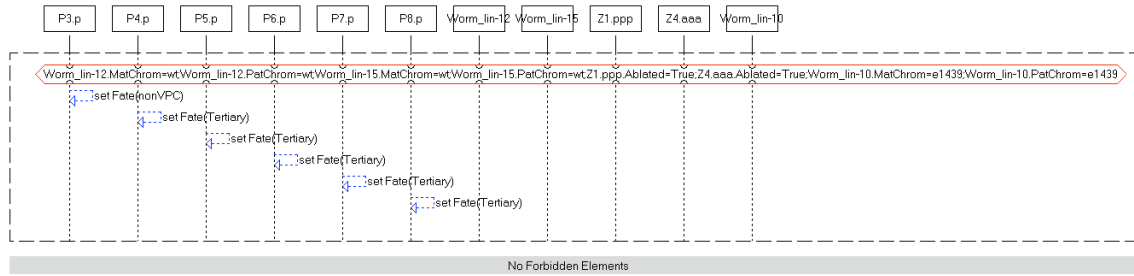
LSC: SH89 T2A c7

SH89 T2A c7



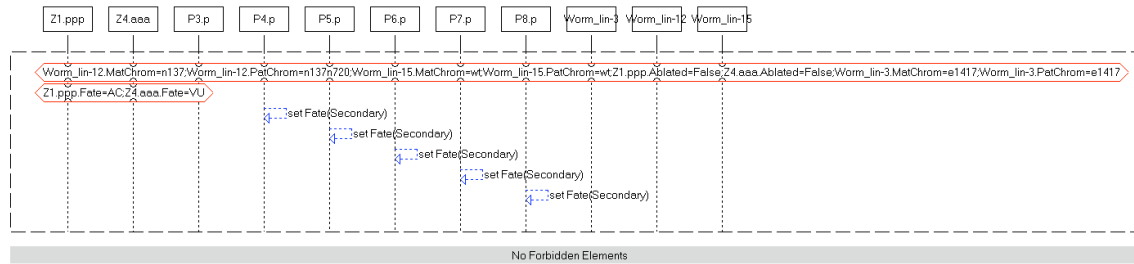
LSC: SH89 T2B b2

SH89 T2B b2



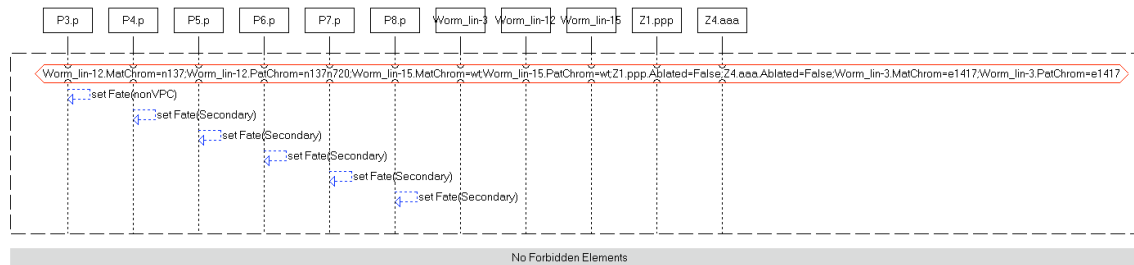
LSC: SH89 T3D a3 Z1

SH89 T3D a3 Z1



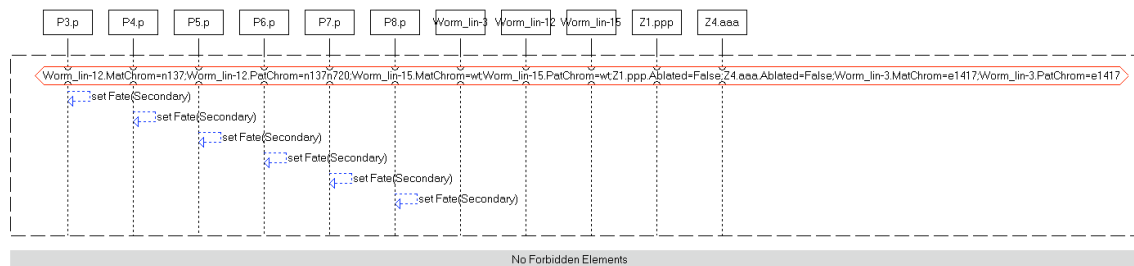
LSC: SH89 T3D a4

SH89 T3D a4



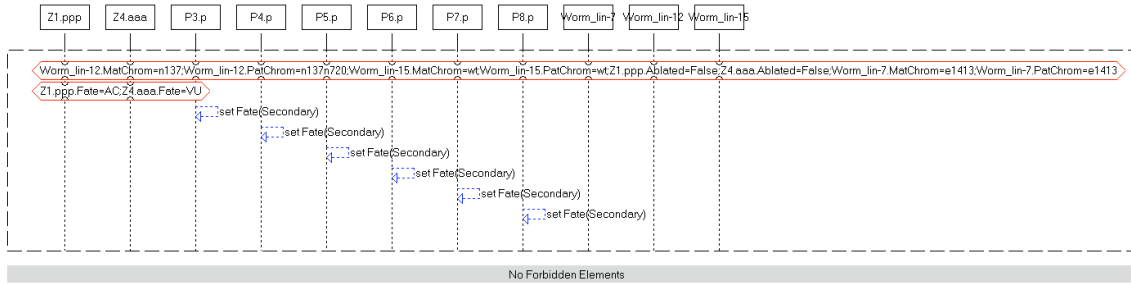
LSC: SH89 T3D a5

SH89 T3D a5



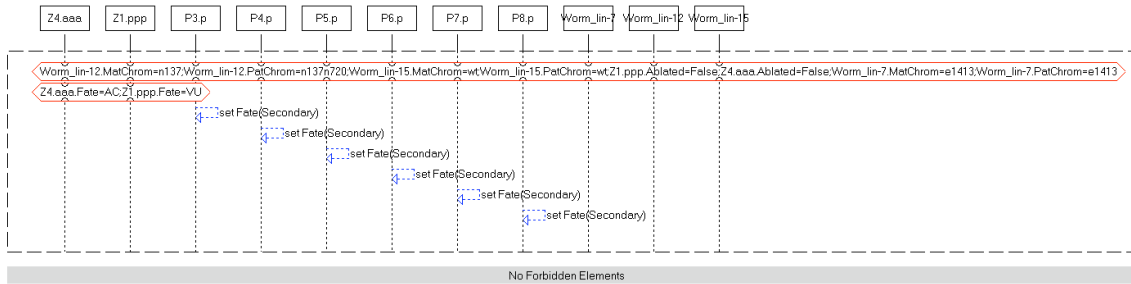
LSC: SH89 T3D b2-4 Z1

SH89 T3D b2-4 Z1



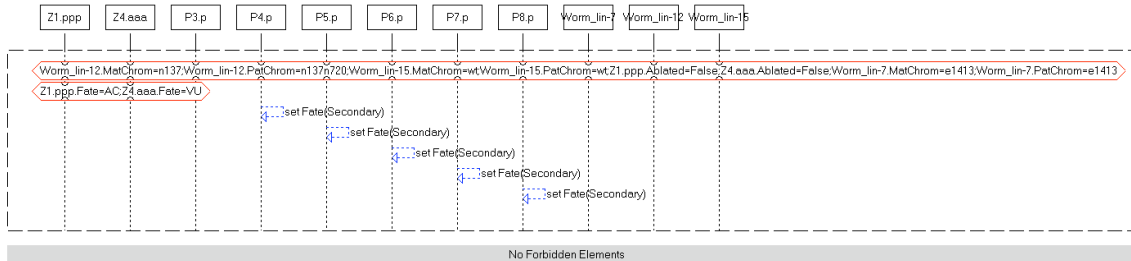
LSC: SH89 T3D b2-4 Z4

SH89 T3D b2-4 Z4



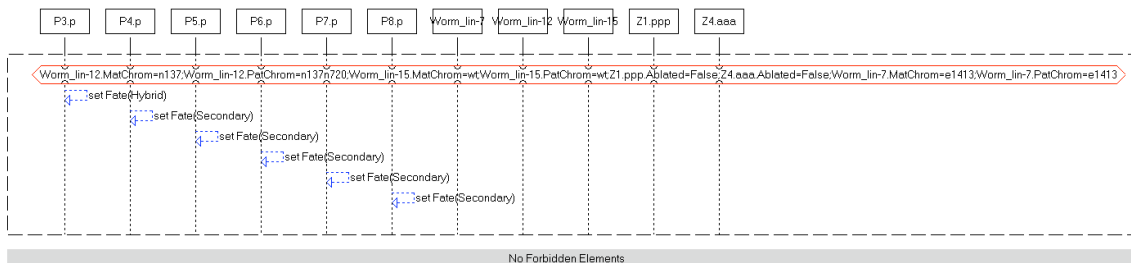
LSC: SH89 T3D b5 Z1

SH89 T3D b5 Z1

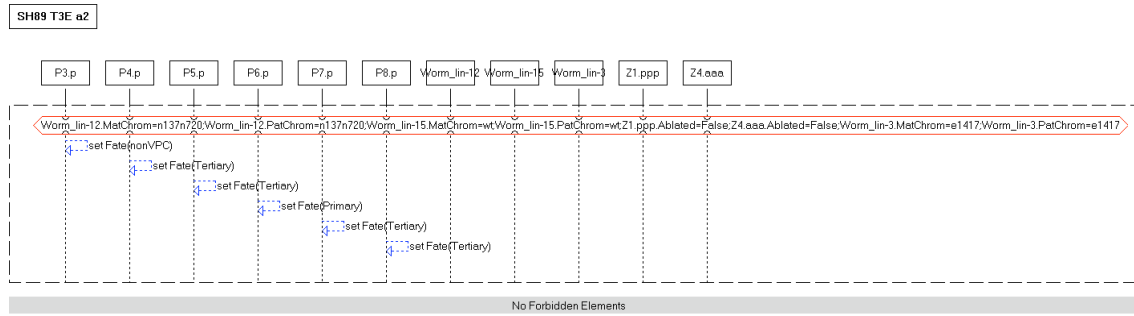


LSC: SH89 T3D b5 hyb

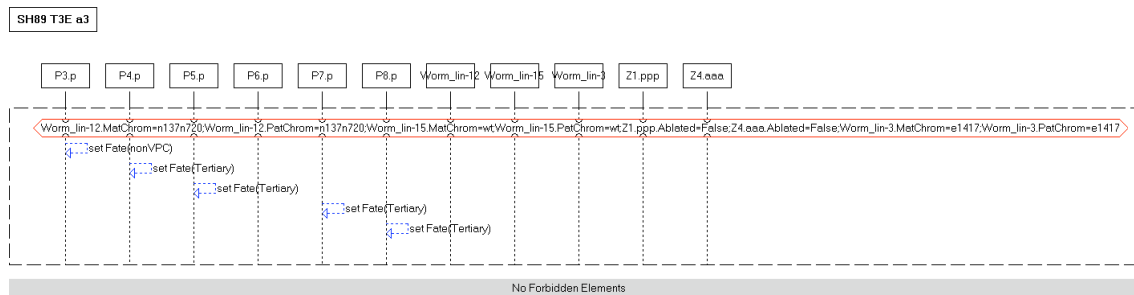
SH89 T3D b5 hyb



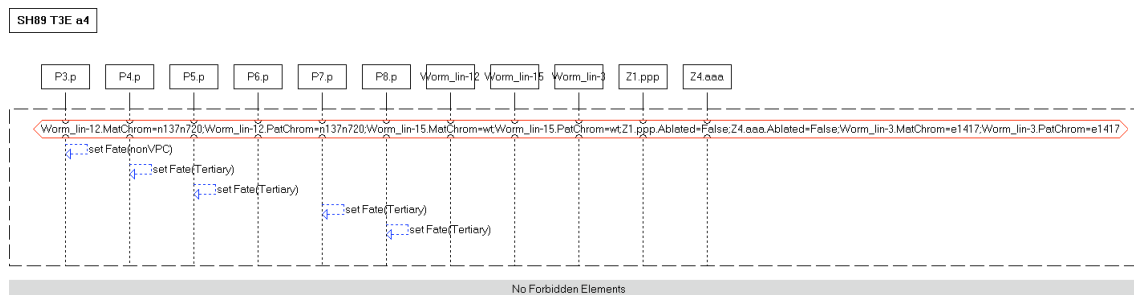
LSC: SH89 T3E a2



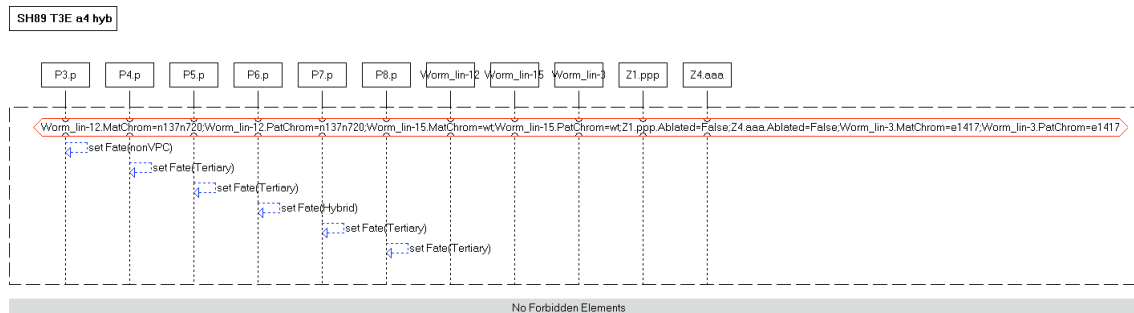
LSC: SH89 T3E a3



LSC: SH89 T3E a4

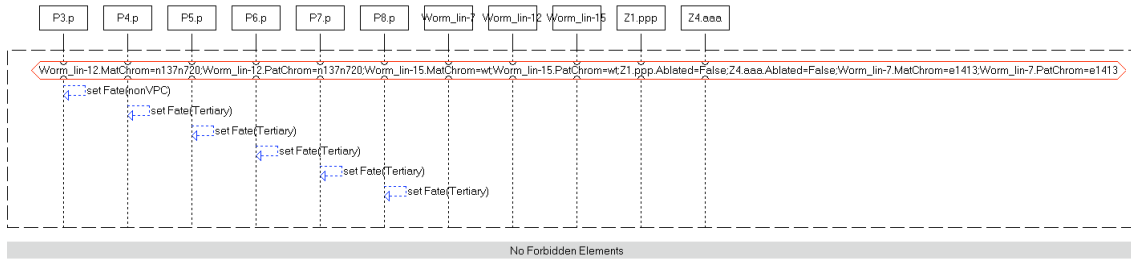


LSC: SH89 T3E a4 hyb



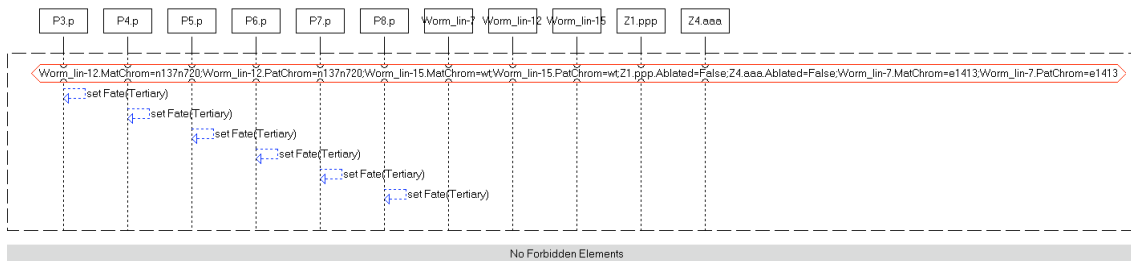
LSC: SH89 T3E b1,2

SH89 T3E b1,2



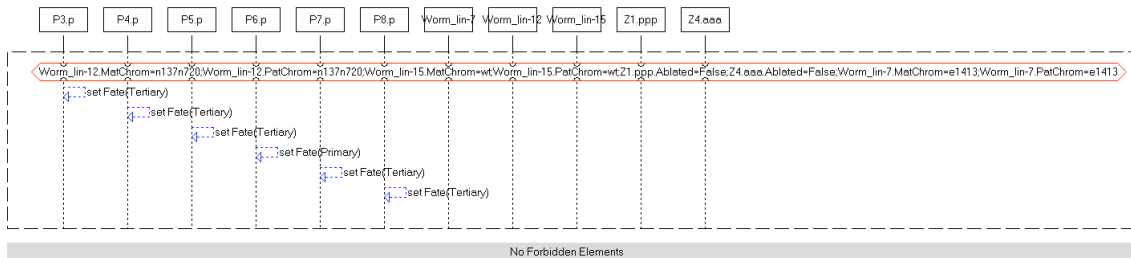
LSC: SH89 T3E b3

SH89 T3E b3



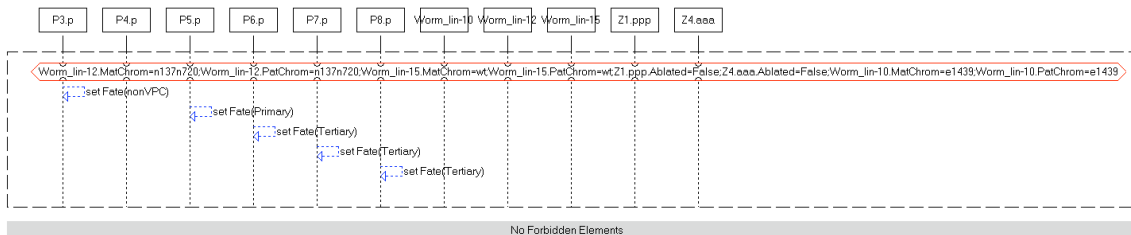
LSC: SH89 T3E b4,5

SH89 T3E b4,5



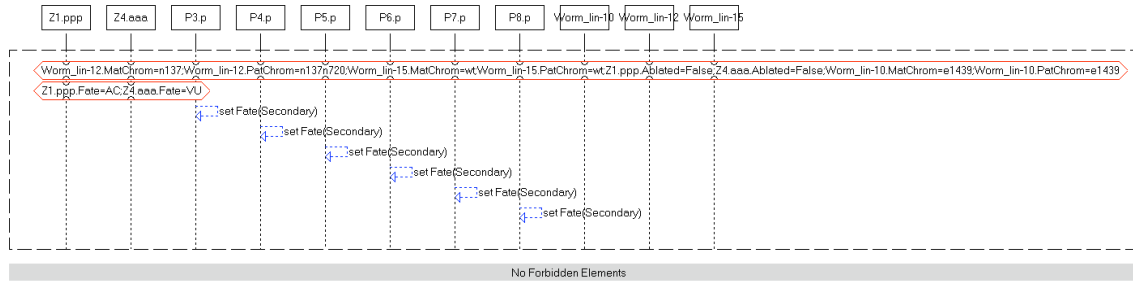
LSC: SH89 T3E c1

SH89 T3E c1



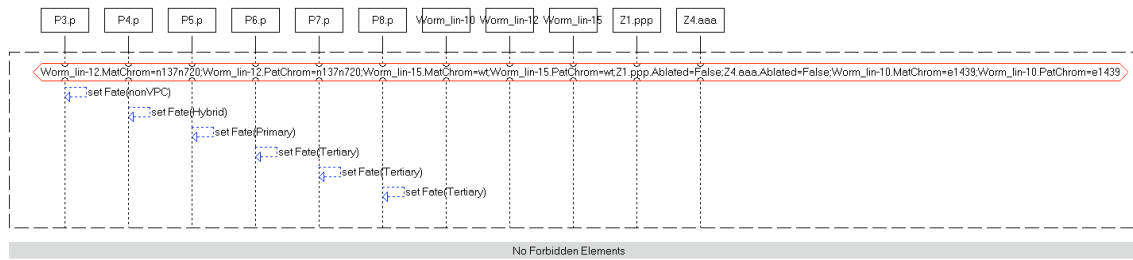
LSC: SH89 T3D c2 Z1

SH89 T3D c2 Z1



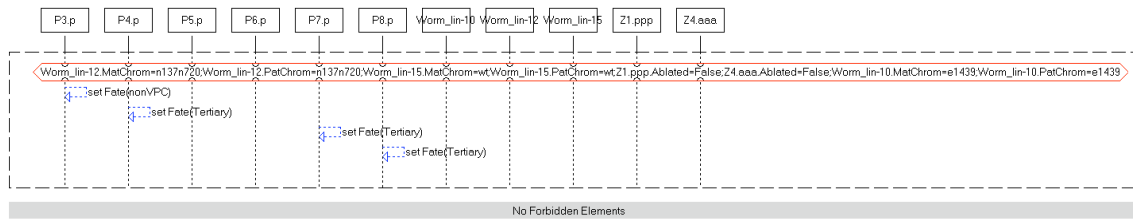
LSC: SH89 T3E c1 hyb

SH89 T3E c1 hyb



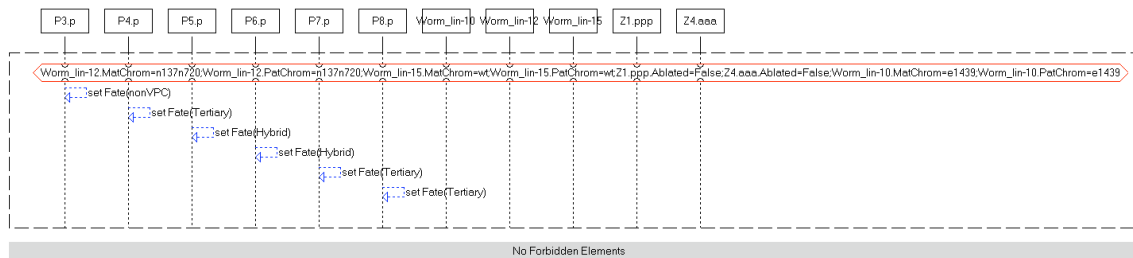
LSC: SH89 T3E c2

SH89 T3E c2



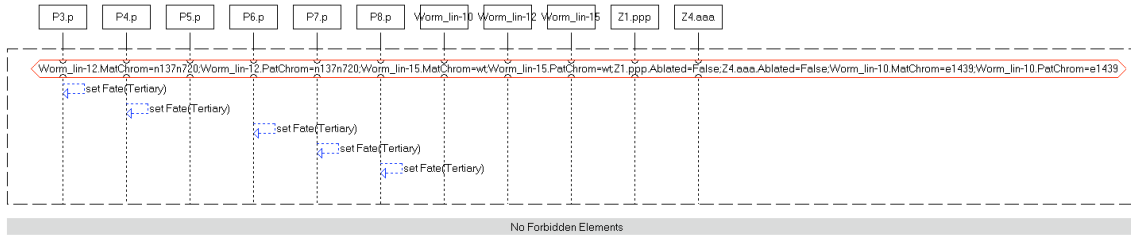
LSC: SH89 T3E c2 hyb

SH89 T3E c2 hyb



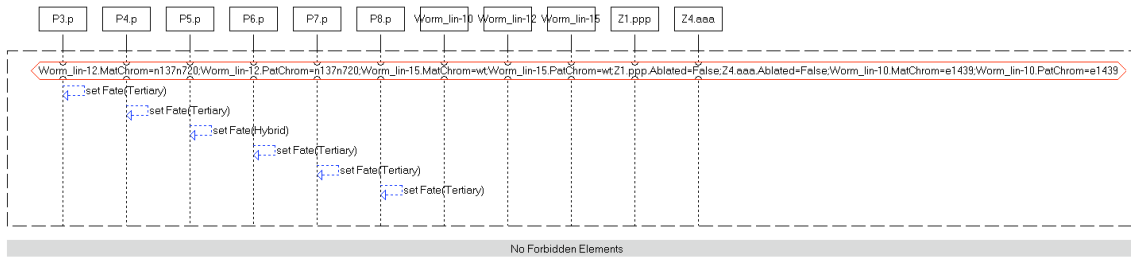
LSC: SH89 T3E c3

SH89 T3E c3



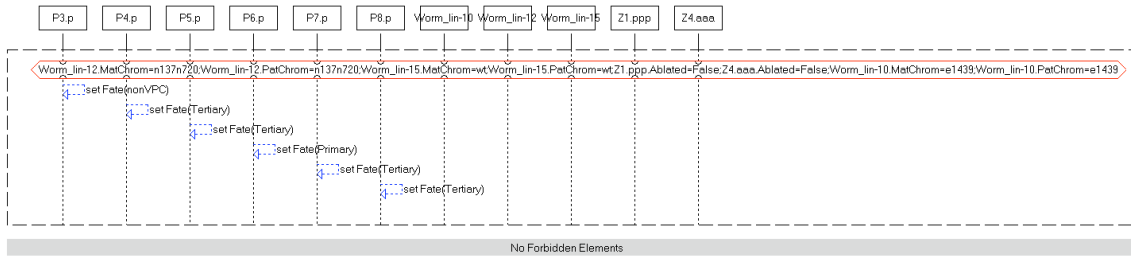
LSC: SH89 T3E c3 hyb

SH89 T3E c3 hyb



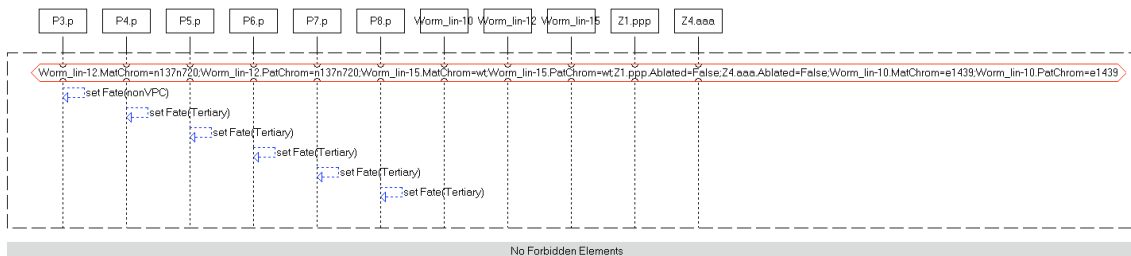
LSC: SH89 T3E c4

SH89 T3E c4



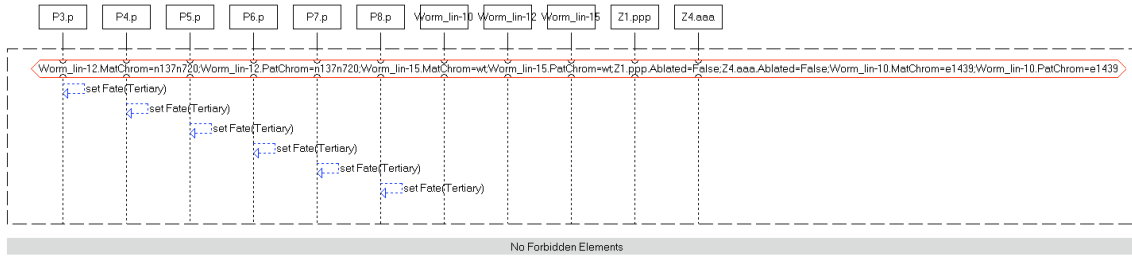
LSC: SH89 T3E c5

SH89 T3E c5



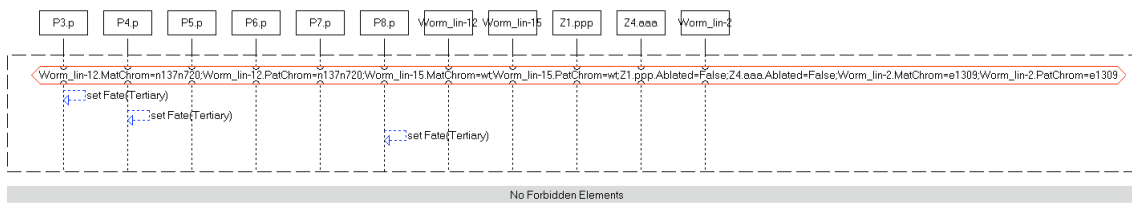
LSC: SH89 T3E c6

SH89 T3E c6



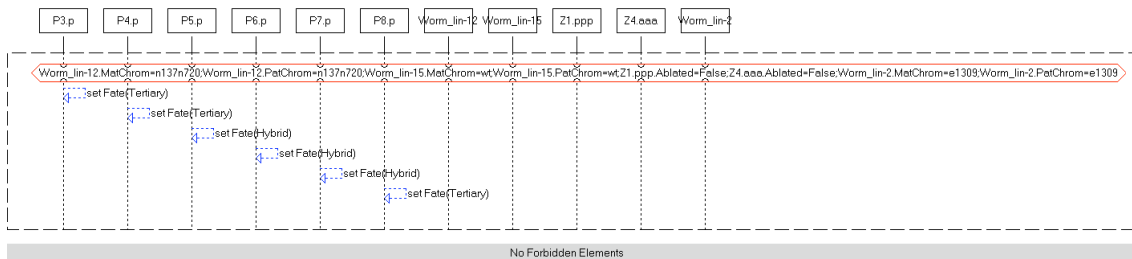
LSC: SH89 T3E d2

SH89 T3E d2



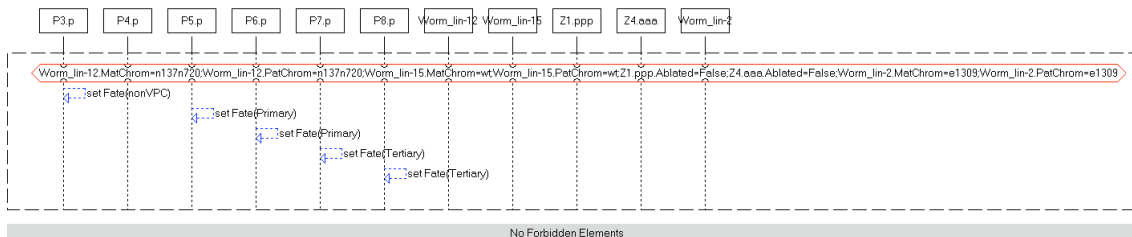
LSC: SH89 T3E d2 hyb

SH89 T3E d2 hyb



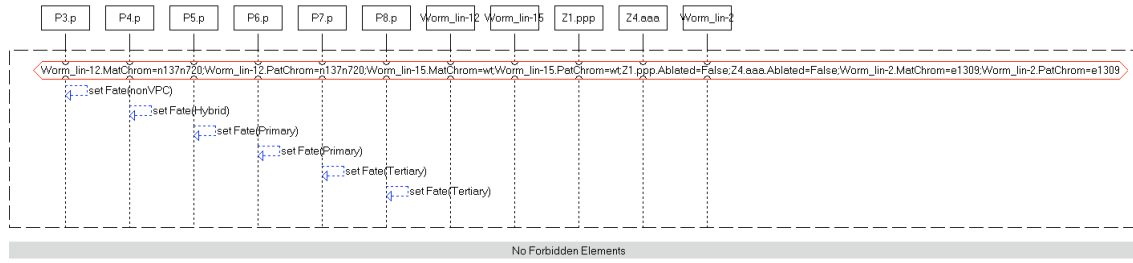
LSC: SH89 T3E d4

SH89 T3E d4



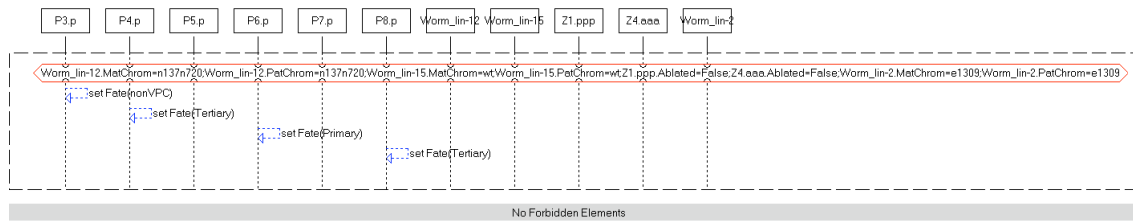
LSC: SH89 T3E d4 hyb

SH89 T3E d4 hyb



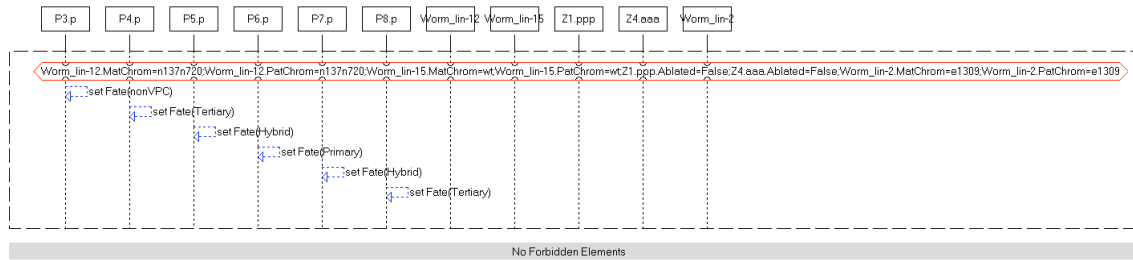
LSC: SH89 T3E d5

SH89 T3E d5



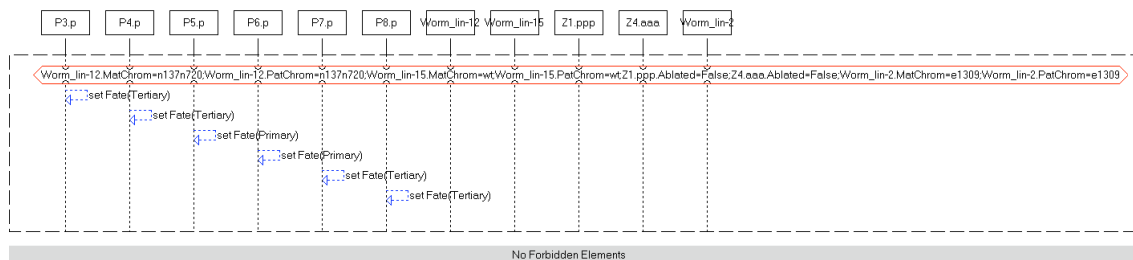
LSC: SH89 T3E d5 hyb

SH89 T3E d5 hyb



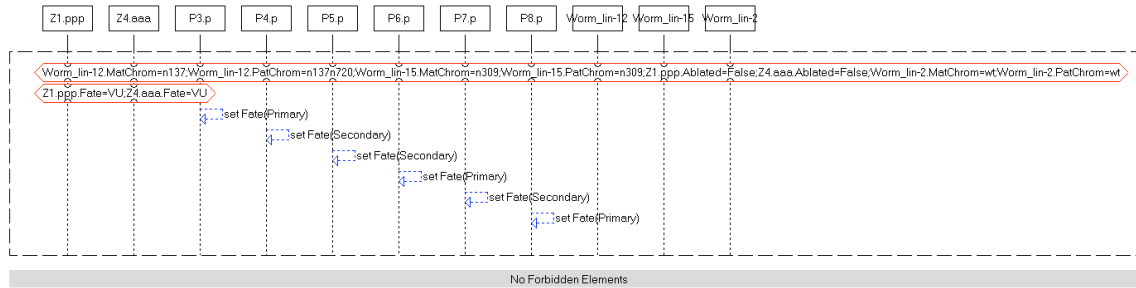
LSC: SH89 T3E d6

SH89 T3E d6



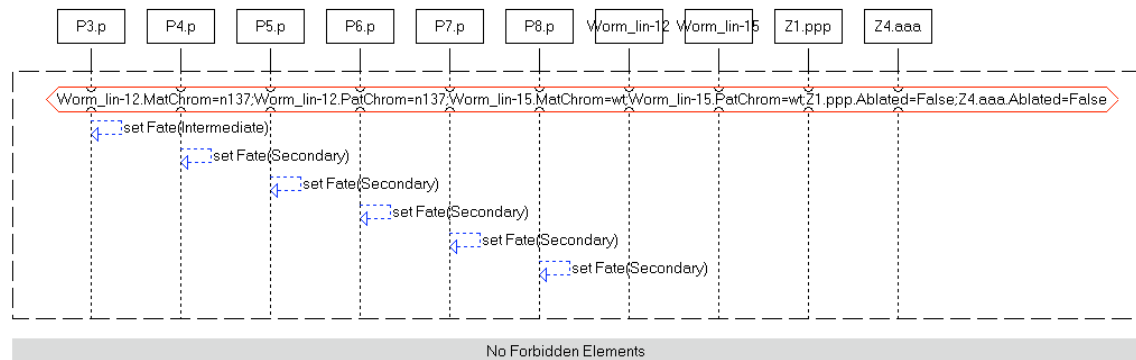
LSC: SH89 T3G 2

SH89 T3G 2



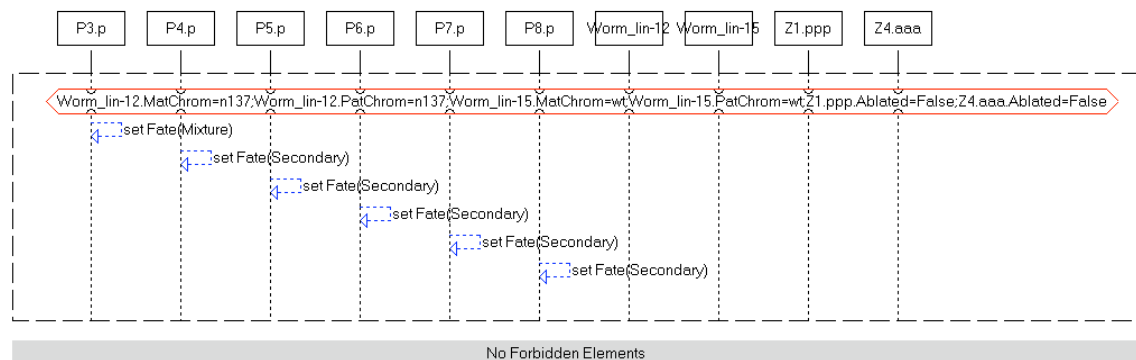
LSC: SH89 T1E 9 int

SH89 T1E 9 int



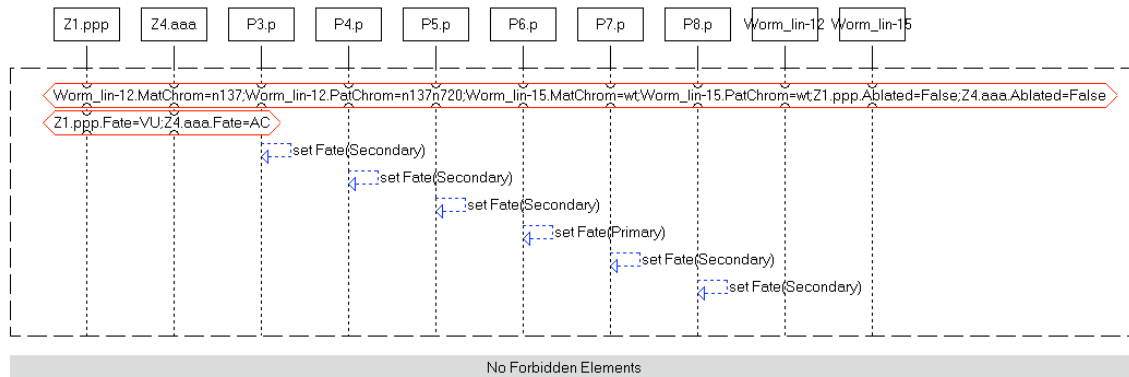
LSC: SH89 T1E 11 mix

SH89 T1E 11 mix



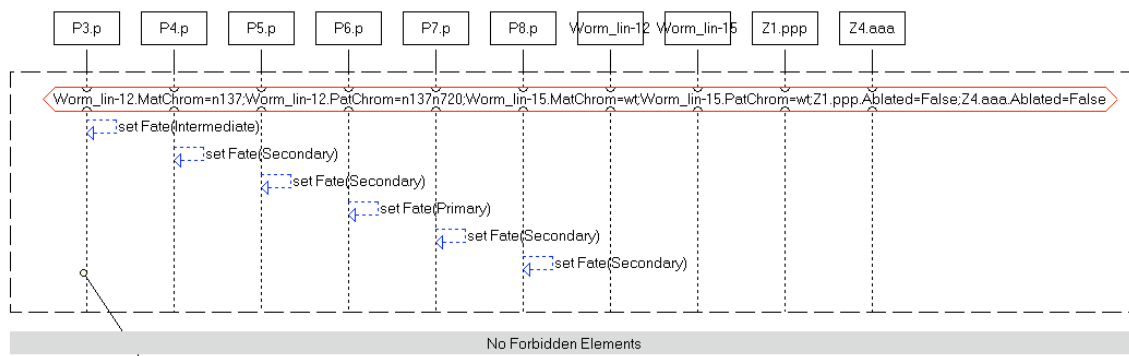
LSC: SH89 T1F 3,4,6,7 Z4

SH89 T1F 3,4,6,7 Z4



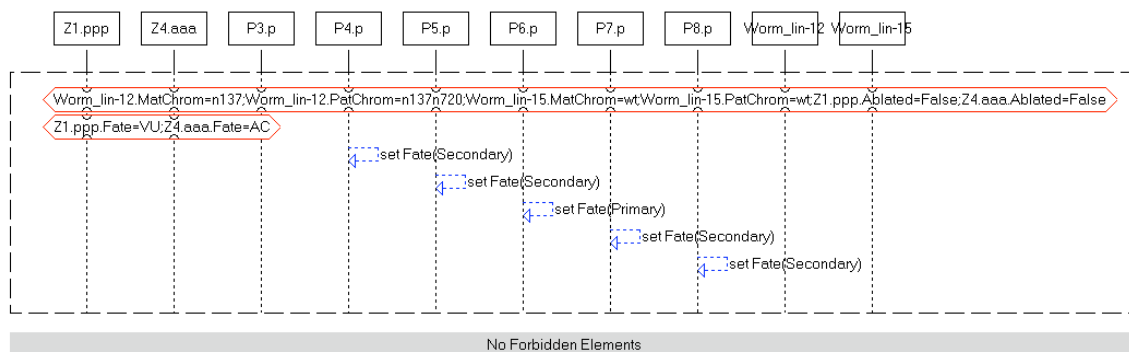
LSC: SH89 T1F 5 int

SH89 T1F 5 int



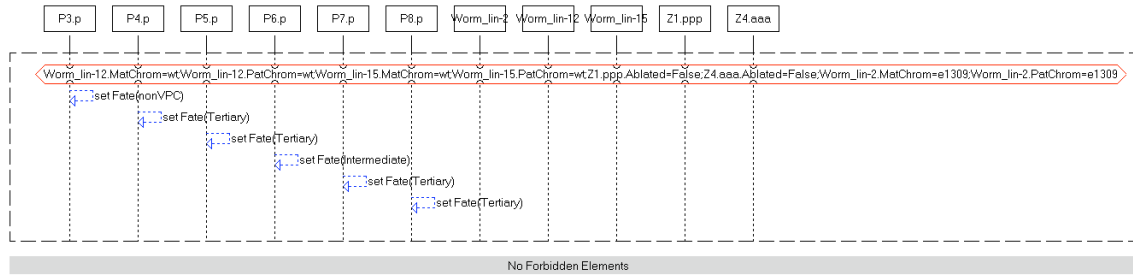
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SH89 T1F 5 Z4



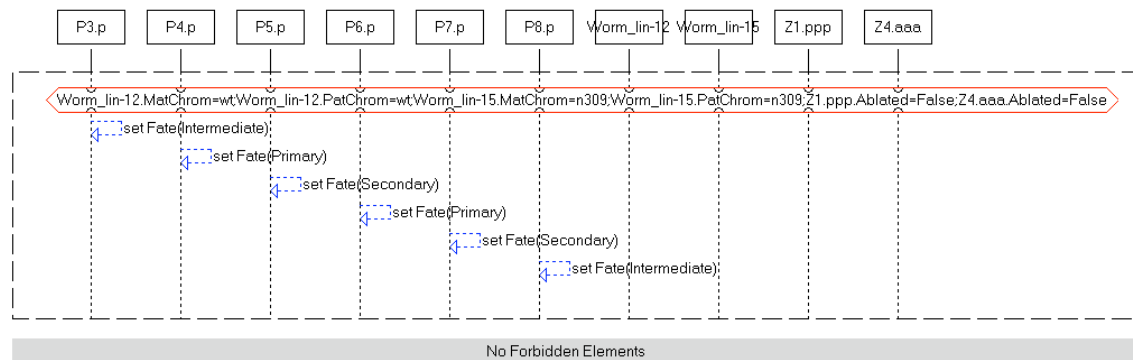
LSC: SH89 T2A c4 int

SH89 T2A c4 int



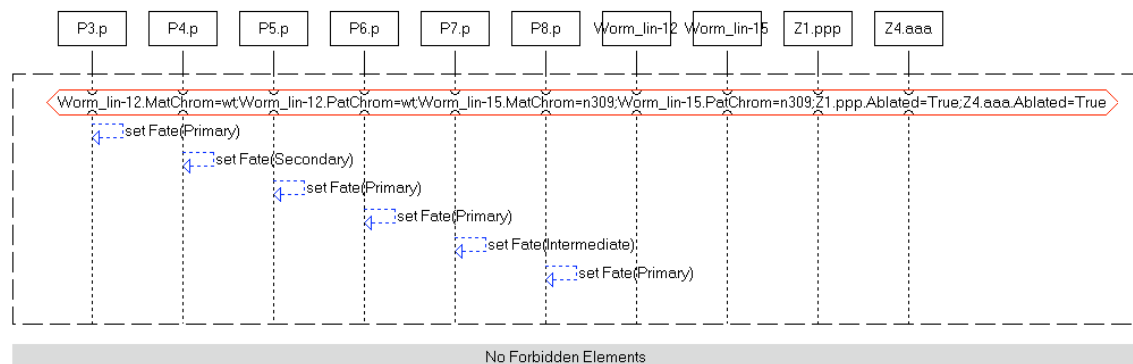
LSC: SH89 T2C 5 int

SH89 T2C 5 int



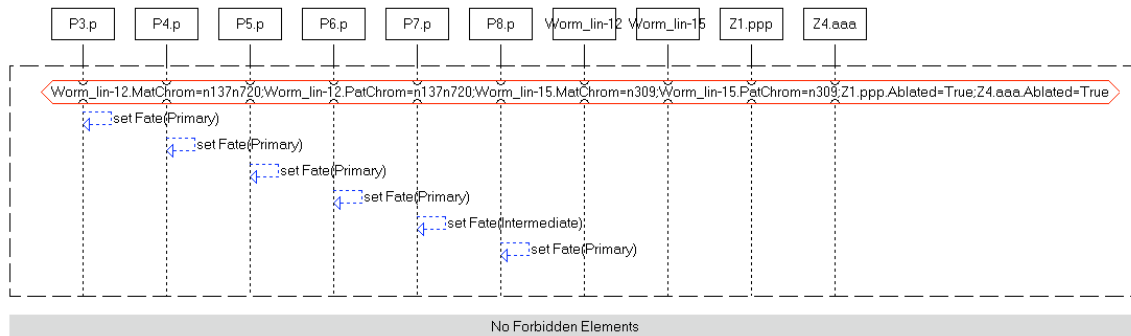
LSC: SH89 T2D 2 int

SH89 T2D 2 int



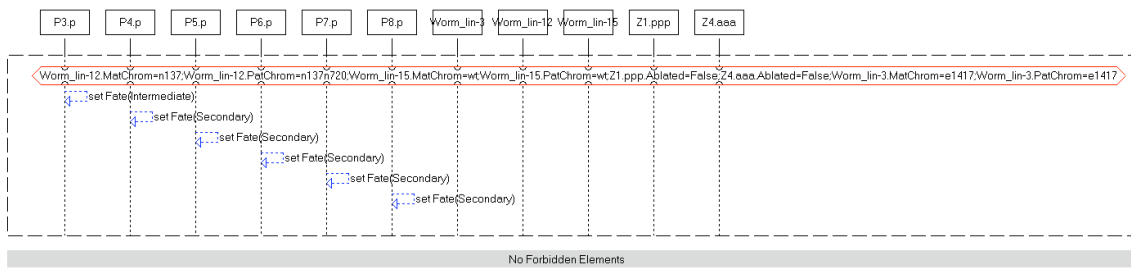
LSC: SH89 T3B int

SH89 T3B int



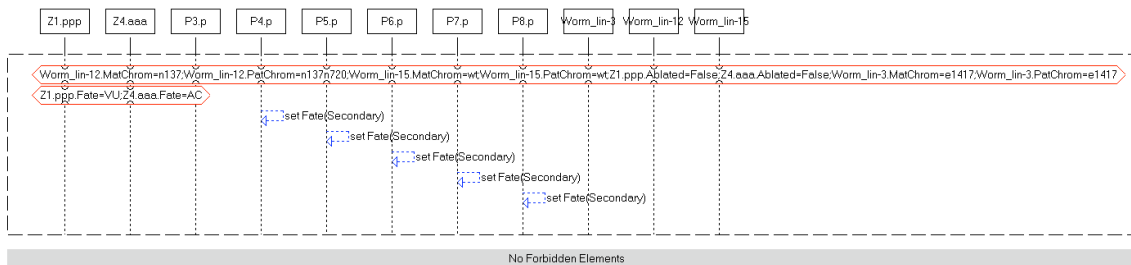
LSC: SH89 T3D a3 int

SH89 T3D a3 int



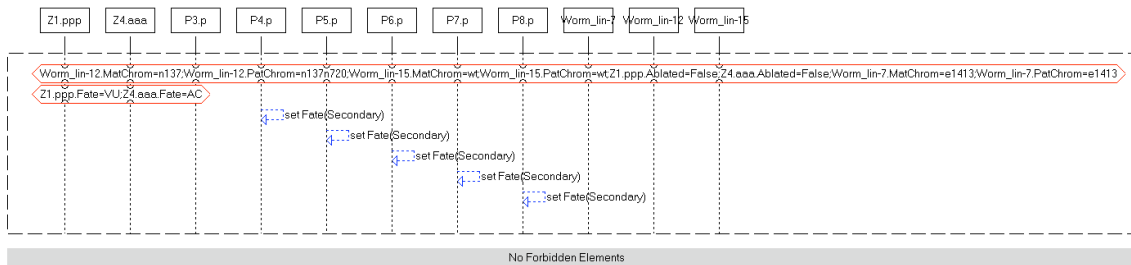
LSC: SH89 T3D a3 Z4

SH89 T3D a3 Z4

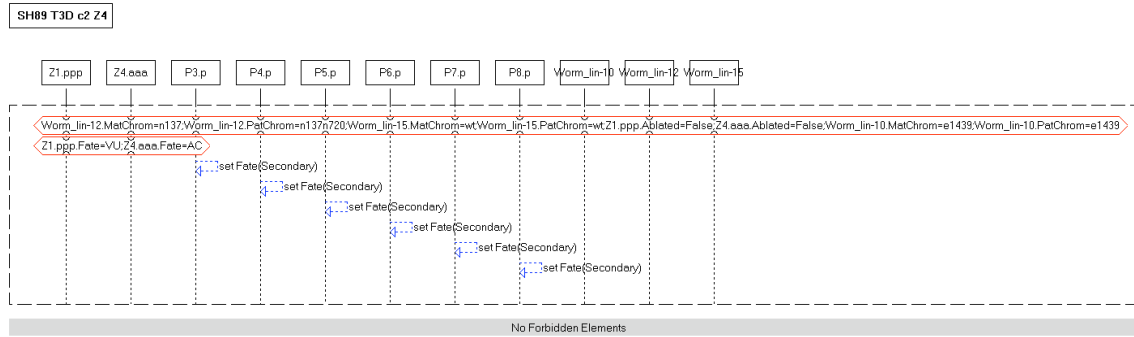


LSC: SH89 T3D b5 Z4

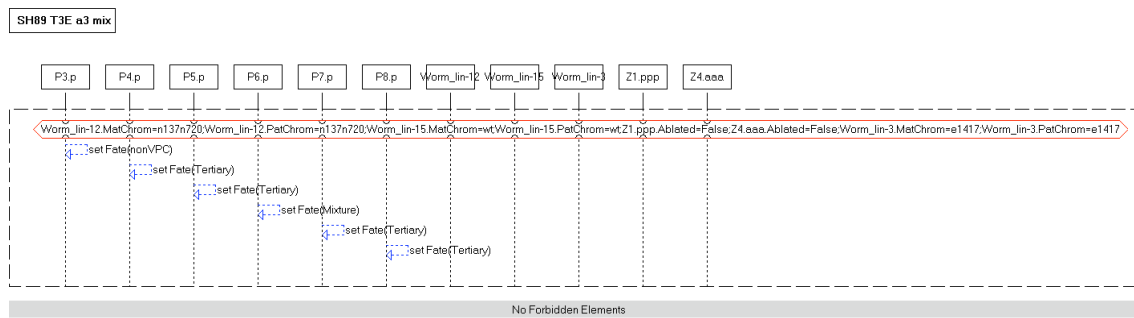
SH89 T3D b5 Z4



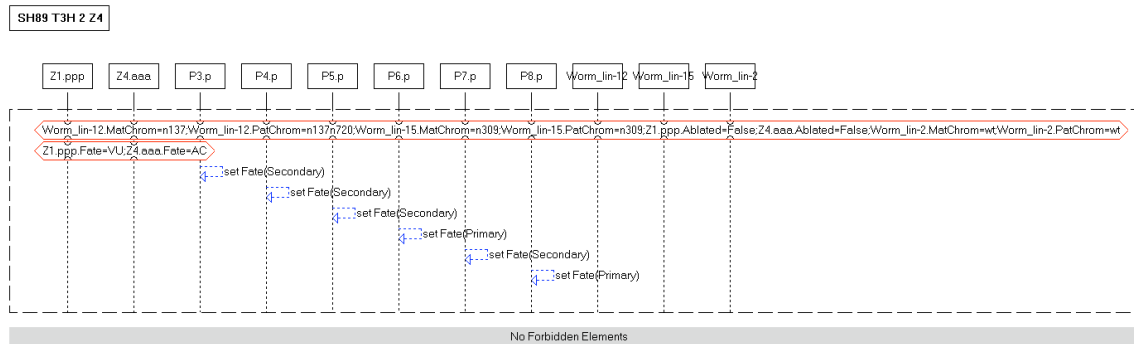
LSC: SH89 T3D c2 Z4



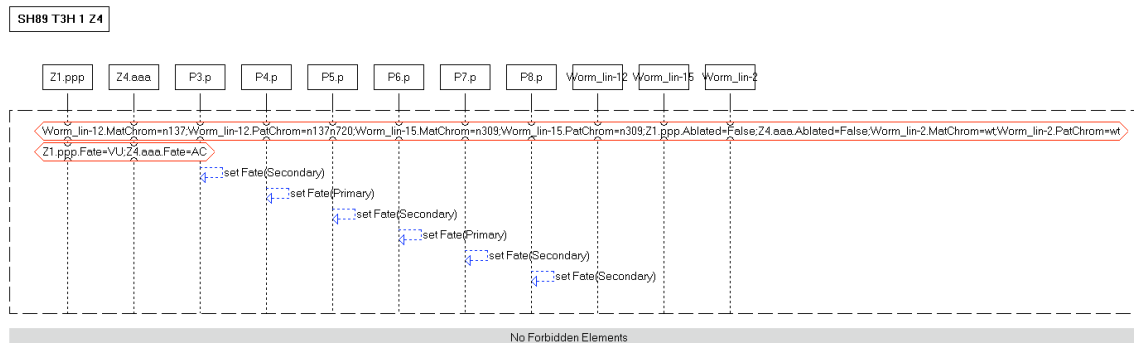
LSC: SH89 T3E a3 mix



LSC: SH89 T3H 2 Z4



LSC: SH89 T3H 1 Z4

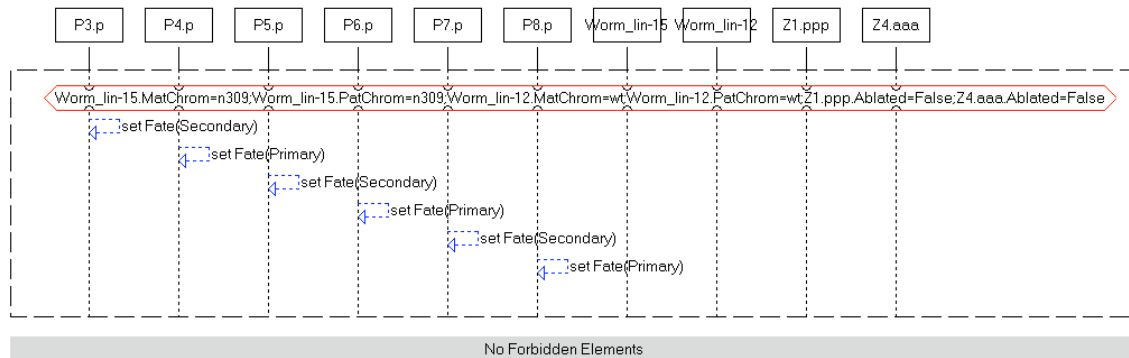


Use Case: S88 EXP

Scenarios:

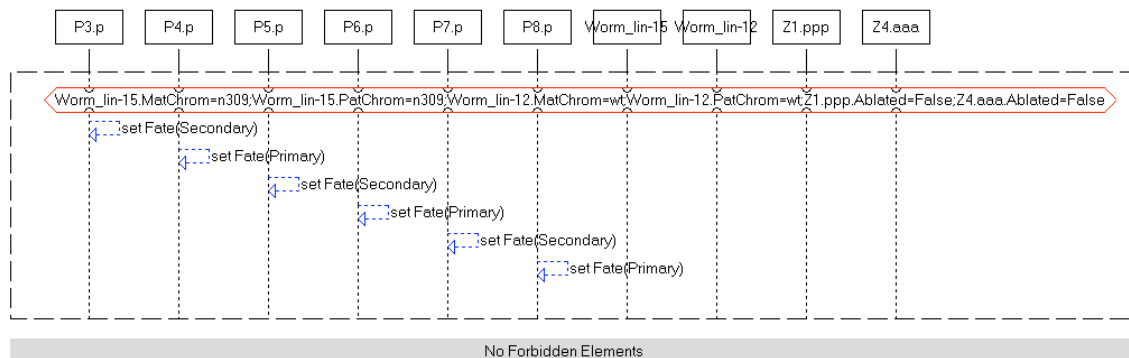
LSC: S88 T1D 1

S88 T1D 1



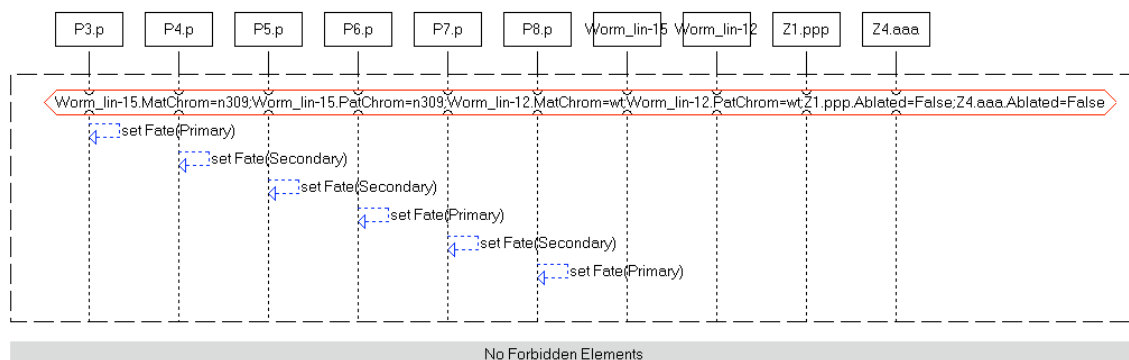
LSC: S88 T1D 2

S88 T1D 2



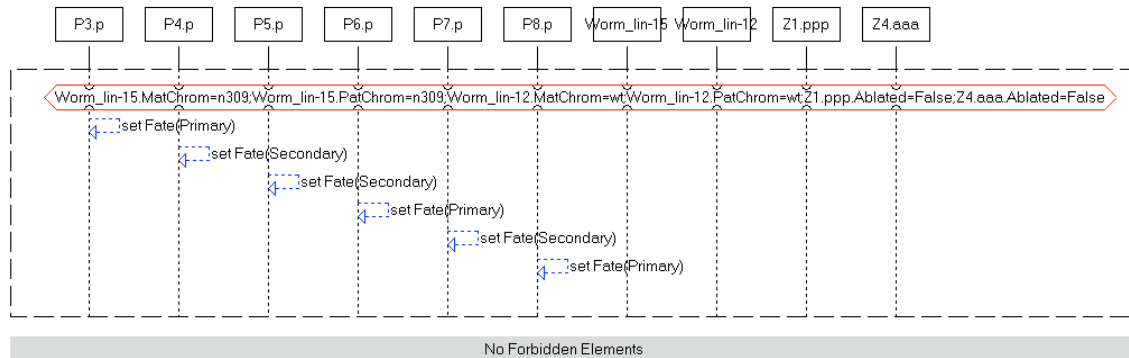
LSC: S88 T1D 3

S88 T1D 3



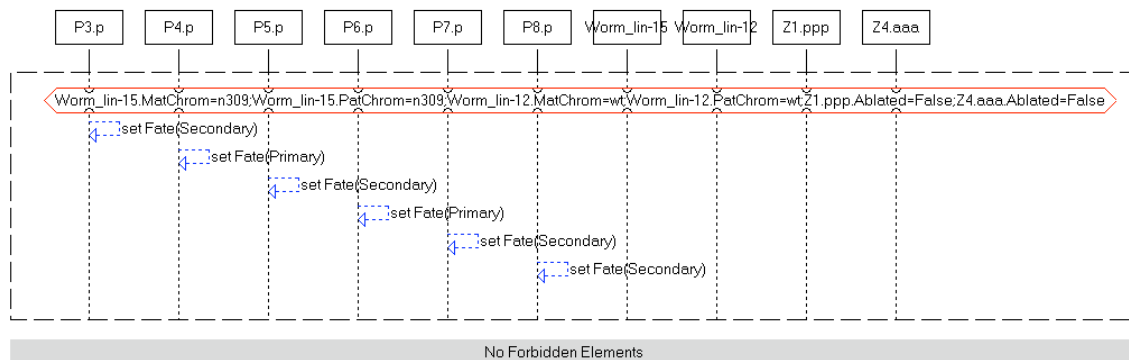
LSC: S88 T1D 4

S88 T1D 4



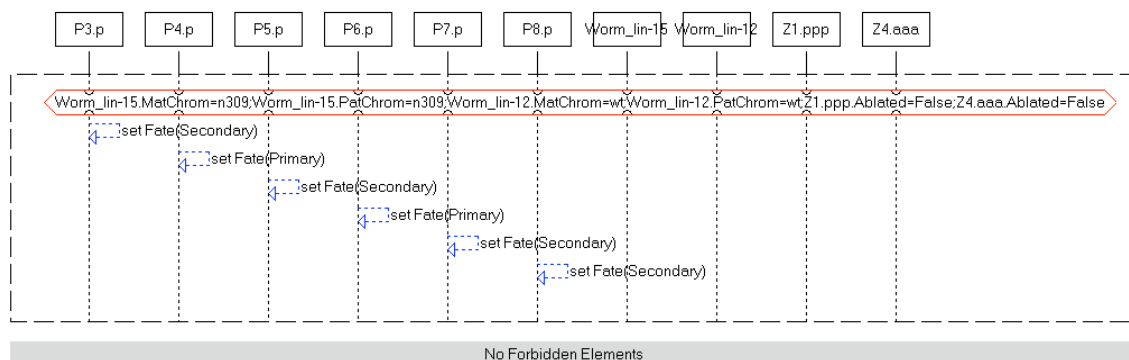
LSC: S88 T1D 5

S88 T1D 5



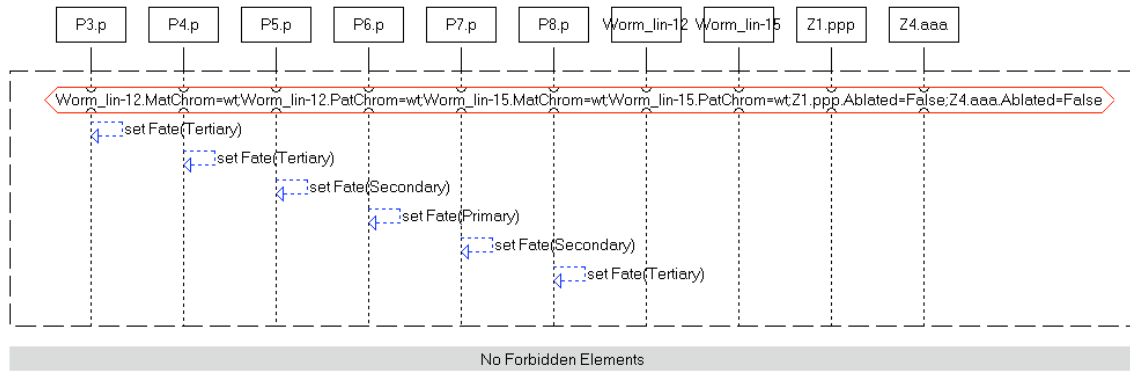
LSC: S88 T1D 6

S88 T1D 6



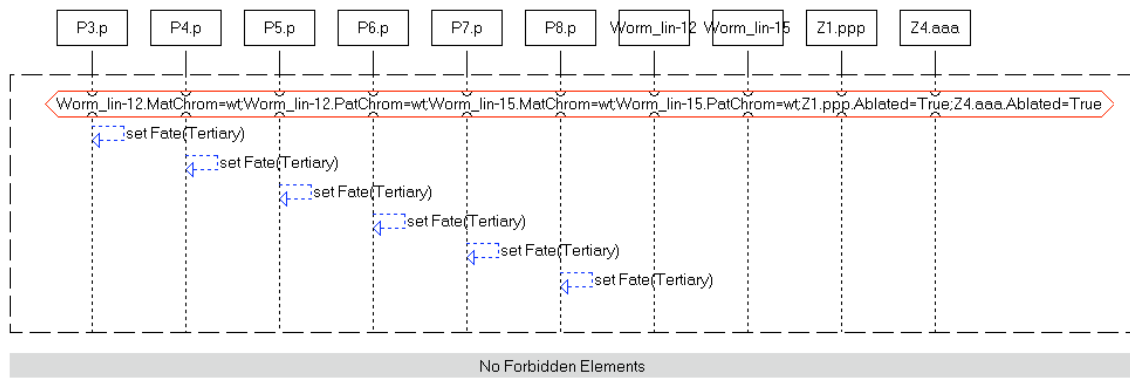
LSC: S88 T1A

S88 T1A



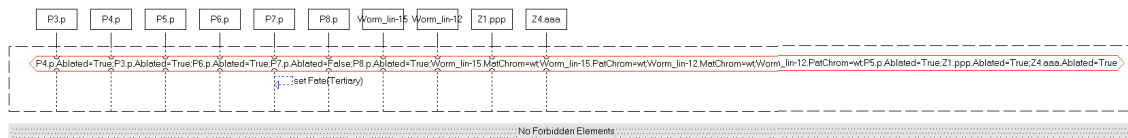
LSC: S88 T1B

S88 T1B



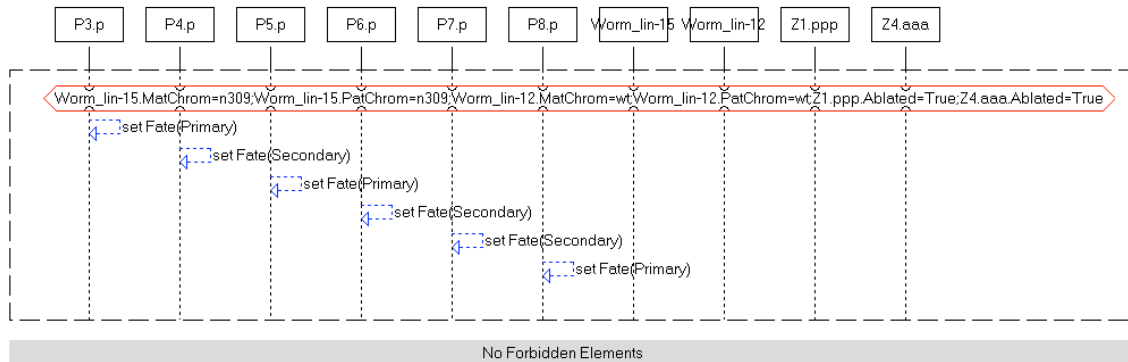
LSC: S88 T1C

S88 T1C



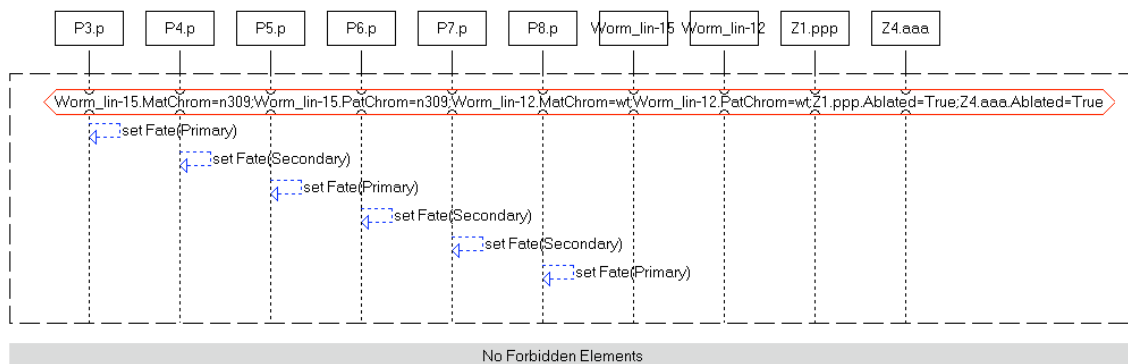
LSC: S88 T1E 1

S88 T1E 1



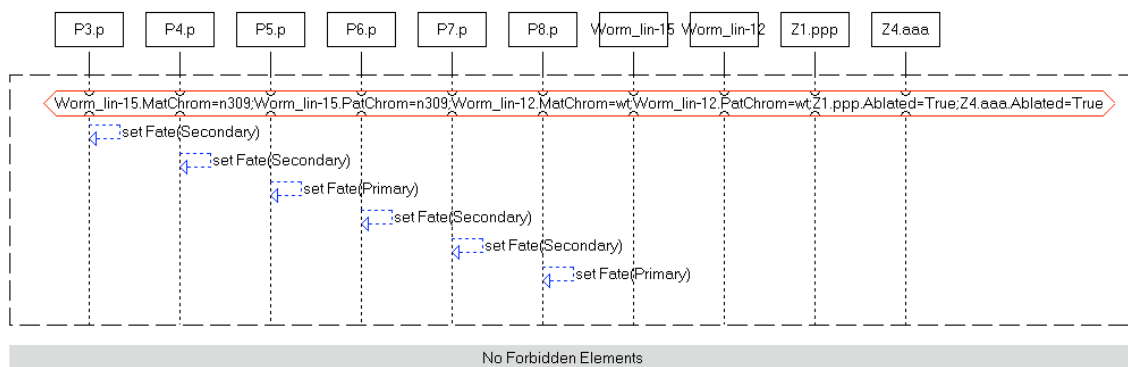
LSC: S88 T1E 2

S88 T1E 2



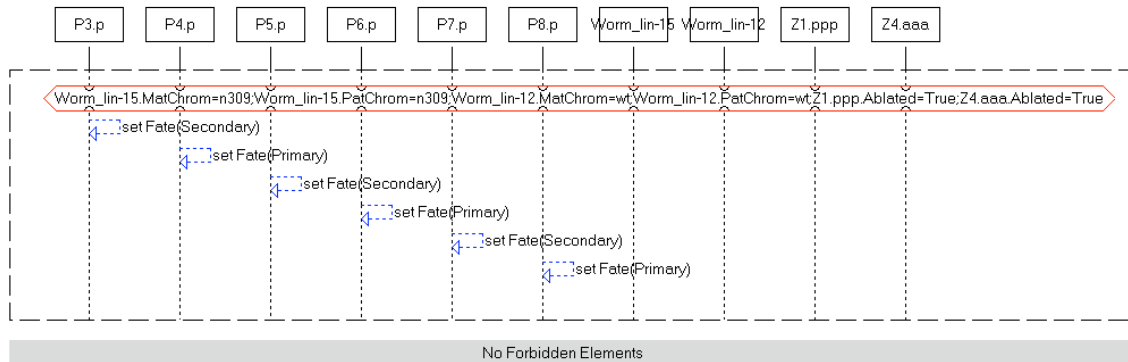
LSC: S88 T1E 3

S88 T1E 3



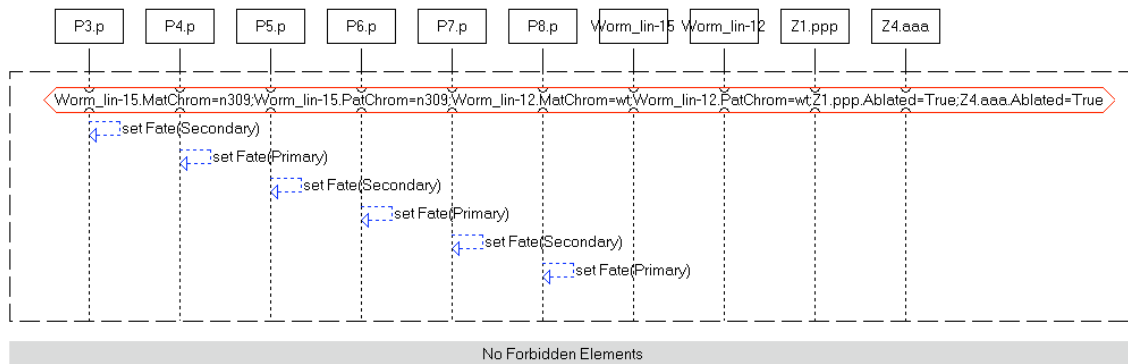
LSC: S88 T1E 4

S88 T1E 4



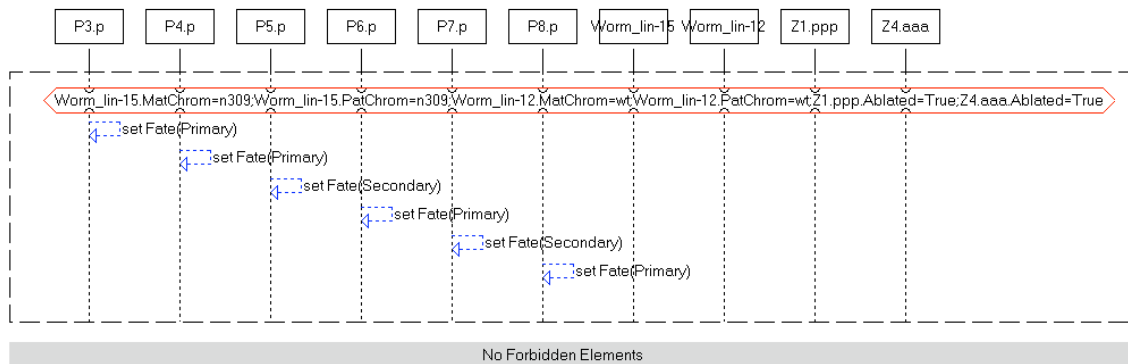
LSC: S88 T1E 5

S88 T1E 5



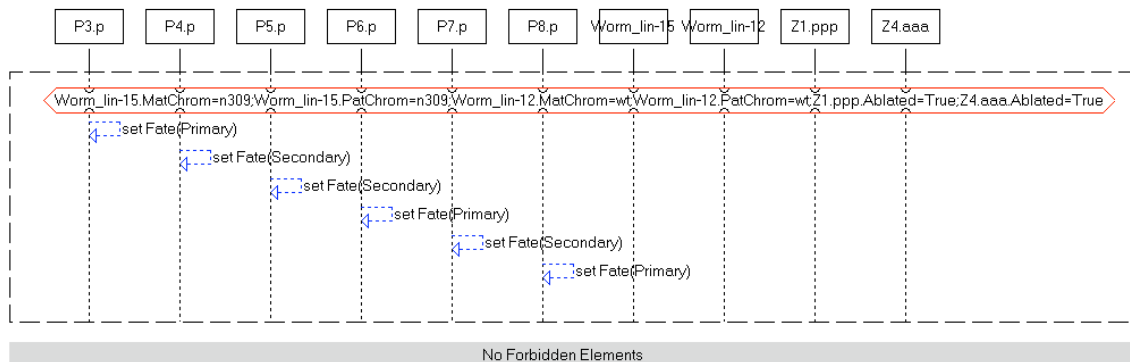
LSC: S88 T1E 6

S88 T1E 6



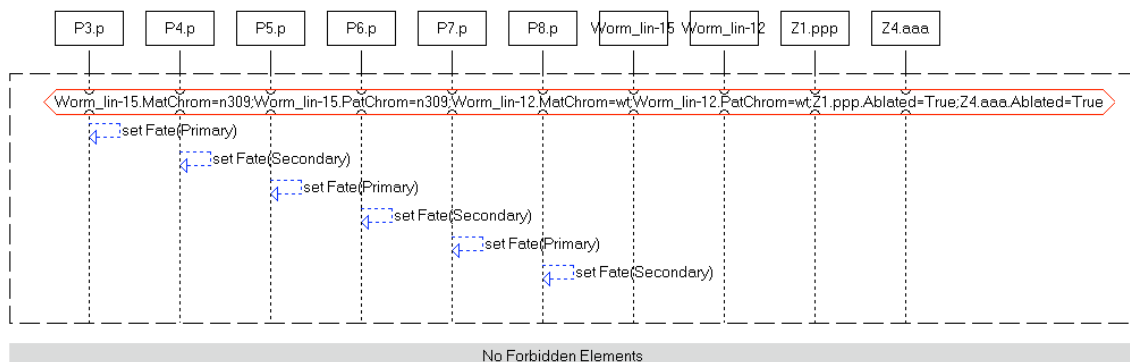
LSC: S88 T1E 7

S88 T1E 7



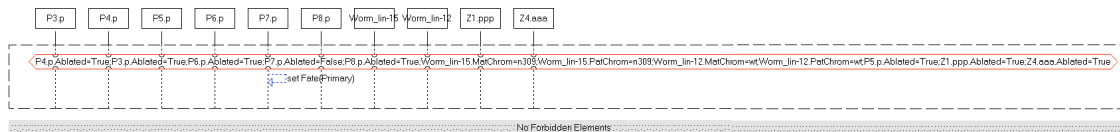
LSC: S88 T1E 8

S88 T1E 8



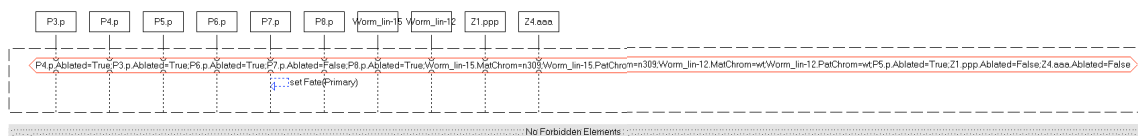
LSC: S88 T1F

S88 T1F



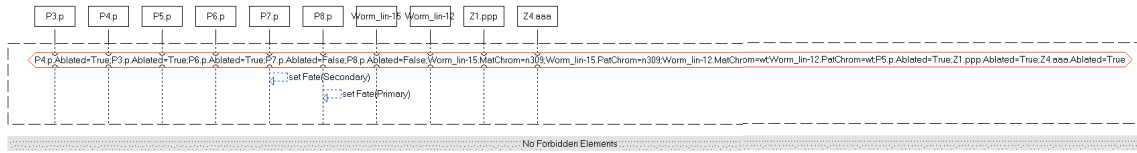
LSC: S88 T1G

S88 T1G



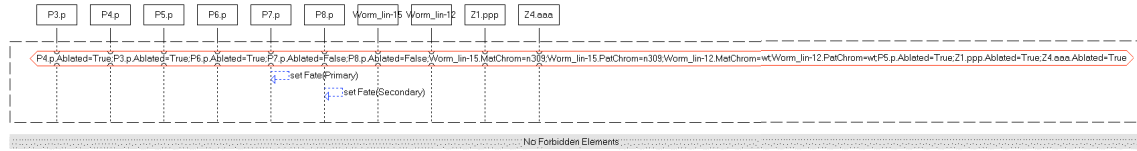
LSC: S88 T1H 1,2,3,4

S88 T1H 1,2,3,4



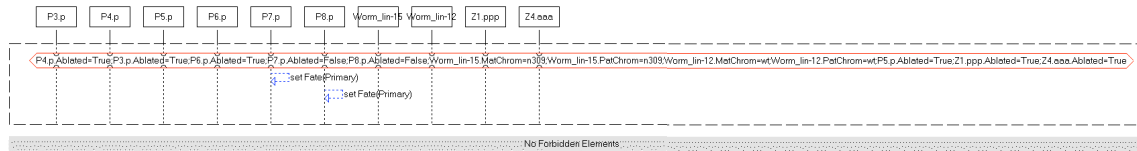
LSC: S88 T1H 5,6

S88 T1H 5,6



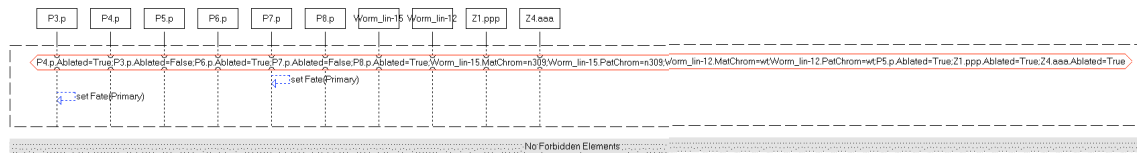
LSC: S88 T1H 7,8,9

S88 T1H 7,8,9



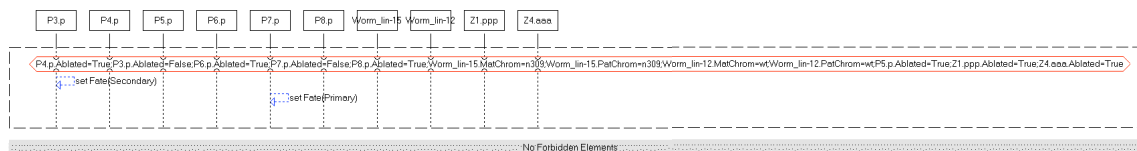
LSC: S88 T1I 1-6

S88 T1I 1-6



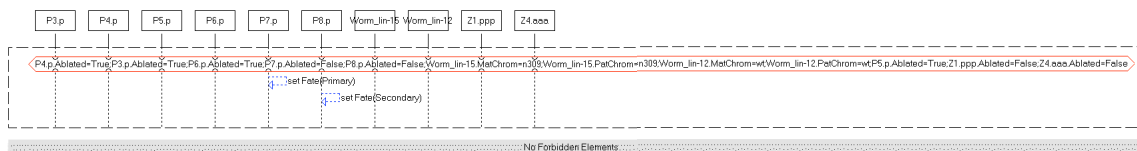
LSC: S88 T1I 7

S88 T1I 7



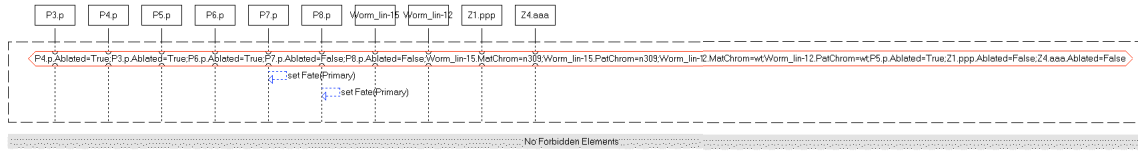
LSC: S88 T1J 1-10

S88 T1J 1-10



LSC: S88 T1J 11-14

S88 T1J 11-14

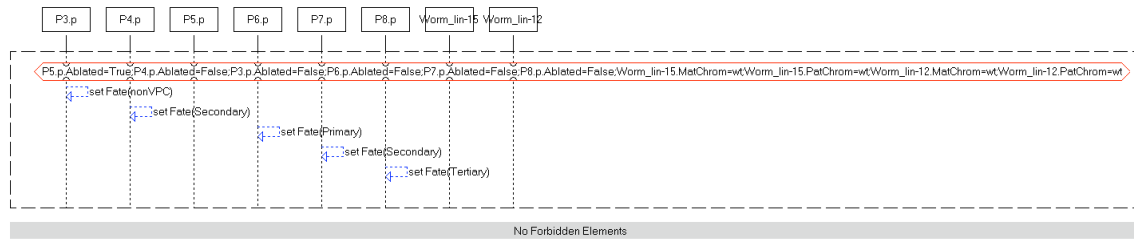


Use Case: SH86 EXP nonVPC

Scenarios:

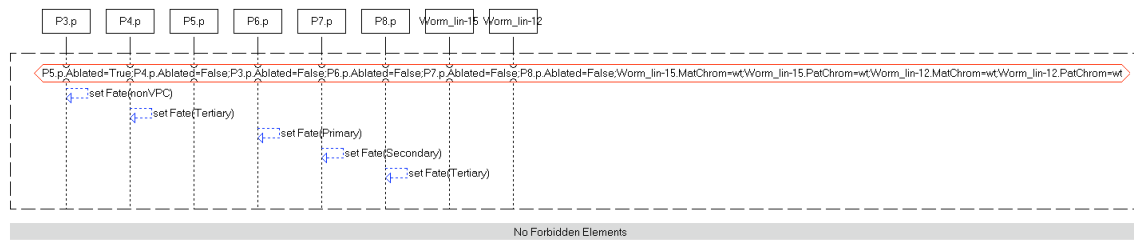
LSC: SH86 T1 2 nonVPC

SH86 T1 2 nonVPC



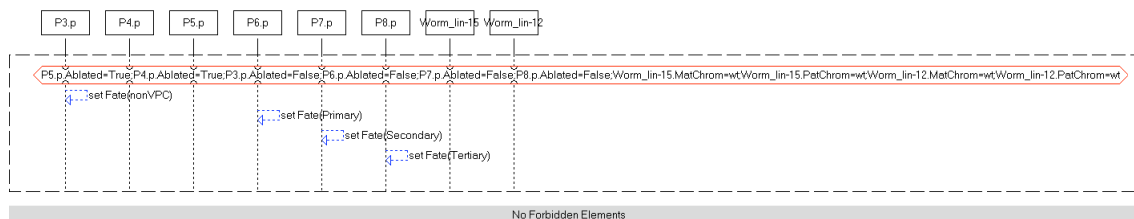
LSC: SH86 T1 3 nonVPC

SH86 T1 3 nonVPC

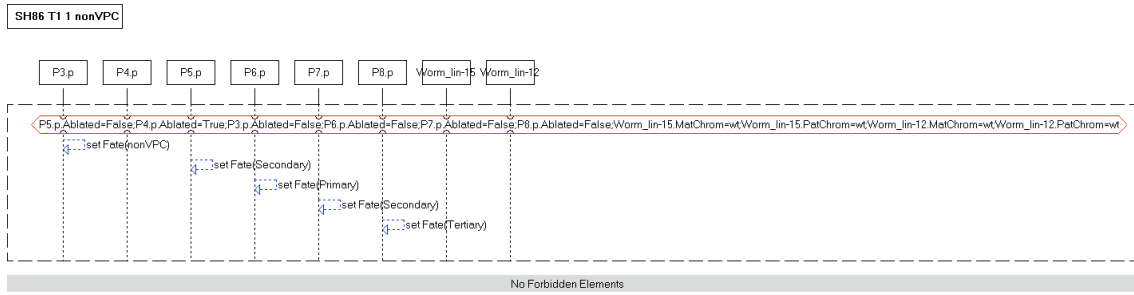


LSC: SH86 T1 13 nonVPC

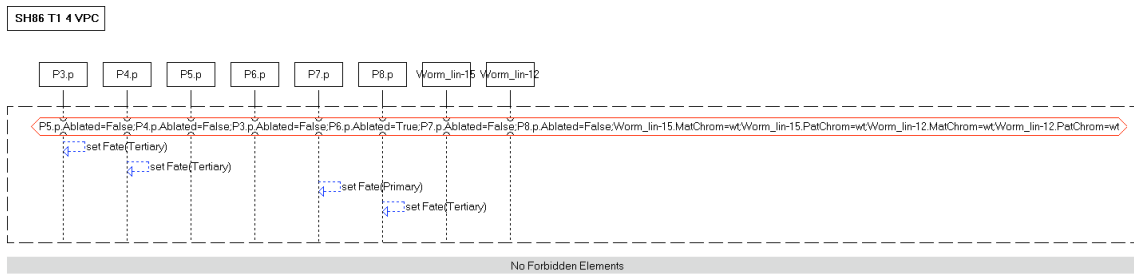
SH86 T1 13 nonVPC



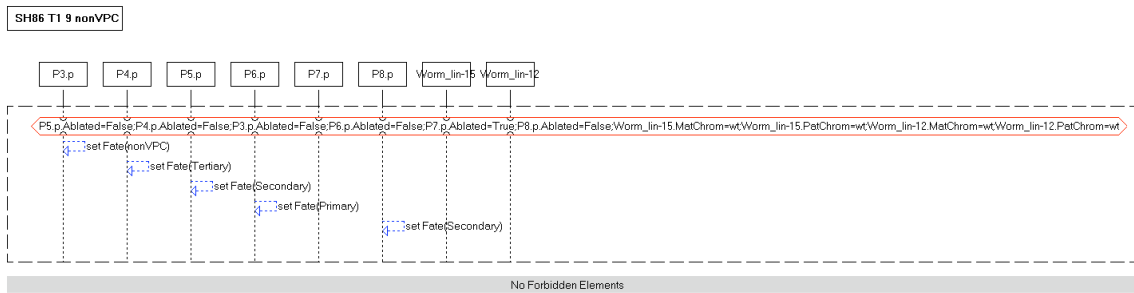
LSC: SH86 T1 1 nonVPC



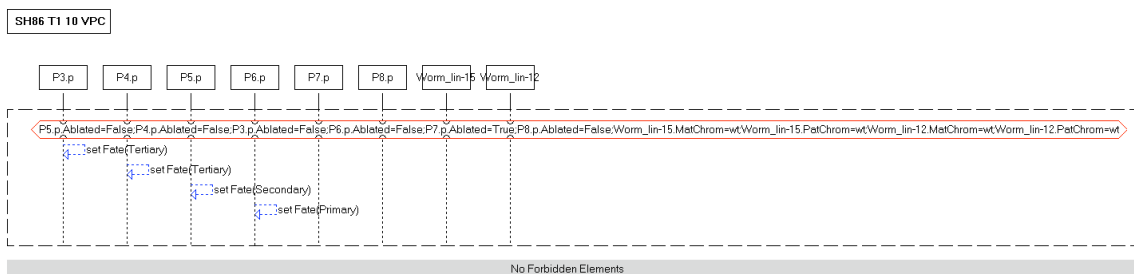
LSC: SH86 T1 4 VPC



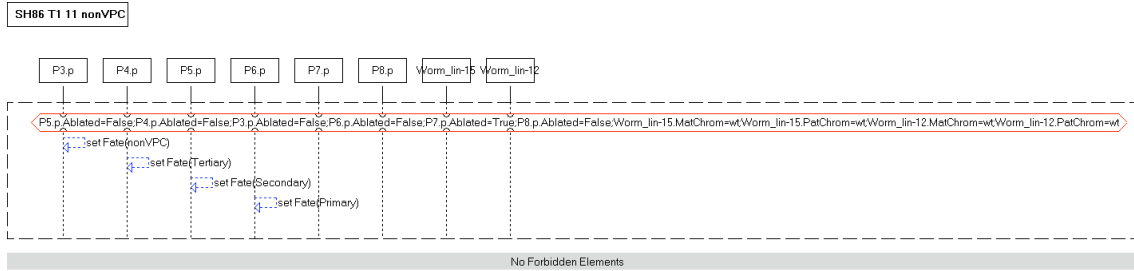
LSC: SH86 T1 9 nonVPC



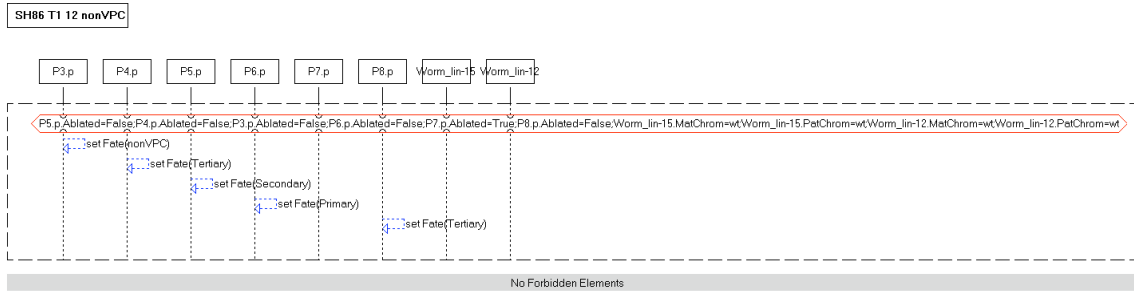
LSC: SH86 T1 10 VPC



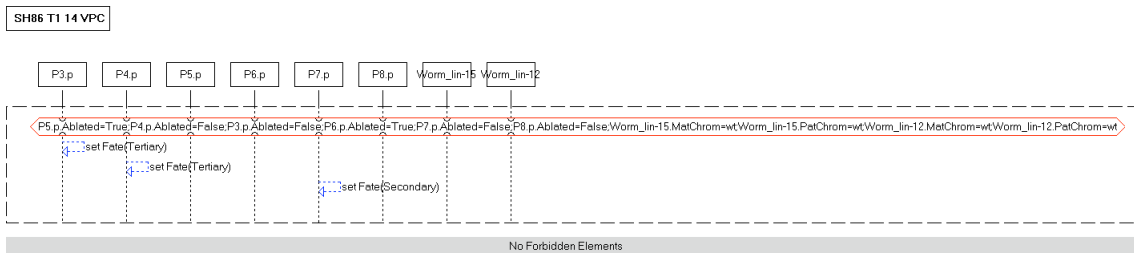
LSC: SH86 T1 11 nonVPC



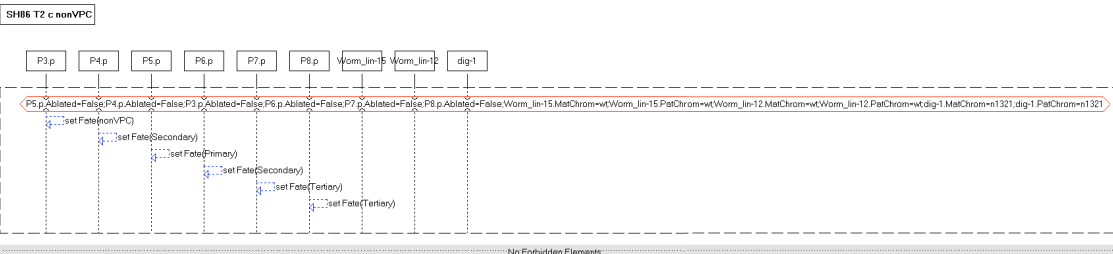
LSC: SH86 T1 12 nonVPC



LSC: SH86 T1 14 VPC

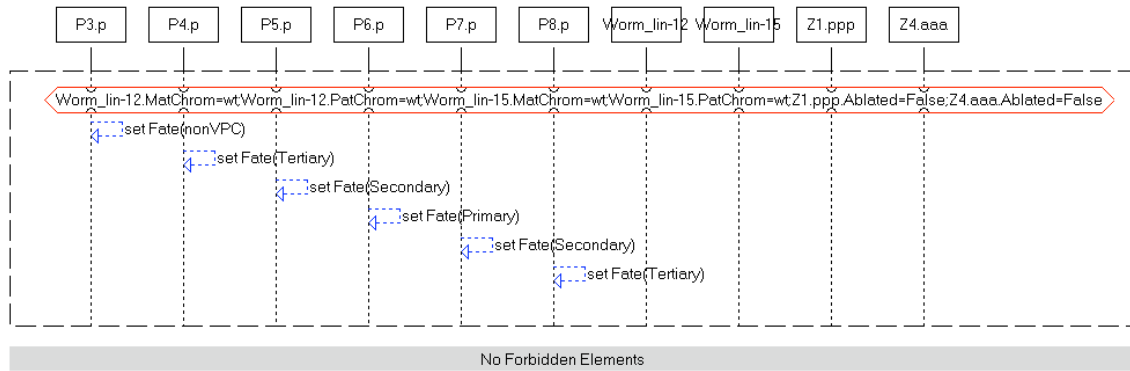


LSC: SH86 T2 c nonVPC



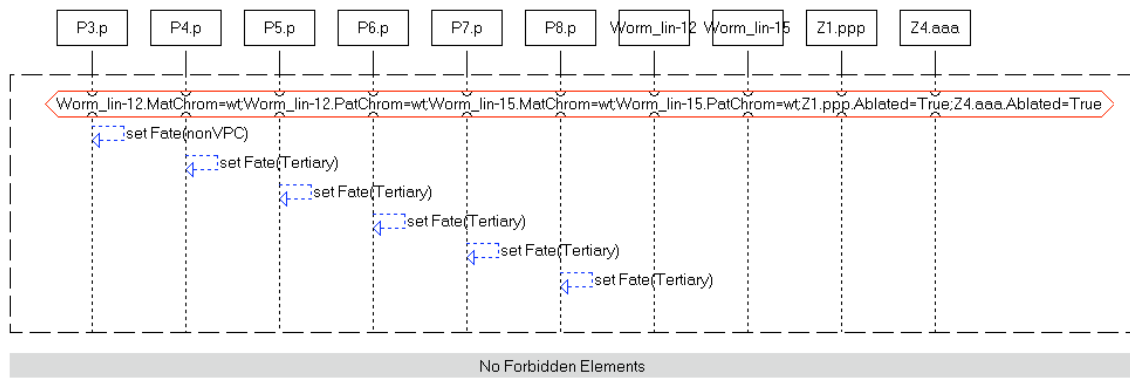
LSC: SH86 T3 a nonVPC

SH86 T3 a nonVPC



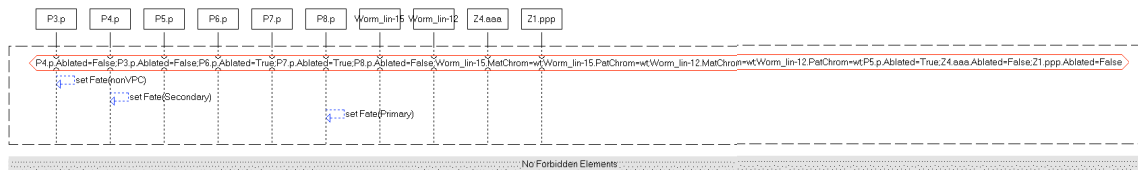
LSC: SH86 T3 b nonVPC

SH86 T3 b nonVPC



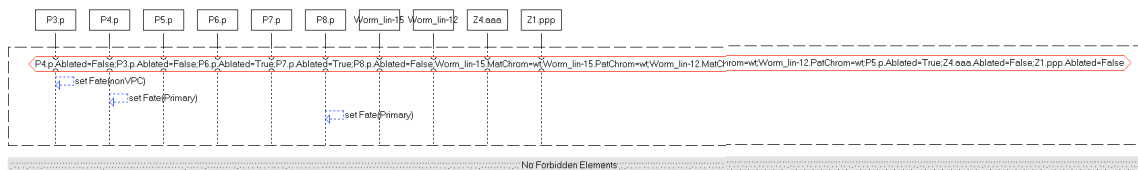
LSC: SH86 T3 c 1 nonVPC

SH86 T3 c 1 nonVPC

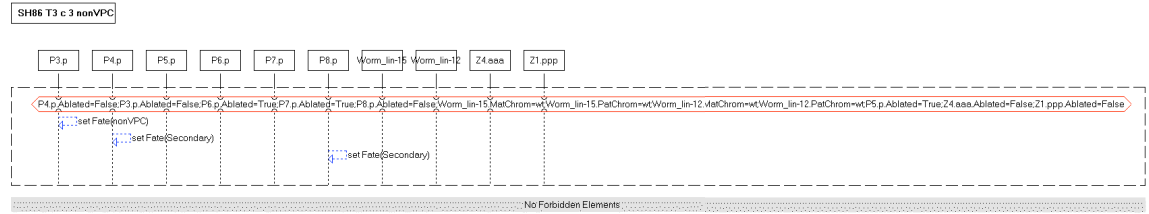


LSC: SH86 T3 c 2 nonVPC

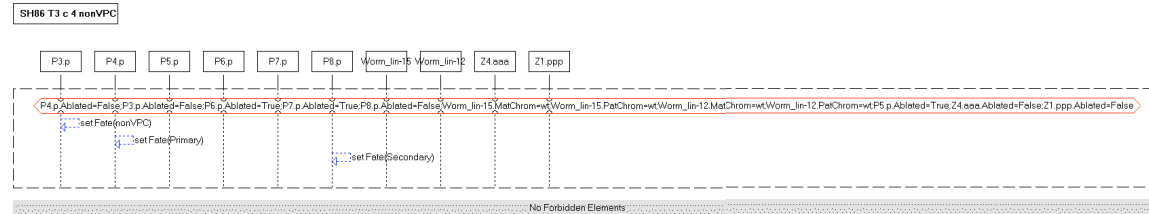
SH86 T3 c 2 nonVPC



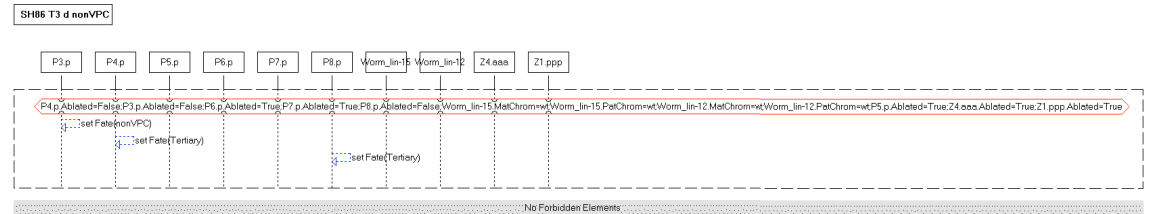
LSC: SH86 T3 c 3 nonVPC



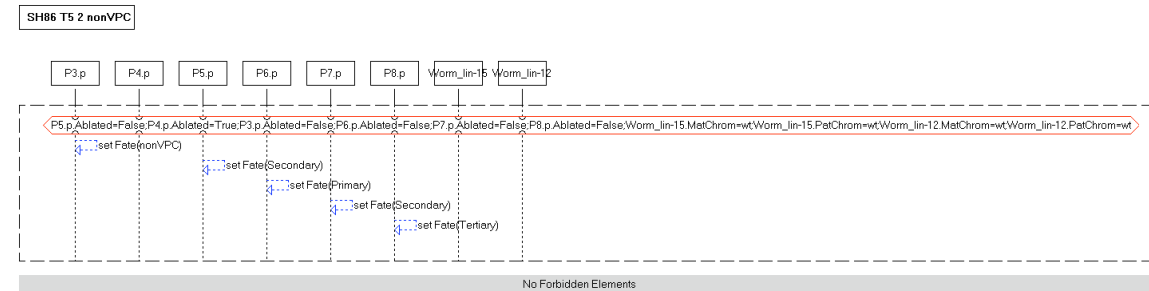
LSC: SH86 T3 c 4 nonVPC



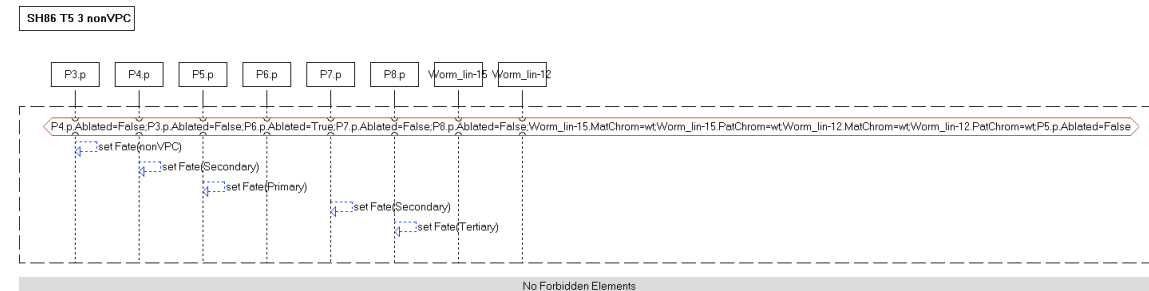
LSC: SH86 T3 d nonVPC



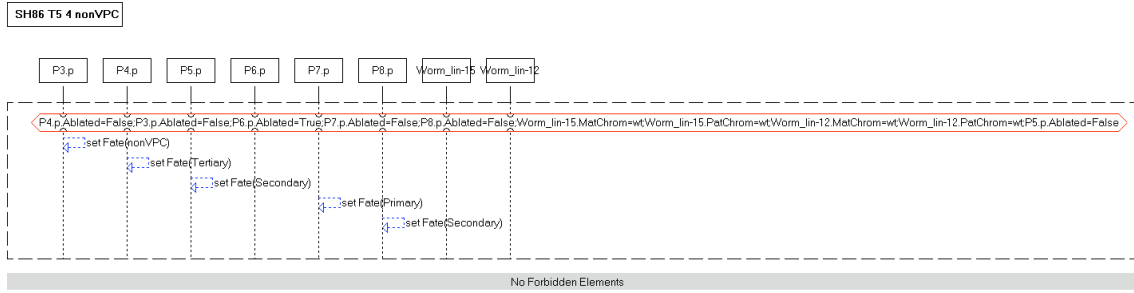
LSC: SH86 T5 2 nonVPC



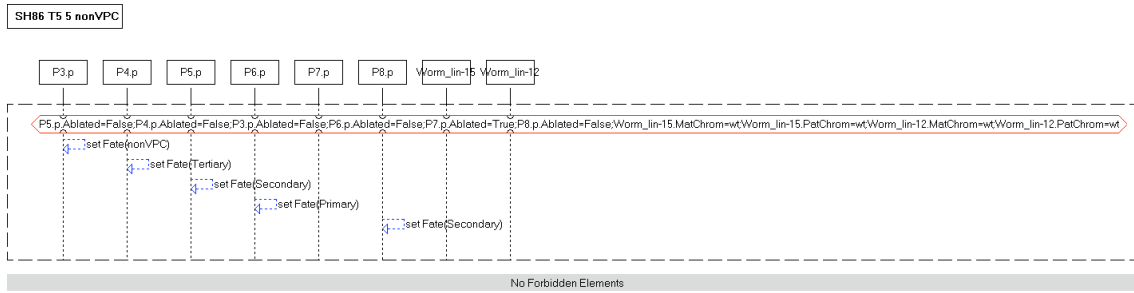
LSC: SH86 T5 3 nonVPC



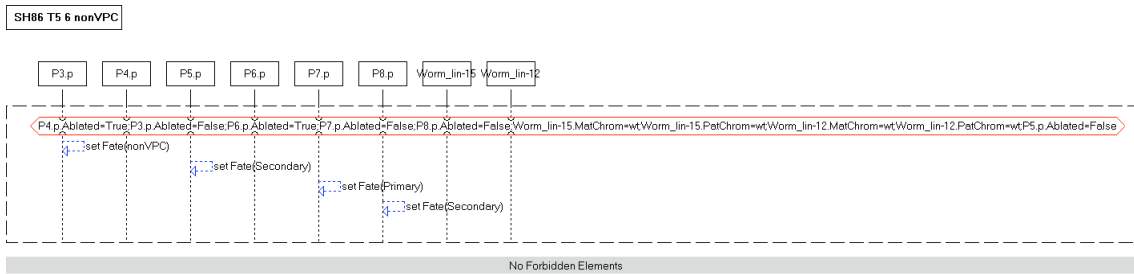
LSC: SH86 T5 4 nonVPC



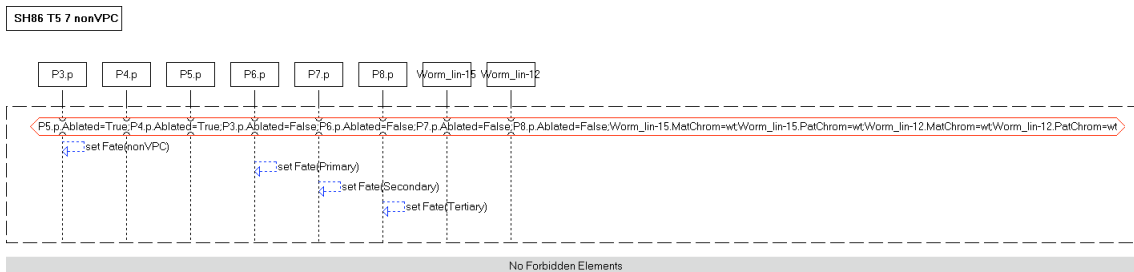
LSC: SH86 T5 5 nonVPC



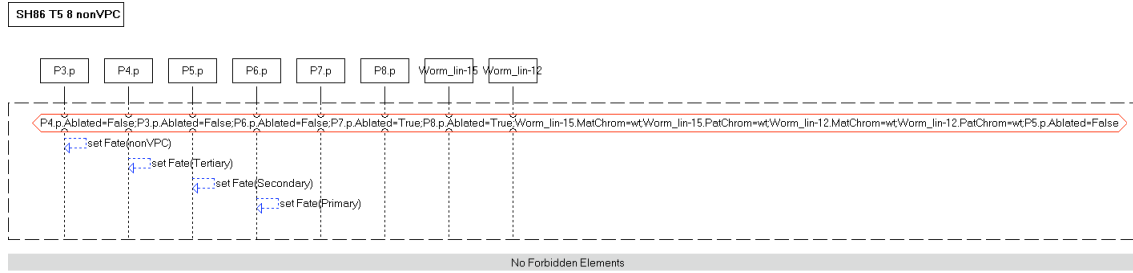
LSC: SH86 T5 6 nonVPC



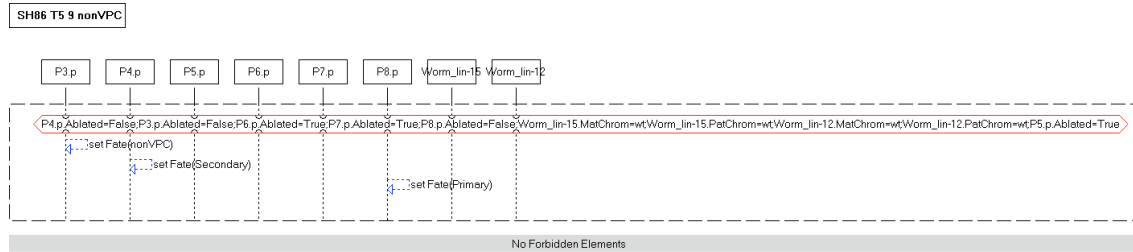
LSC: SH86 T5 7 nonVPC



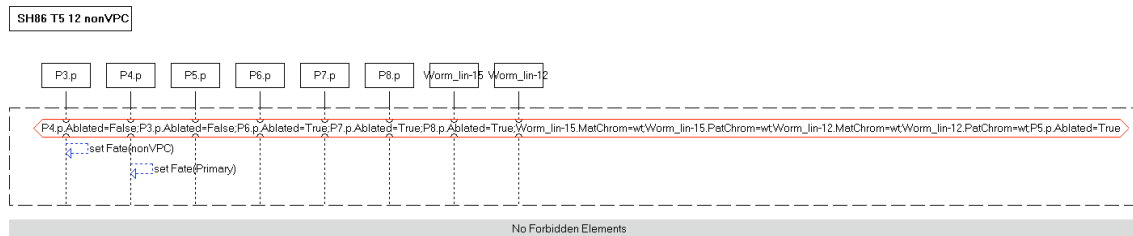
LSC: SH86 T5 8 nonVPC



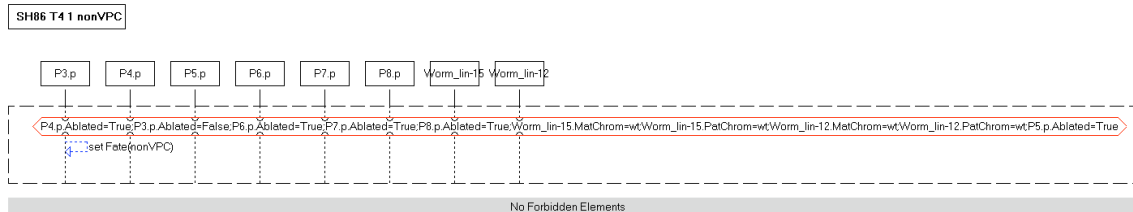
LSC: SH86 T5 9 nonVPC



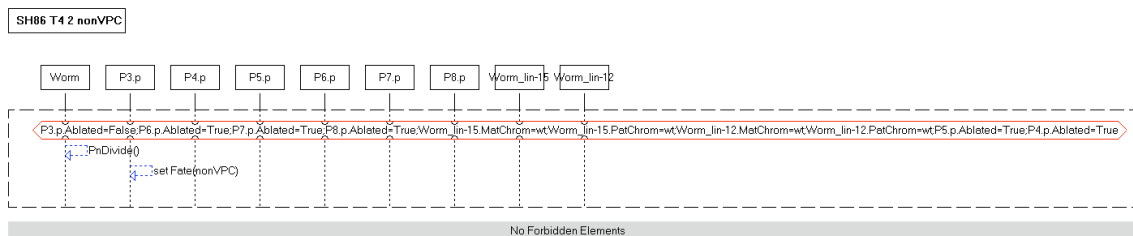
LSC: SH86 T5 12 nonVPC



LSC: SH86 T4 1 nonVPC



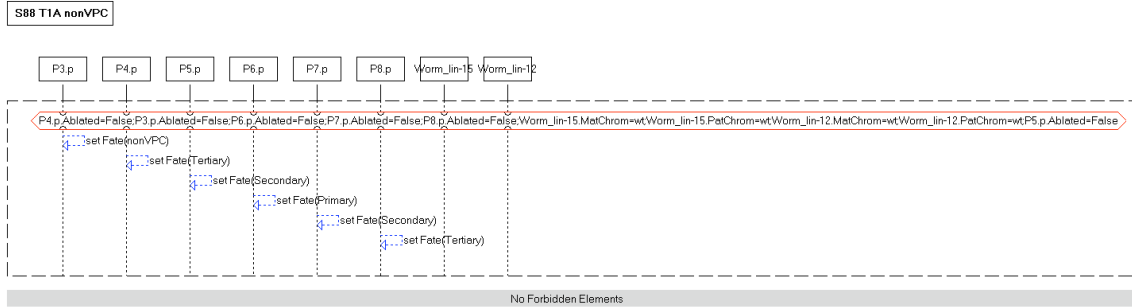
LSC: SH86 T4 2 nonVPC



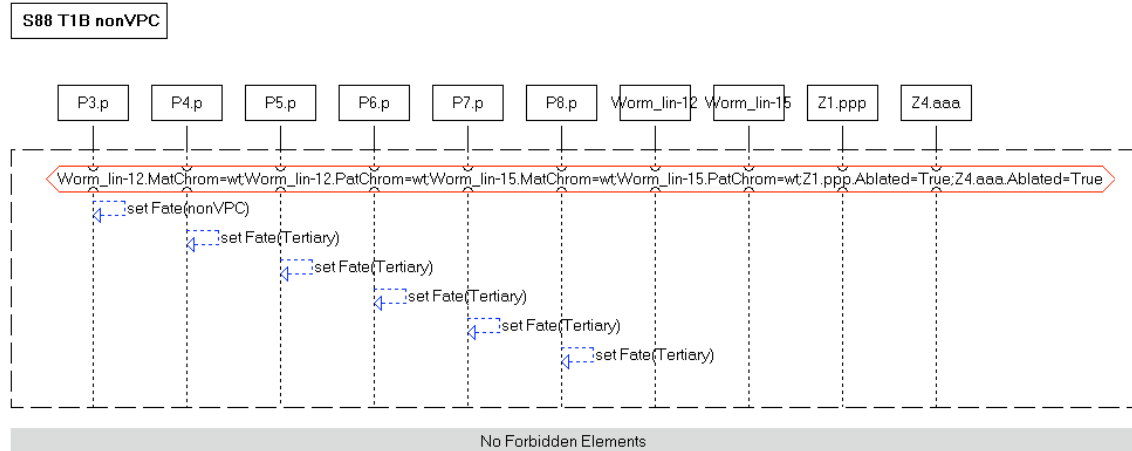
Use Case: S88 EXP nonVPC

Scenarios:

LSC: S88 T1A nonVPC



LSC: S88 T1B nonVPC

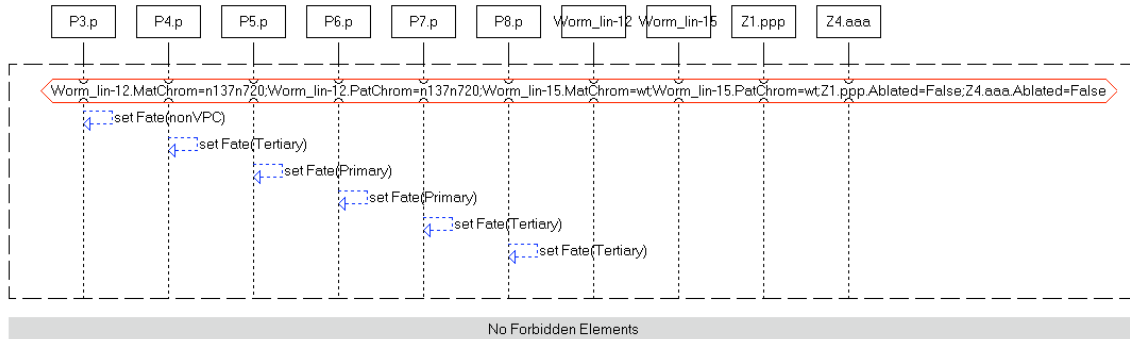


Use Case: SH89 EXP nonVPC

Scenarios:

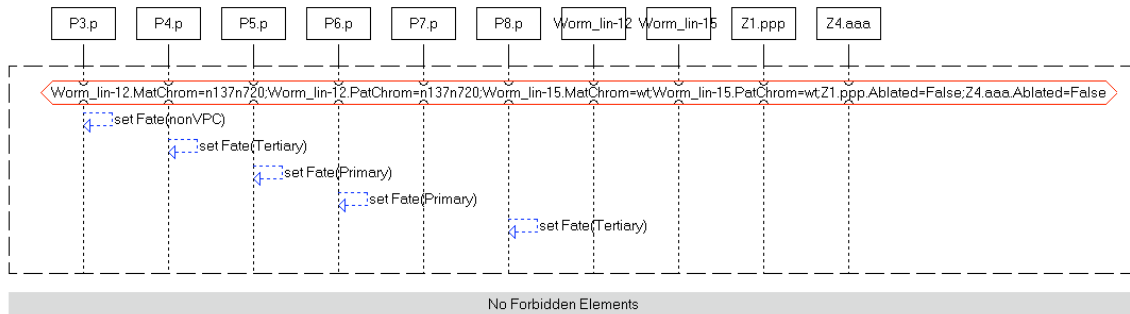
LSC: SH89 T1C 1 nonVPC

SH89 T1C 1 nonVPC



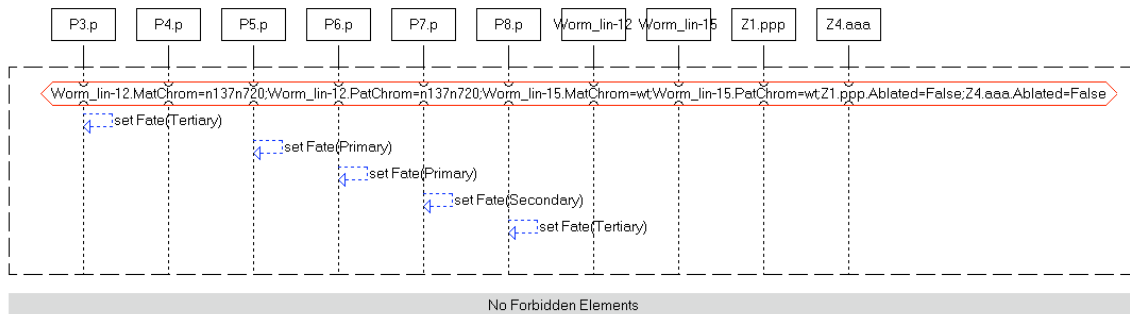
LSC: SH89 T1C 2 nonVPC

SH89 T1C 2 nonVPC



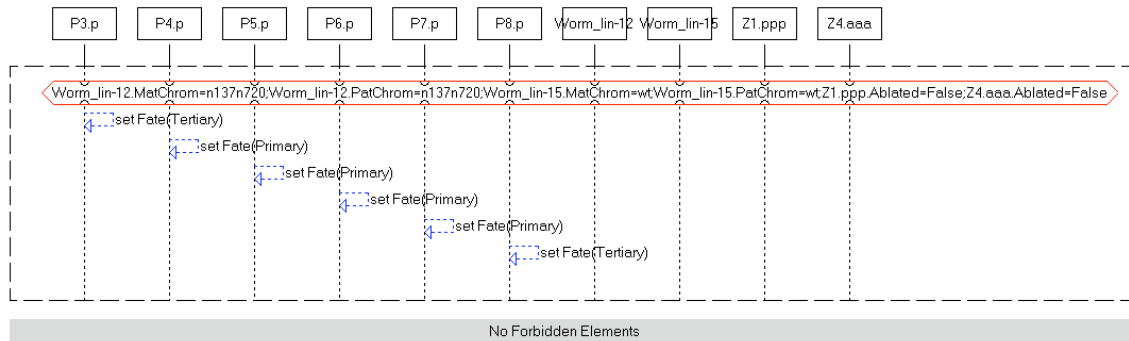
LSC: SH89 T1C 3 VPC

SH89 T1C 3 VPC



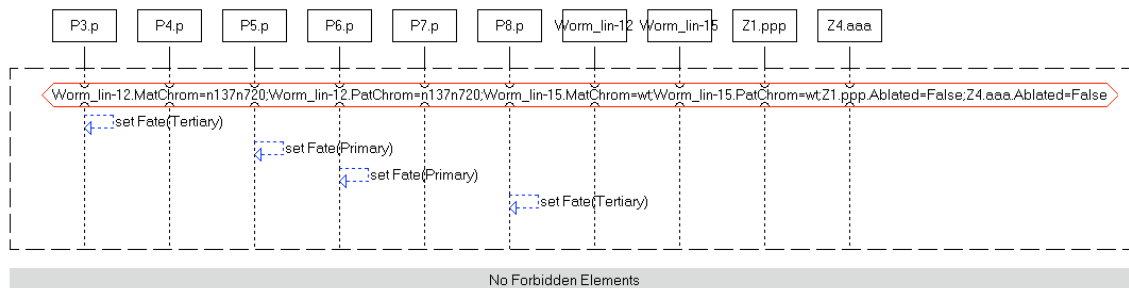
LSC: SH89 T1C 5 VPC

SH89 T1C 5 VPC



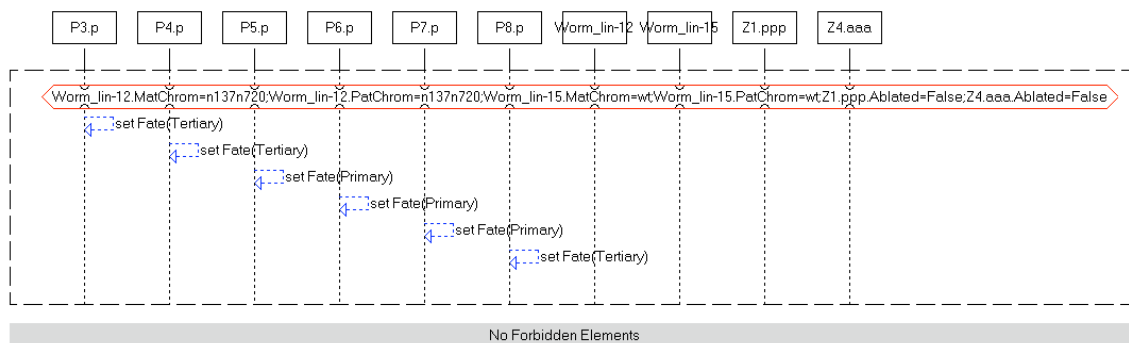
LSC: SH89 T1C 6 VPC

SH89 T1C 6 VPC



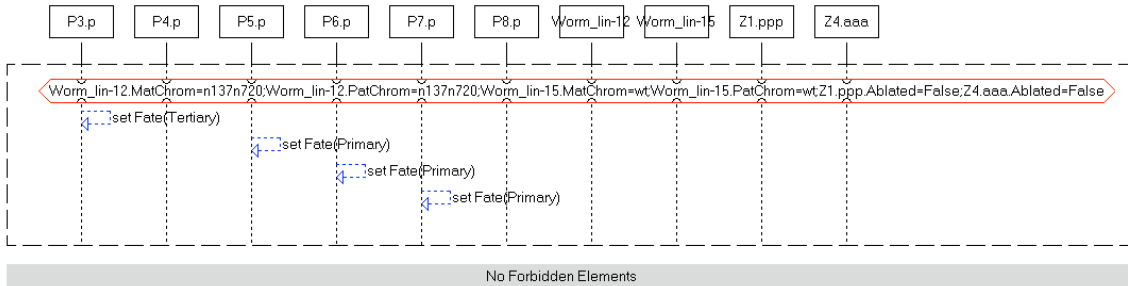
LSC: SH89 T1C 9 VPC

SH89 T1C 9 VPC



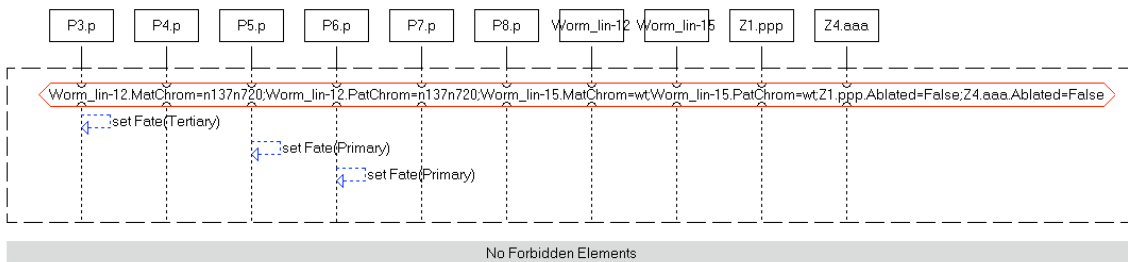
LSC: SH89 T1C 10 VPC

SH89 T1C 10 VPC



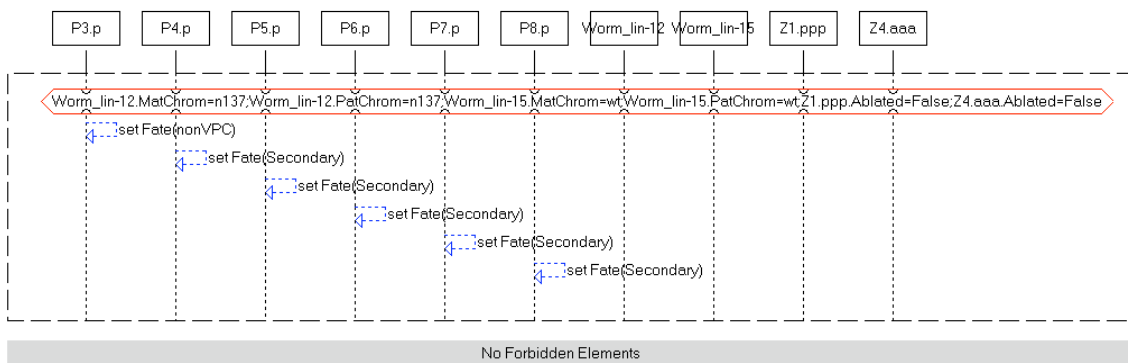
LSC: SH89 T1C 11 VPC

SH89 T1C 11 VPC



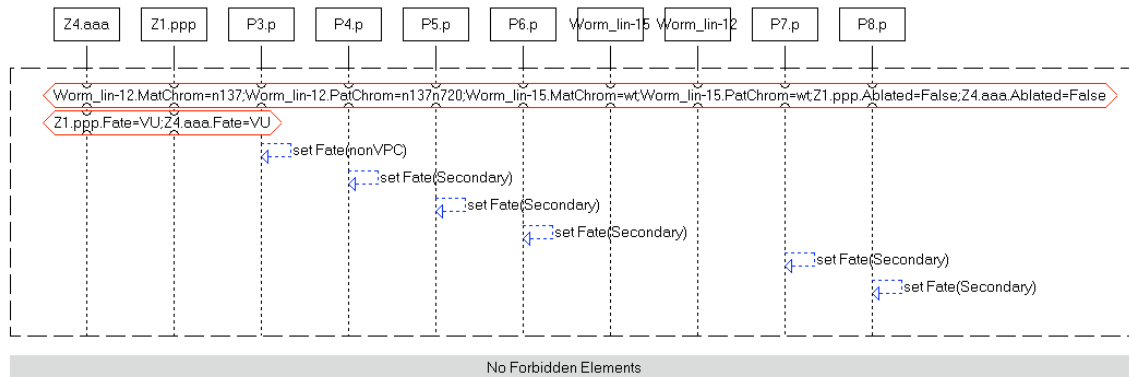
LSC: SH89 T1E 1-8, 10 nonVPC

SH89 T1E 1-8, 10 nonVPC



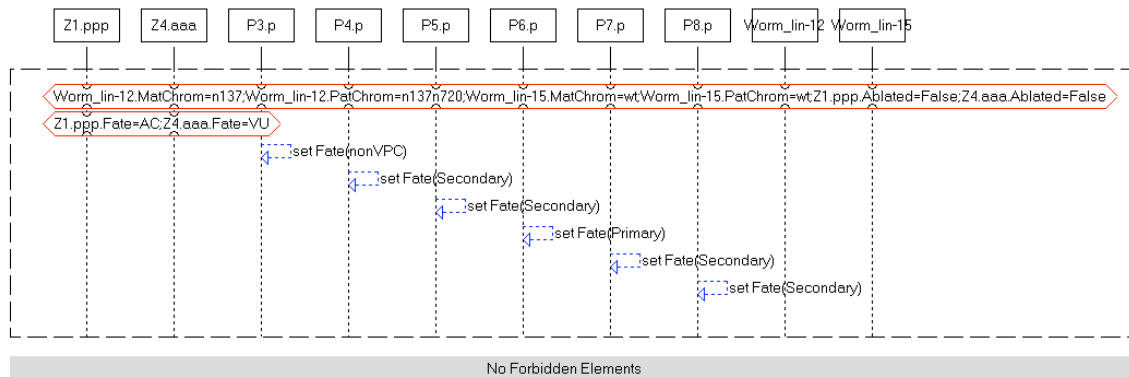
LSC: SH89 T1F 1,2 nonVPC

SH89 T1F 1.2 nonVPC



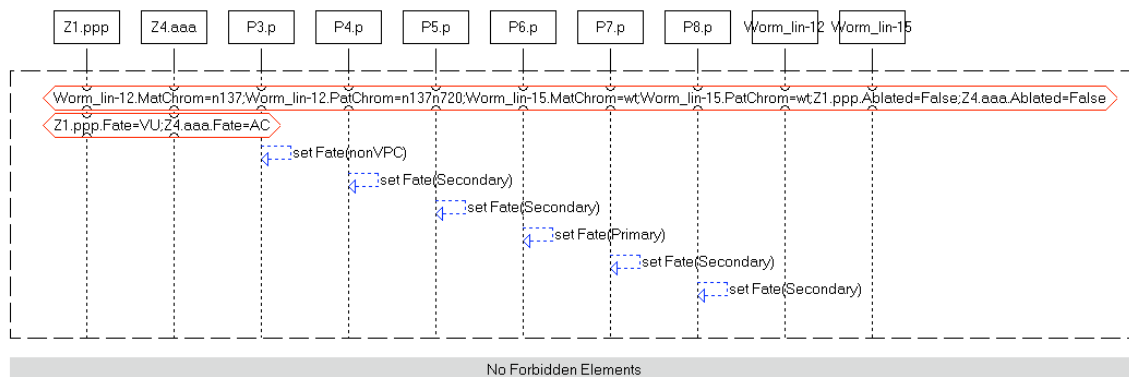
LSC: SH89 T1F 3,4,6,7 Z1 nonVPC

SH89 T1F 3.4.6.7 Z1 nonVPC



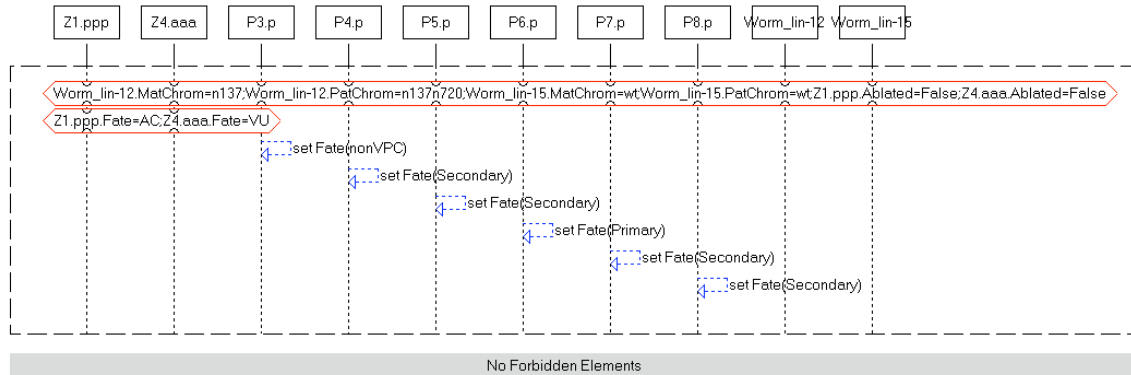
LSC: SH89 T1F 3,4,6,7 Z4 nonVPC

SH89 T1F 3.4.6.7 Z4 nonVPC



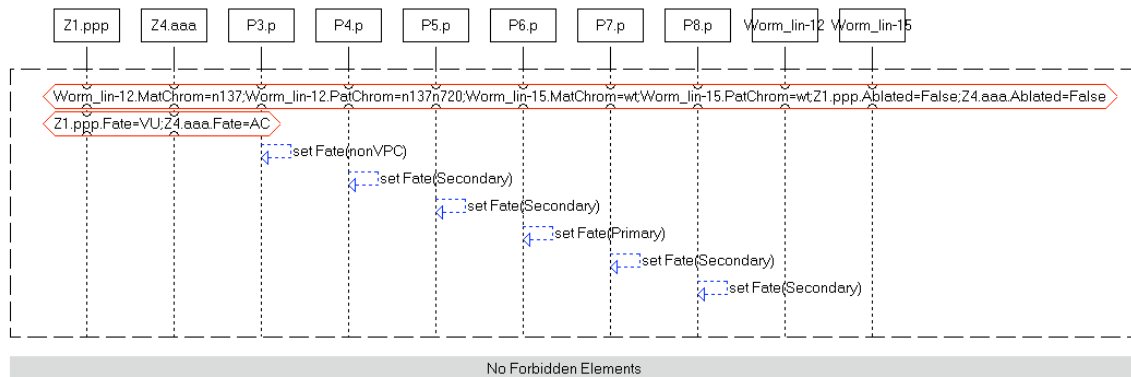
LSC: SH89 T1F 5 Z1 nonVPC

SH89 T1F 5 Z1 nonVPC



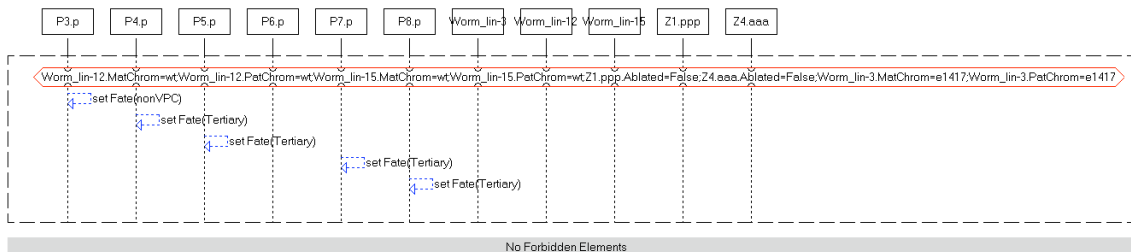
LSC: SH89 T1F 5 Z4 nonVPC

SH89 T1F 5 Z4 nonVPC



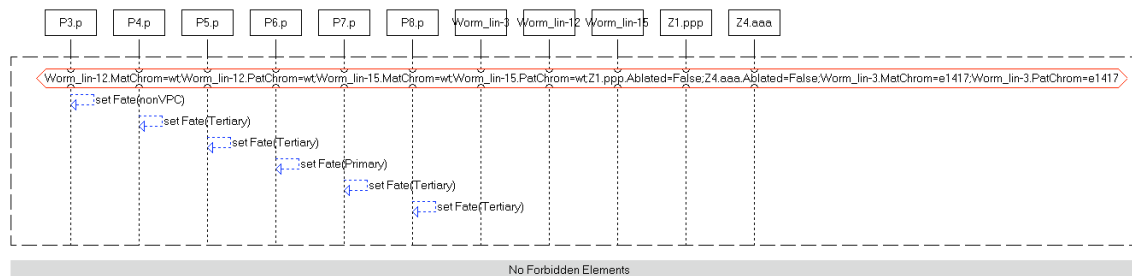
LSC: SH89 T2A a2 nonVPC

SH89 T2A a2 nonVPC



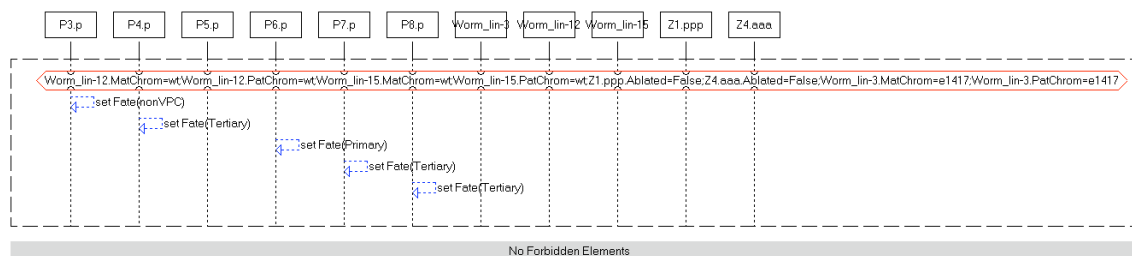
LSC: SH89 T2A a3,4 nonVPC

SH89 T2A a3,4 nonVPC



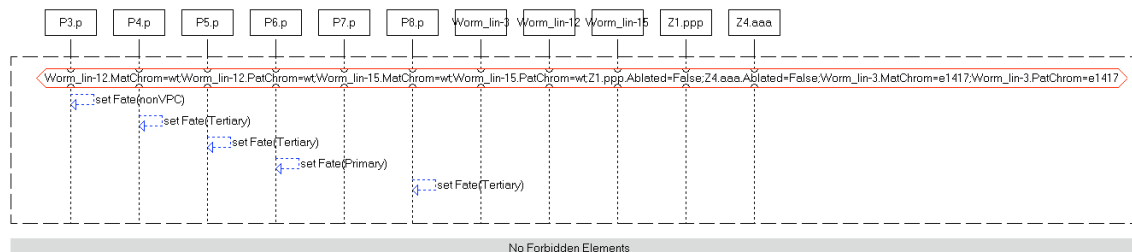
LSC: SH89 T2A a5 nonVPC

SH89 T2A a5 nonVPC



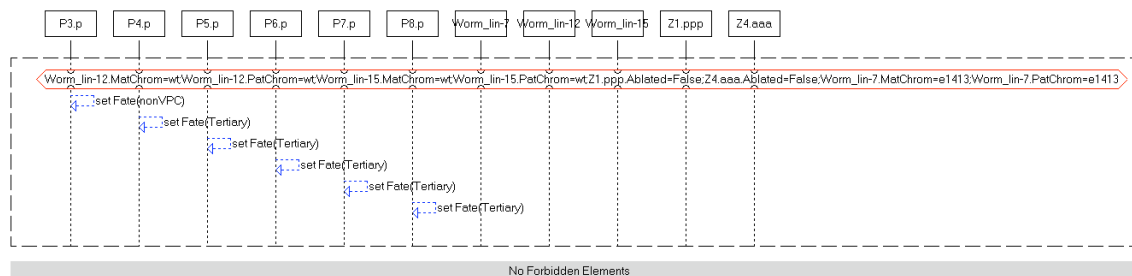
LSC: SH89 T2A a6 nonVPC

SH89 T2A a6 nonVPC

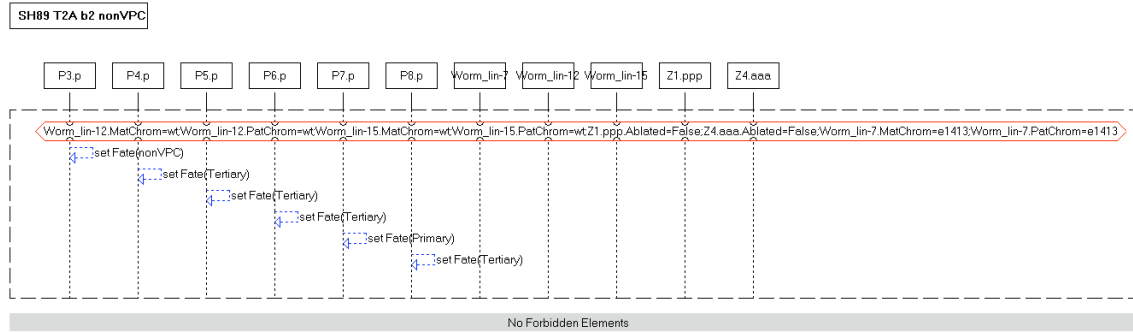


LSC: SH89 T2A b1 nonVPC

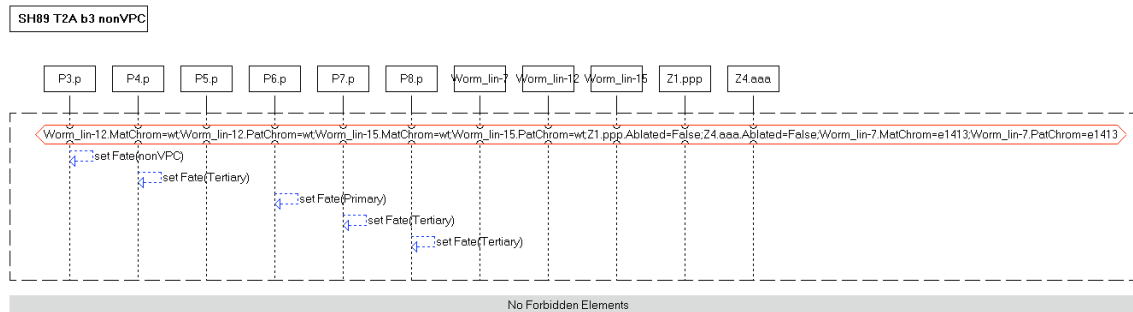
SH89 T2A b1 nonVPC



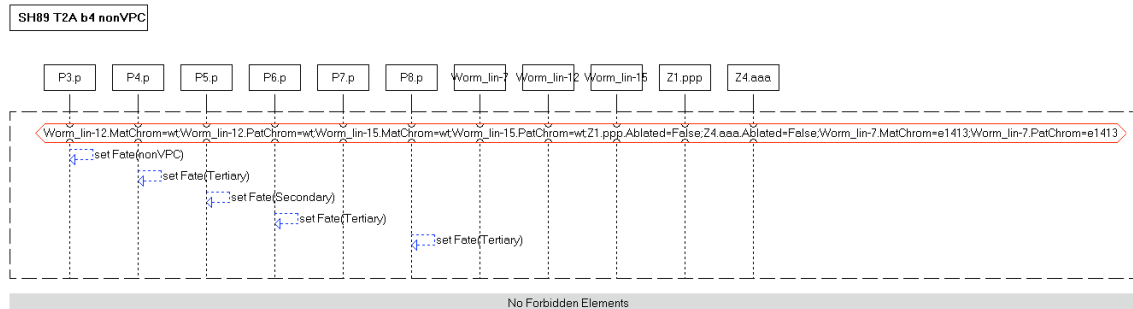
LSC: SH89 T2A b2 nonVPC



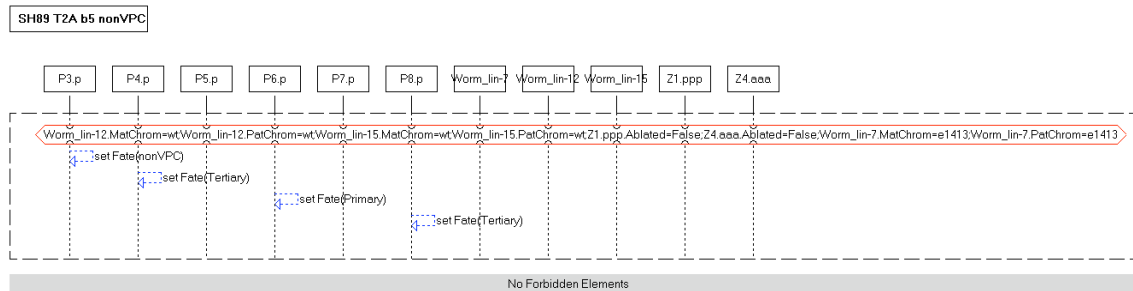
LSC: SH89 T2A b3 nonVPC



LSC: SH89 T2A b4 nonVPC

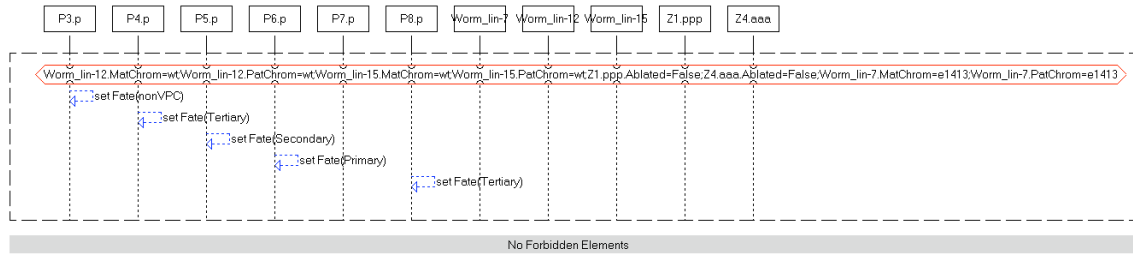


LSC: SH89 T2A b5 nonVPC



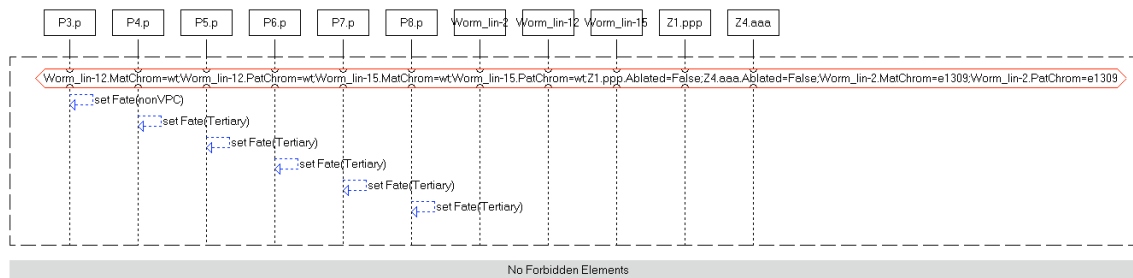
LSC: SH89 T2A b6 nonVPC

SH89 T2A b6 nonVPC



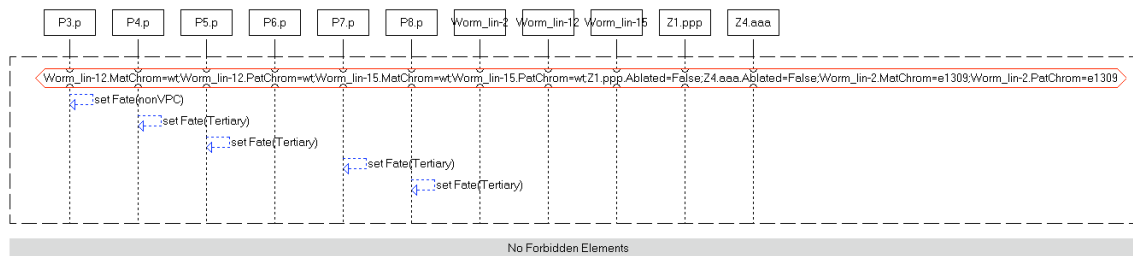
LSC: SH89 T2A c1 nonVPC

SH89 T2A c1 nonVPC



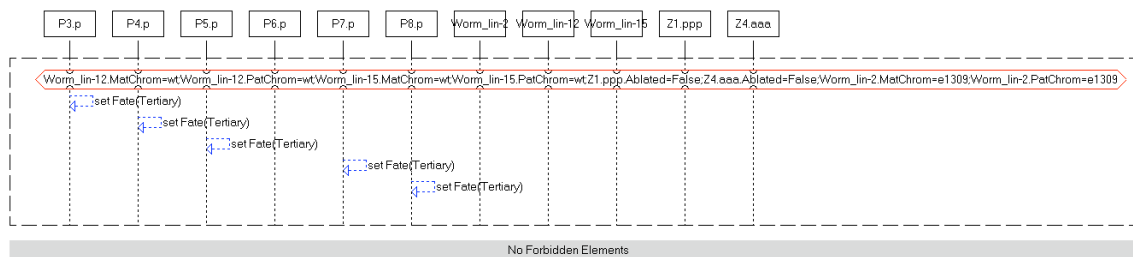
LSC: SH89 T2A c2 nonVPC

SH89 T2A c2 nonVPC



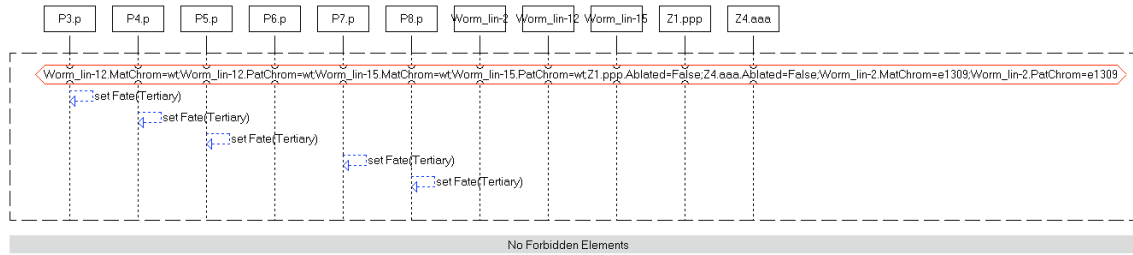
LSC: SH89 T2A c3 VPC

SH89 T2A c3 VPC



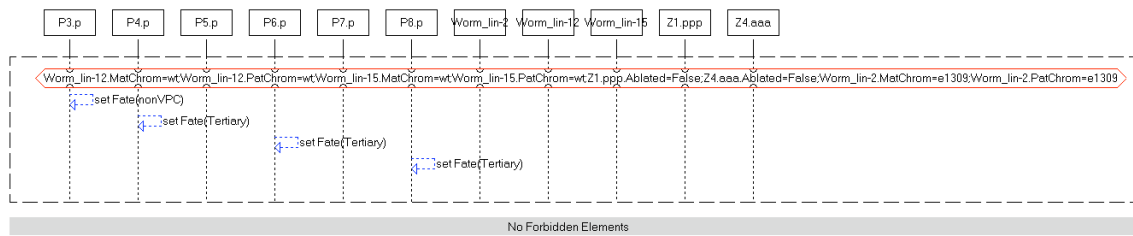
LSC: SH89 T2A c4 VPC

SH89 T2A c4 VPC



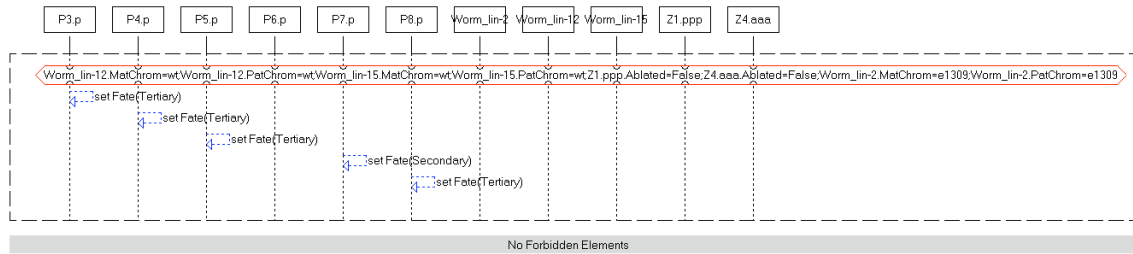
LSC: SH89 T2A c5 nonVPC

SH89 T2A c5 nonVPC



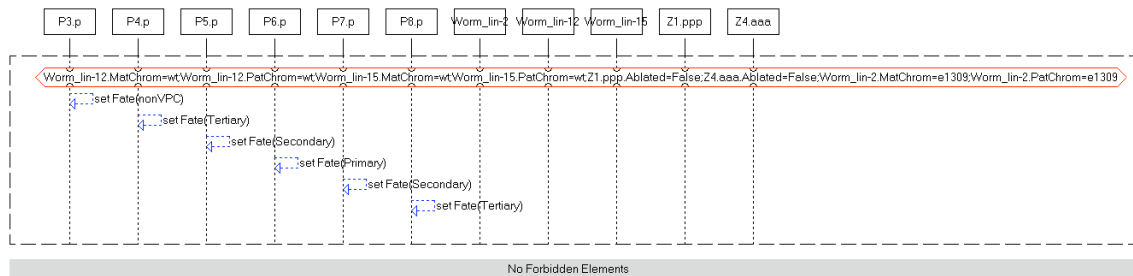
LSC: SH89 T2A c6 VPC

SH89 T2A c6 VPC

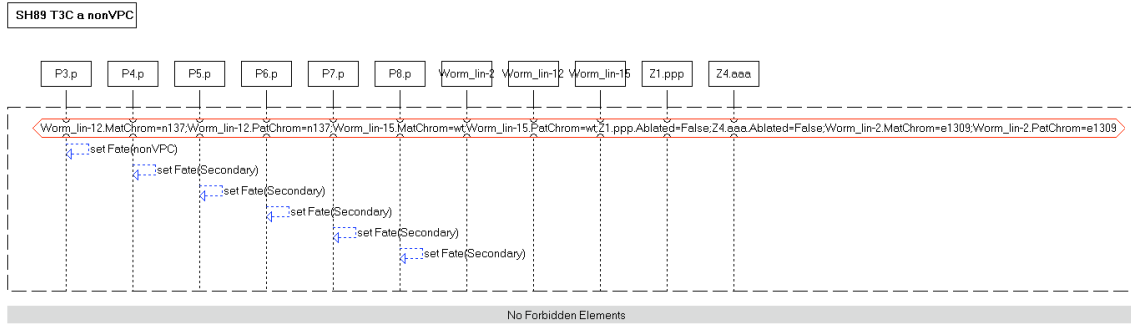


LSC: SH89 T2A c7 nonVPC

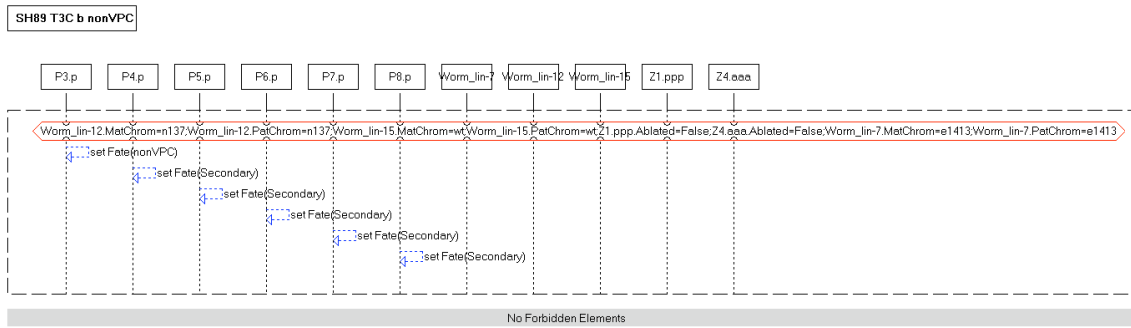
SH89 T2A c7 nonVPC



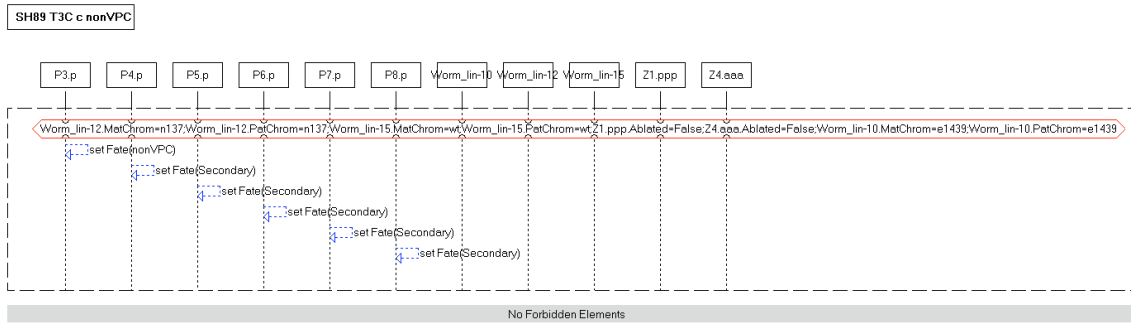
LSC: SH89 T3C a nonVPC



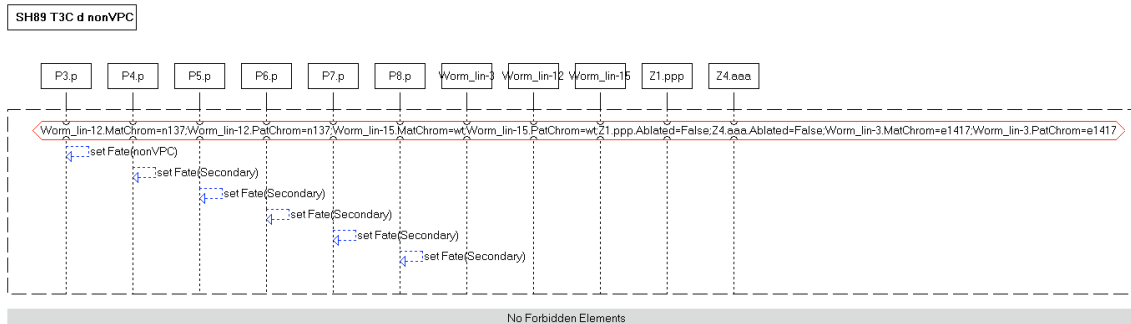
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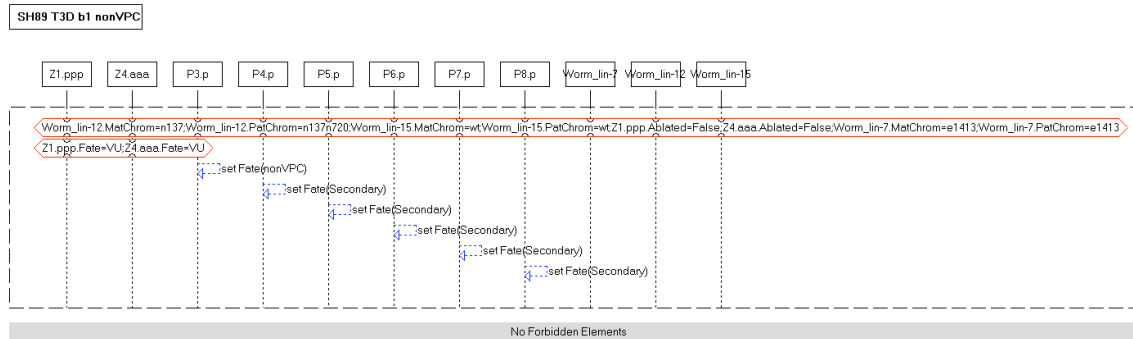
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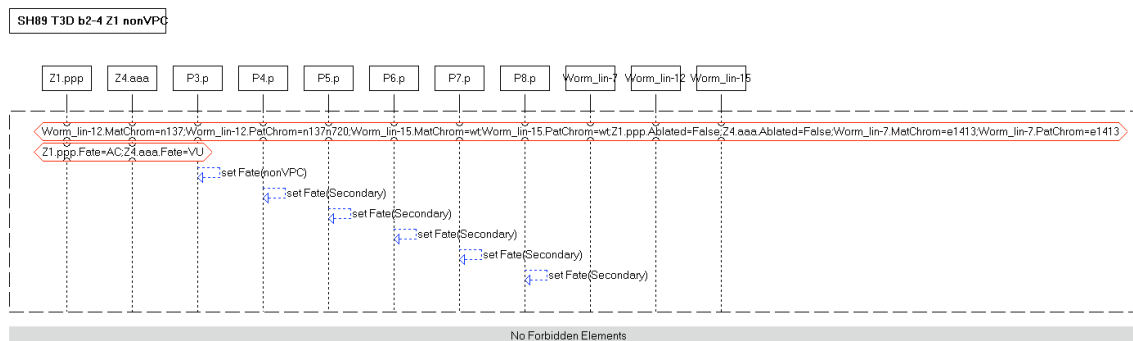
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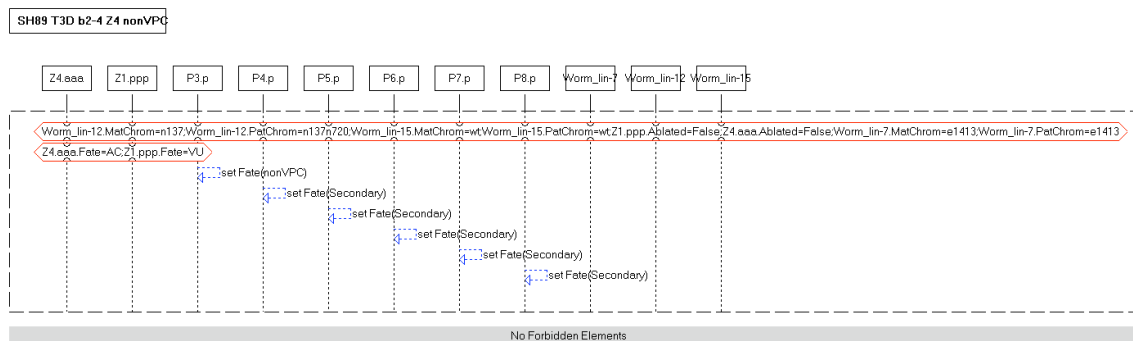
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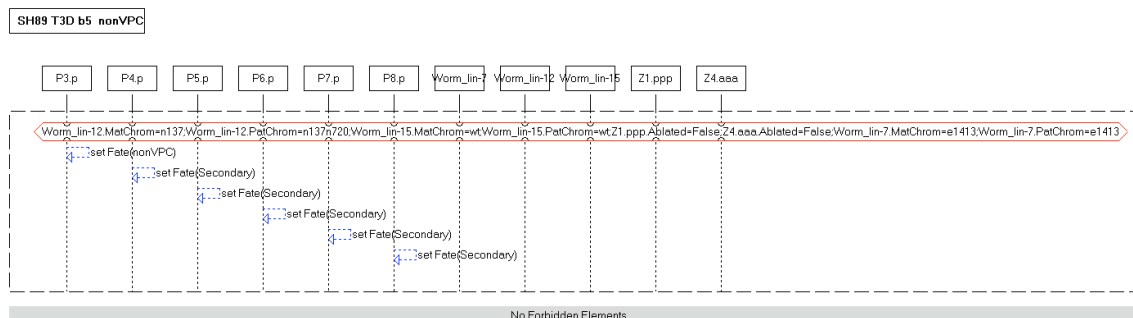
LSC: SH89 T3D b2-4 Z1 nonVPC



LSC: SH89 T3D b2-4 Z4 nonVPC

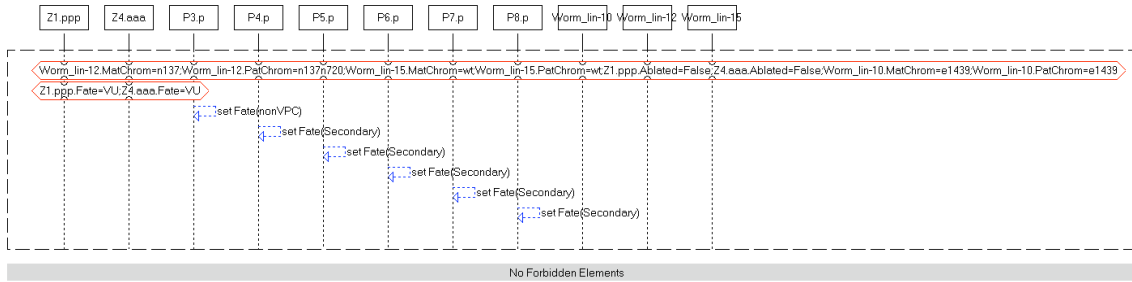


LSC: SH89 T3D b5 nonVPC



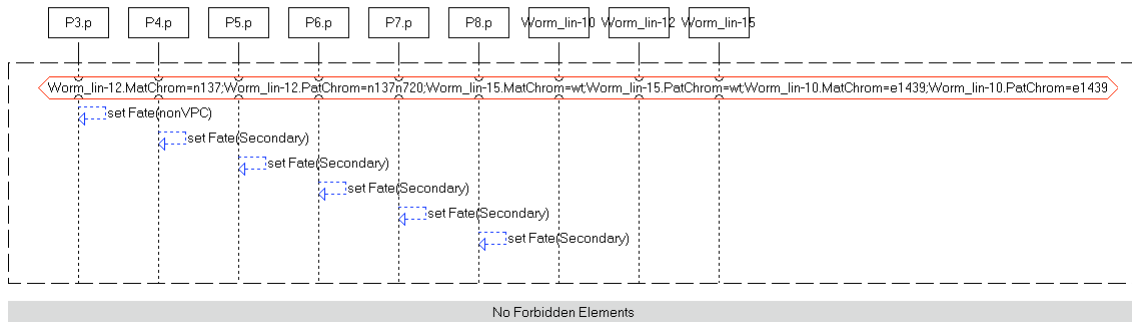
LSC: SH89 T3D c1 nonVPC

SH89 T3D c1 nonVPC



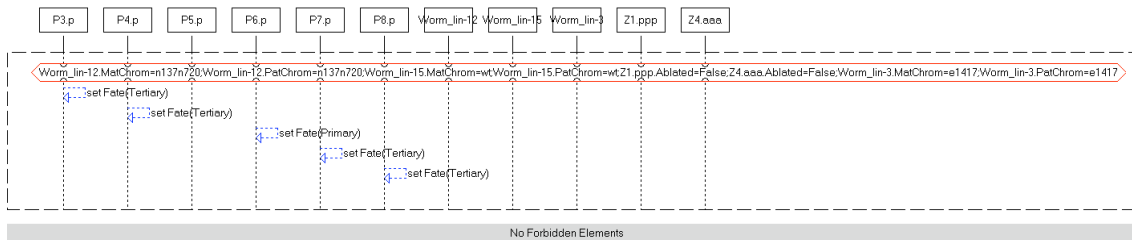
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SH89 T3D c2 nonVPC



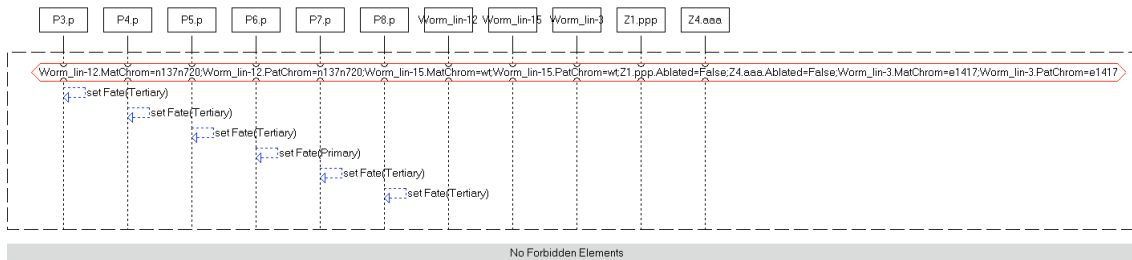
LSC: SH89 T3E a1 VPC

SH89 T3E a1 VPC

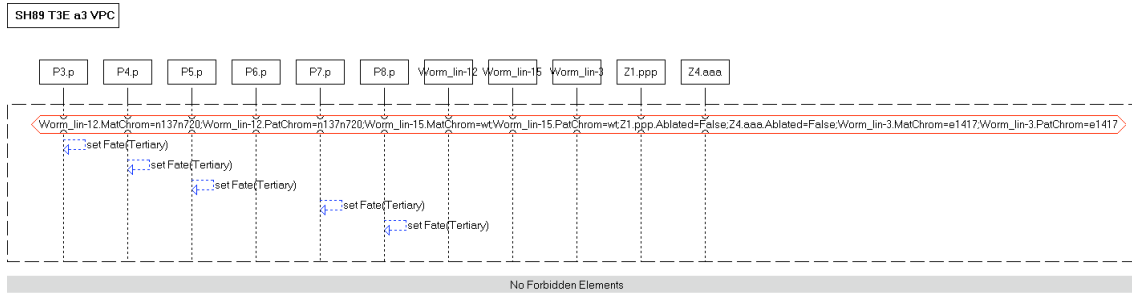


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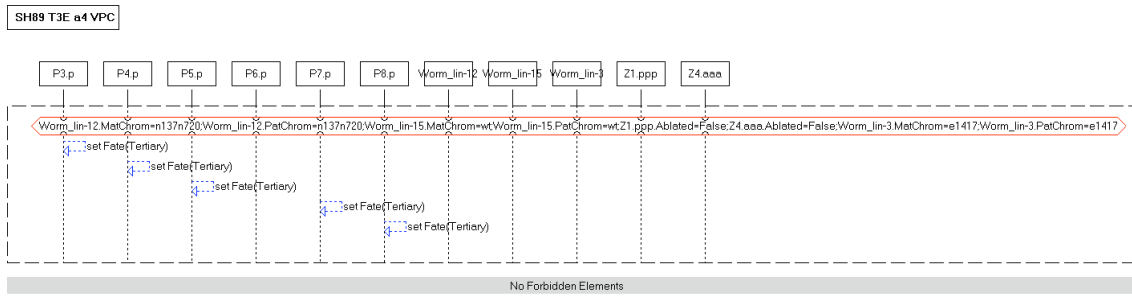
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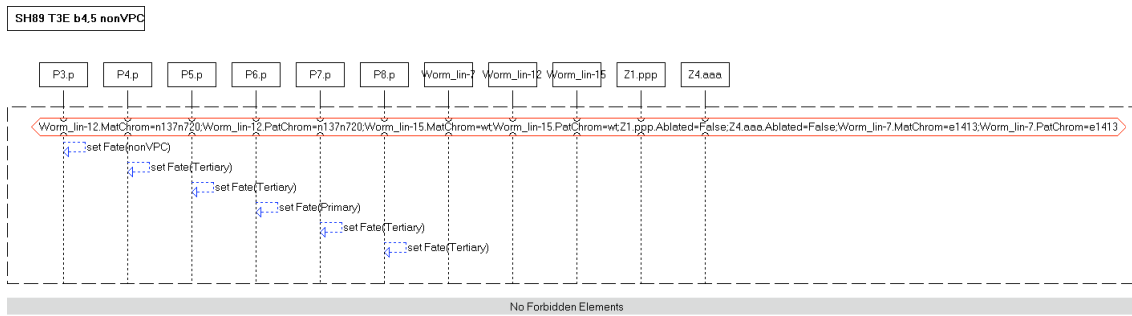
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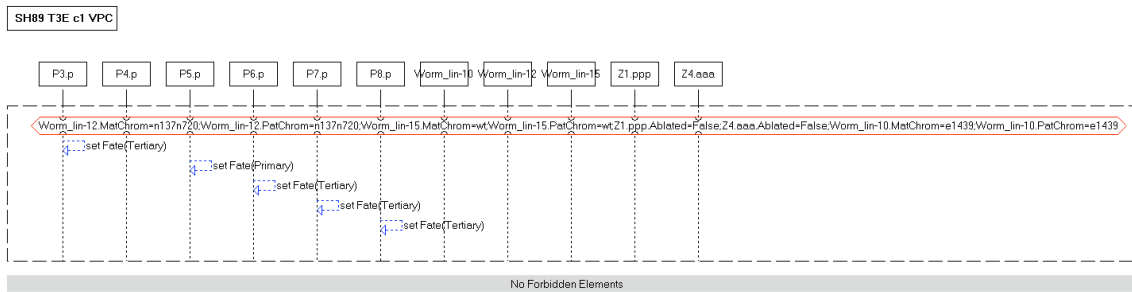
LSC: SH89 T3E a4 VPC



LSC: SH89 T3E b4,5 nonVPC

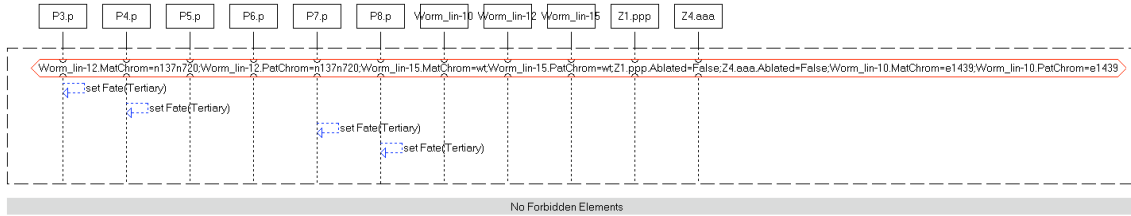


LSC: SH89 T3E c1 VPC



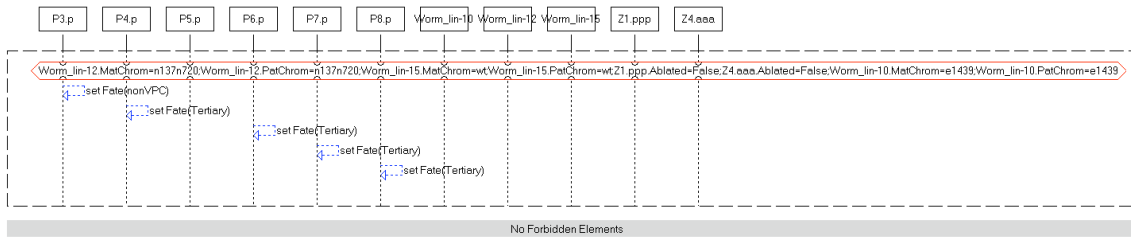
LSC: SH89 T3E c2 VPC

SH89 T3E c2 VPC



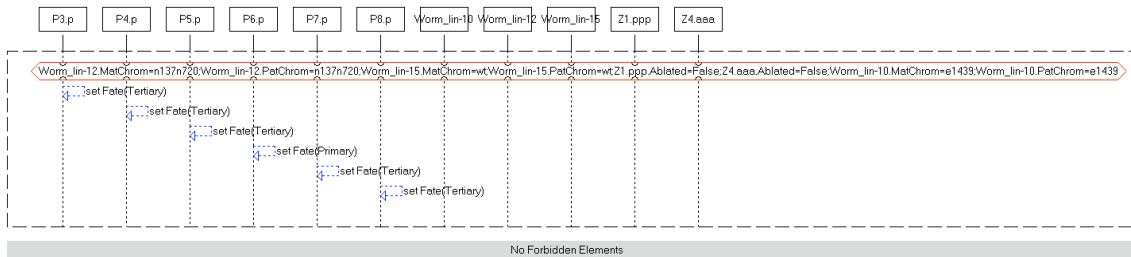
LSC: SH89 T3E c3 nonVPC

SH89 T3E c3 nonVPC



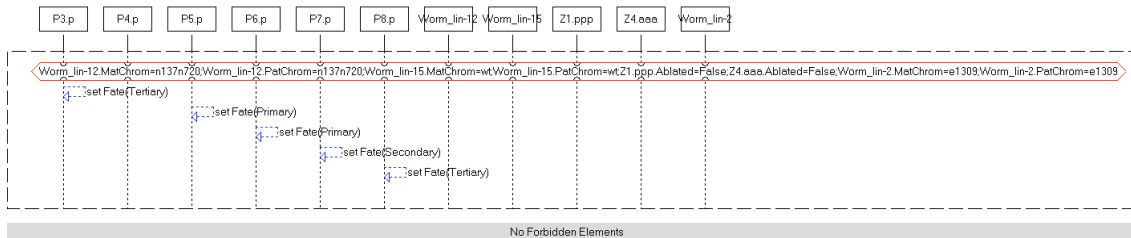
LSC: SH89 T3E c4 VPC

SH89 T3E c4 VPC

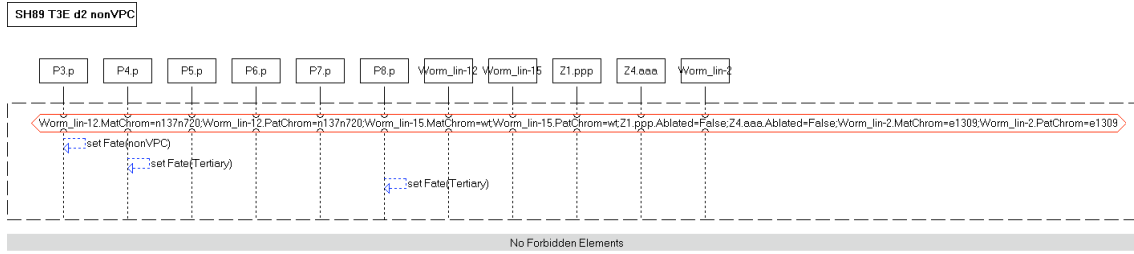


LSC: SH89 T3E d1 VPC

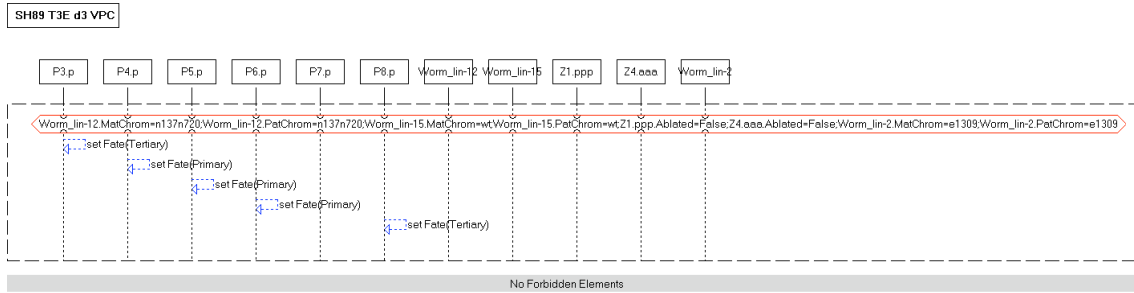
SH89 T3E d1 VPC



LSC: SH89 T3E d2 nonVPC



LSC: SH89 T3E d3 VPC



LSC: SH89 T3E d5 VPC

