

Decisive Classification & Sequencing



McIlvaine Company

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Decisive Classification & Sequencing

- **What is it?** Decisive Classification & Sequencing is a highly targeted search routine that results in selection of **exactly** the right product for a specific application.
- **What it is not.** It is not a broad undisciplined search that results in **hundreds** of listings of which only one unknown listing is the correct or desired destination of the search.
- **Why it is so powerful.** One number identifies an entire application for a product. This number can be linked to qualified bidders, to relevant articles, or to any kind of intelligence to help the decision maker.

Decisive Classification & Sequencing

Decisive classification and sequencing combined with a unique new **universal product identification system** results in **better decisions** and the ability to communicate that decision to bidders. More importantly once this process is completed the next specifier with the same need can simply use **one number** to communicate a selection which is very precise.

Sequencing Steps

Using decisive classification, any application can be identified by following these simple steps:

1. Set up a sequence of ever narrowing classifications and then list the options in each sequence step that are relevant.
2. Agree on one common descriptor and label all others as synonyms
3. Utilize the parent/child software concept so that one phrase and number is all that is needed to describe an entire sequence

Industry	Industry Sub Segment	Process	Sub Process	System	Reagents	Sub System	Sub System Type	Generic Component	Component Type
Fossil Fired Boilers #284	Gas	Air Quality #10	Mercury Removal	Wet #20	Lime	Absorber Slurry #217	Sump	Shell	Rotary
Nuclear	Coal #3	Water Quality	FGD #18	Dry	Lime Stone #26	By-Product Handling	Tray	Nozzles	Diaphragm
Hydro	Oil	Steam Production	DeNOx	Other	Seawater	FGD Waste Water	Spray Tower #401	Mist Eliminator	Centrifugal #609
Wind	IGCC		Particulate		Sodium	Reagent Preparation		Re-Cycle Tank	Reciprocating
Geo Thermal	PFB							Re-Cycle Pump # 219	

Two Examples

This Power Point demonstrates the Decisive Classification & Sequencing system using two examples:

- The first example involves specification of an **FGD re-cycle slurry pump** for a wet limestone scrubbing system in a coal fired power plant, and
- The second example involves specification of a **safety relief valve** for the main pressurizer in a nuclear reactor coolant system.

**Example #1:
Selection of FGD Re-Cycle
Slurry Pump**

FGD Re-Cycle Slurry Pump

From a purchaser perspective, there are three major sequencing steps in selecting an FGD slurry pump:

Bid Specification	Analysis of potential bidders	Vendor Selection
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- The bid specification for an FGD recycle slurry pump must utilize the following sequence of classifications. The actual bid request has to have lots of details but the skeleton is essentially the following:

Application	Reagent	Process	System	Generic Component	Component Type
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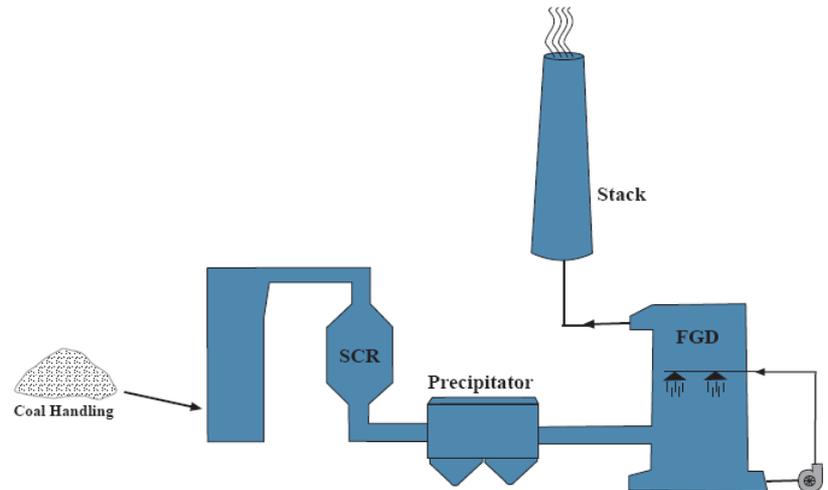
- If the specifier gets this sequence right, then he can prepare a good bid request. If he ignores any of the sequence steps, then he will not be asking for the right product.

Note: This analysis only deals with the bid specification. McIlvaine also provides analysis of potential bidders and vendor evaluation.

FGD Re-Cycle Slurry Pump

Fuel Type

The power plant **fuel type** needs to be established to define the application. In this case, it is coal rather than gas turbine or other type.

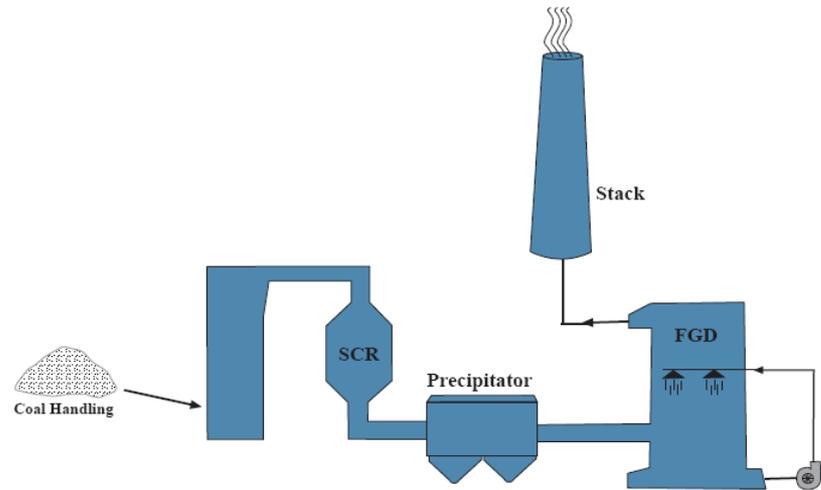


Industry	Industry Sub Segment (Fuel Type)
Fossil Fired Boilers, NAICS #22112	Oil
	Coal #3
	IGCC
	PFB

FGD Re-Cycle Slurry Pump

Process - Air Quality

Next, the **process** needs to be classified, which in this case is air quality rather than water quality or steam production.

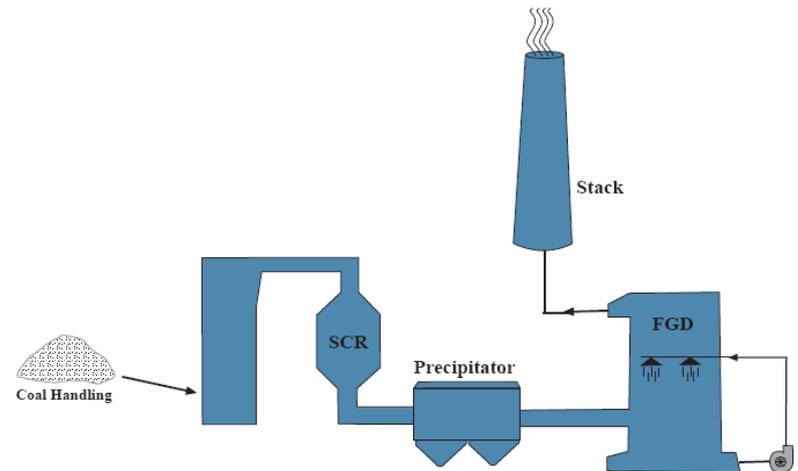


Industry	Industry Sub-Segment	Process
Fossil Fired Boilers #284	Coal Fired Boilers #3	Air Quality #10
		Water Quality
		Steam Production

FGD Re-Cycle Slurry Pump

Sub Process - FGD

The next action is to specify what type of air pollution reduction is required. The **sub process** is FGD (flue gas desulfurization) as opposed to DeNOx or particulate removal.



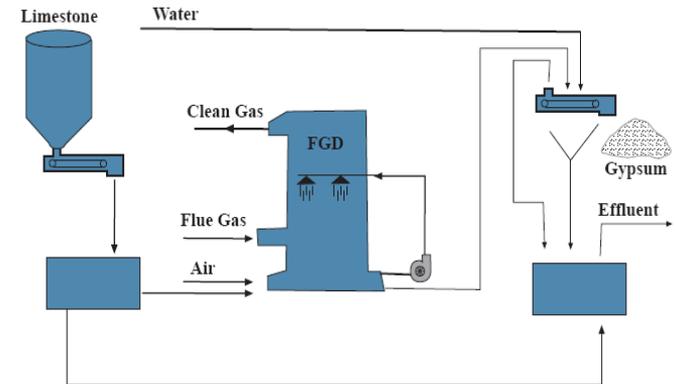
Industry	Industry Sub Segment	Process	Sub Process
Fossil Fired Boilers #284	Coal Fired #3	Air Quality #10	FGD #18
			DeNOx
			Particulate Removal

FGD Re-Cycle Slurry Pump

System Type - Wet Limestone

Next, the **type** of FGD system must be selected.

The options are dry or wet or other. Wet calcium is considerably different than dry calcium. In this case wet calcium is selected. Then limestone is selected rather than lime, seawater, or sodium.

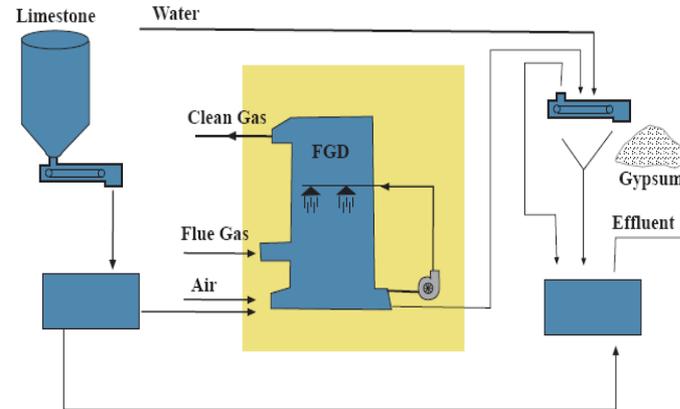


Industry	Industry Sub Segment	Process	Sub Process	System	Reagents
Fossil Fired Boilers #284	Coal Fired Boilers #3	Air Quality #10	FGD #18	Wet #202	Lime
				Dry	Limestone #26
				Other	Seawater
					Sodium

FGD Re-Cycle Slurry Pump

Sub System – Absorber Slurry

Next it is necessary to identify the **sub system** in which the pump is used. The choices are reagent preparation, absorber slurry, by product handling, and FGD wastewater treatment. In this case it is the absorber slurry system pump.

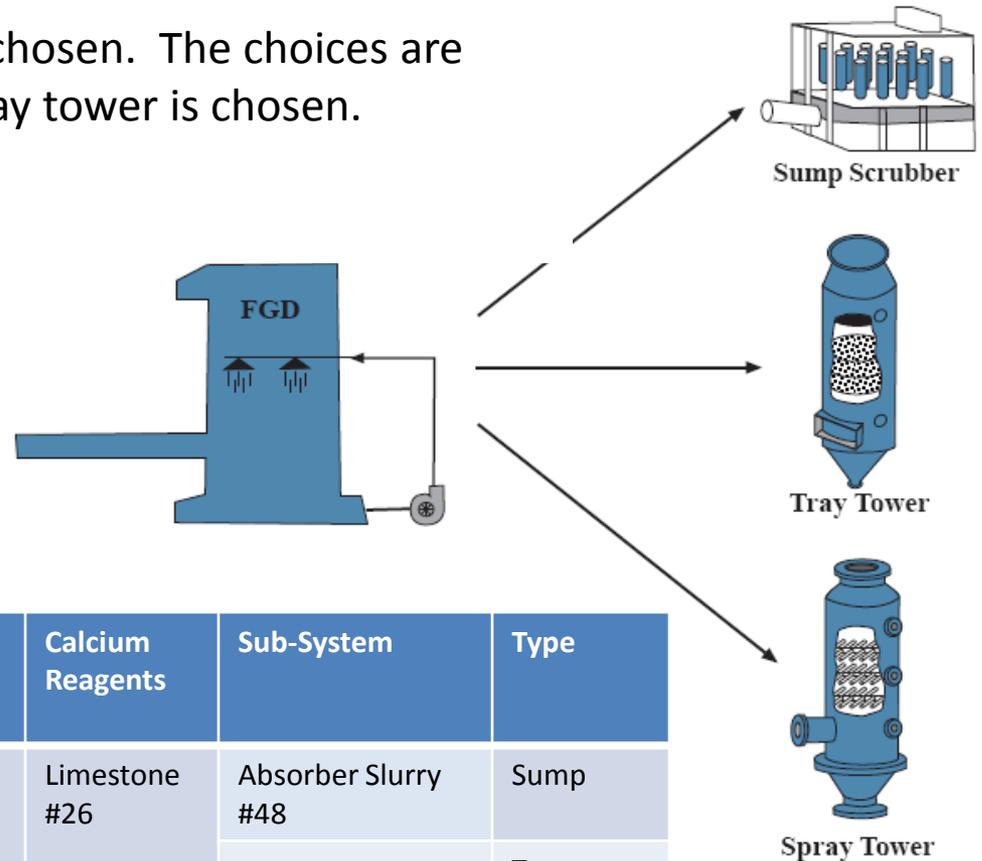


Industry	Industry Sub Segment	Process	Sub Process	System	Reagents	Sub System
Fossil Fired Boilers #284	Coal Fired Boilers #3	Air Quality #10	FGD #18	Wet #202	Limestone #26	Absorber Slurry #48
						By-Product Handling
						FGD Waste Water
						Reagent Preparation

FGD Re-Cycle Slurry Pump

Absorber Type

The **type of absorber** must also be chosen. The choices are sump, tray and spray tower. Spray tower is chosen.

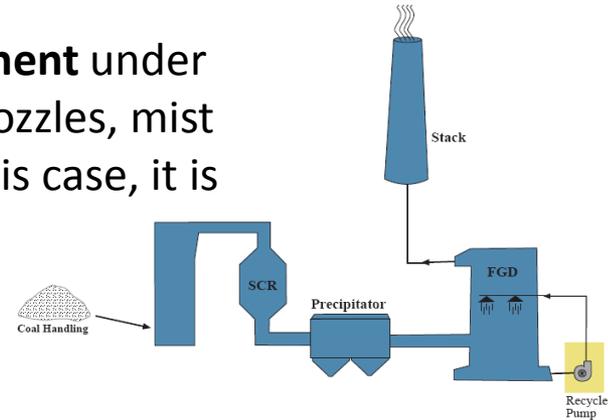


Industry	Industry Sub-Segment	Process	Sub-Process	System	Calcium Reagents	Sub-System	Type
Fossil Fired Boilers #284	Coal Fired Boilers #3	Air Quality #10	FGD #18	Wet #202	Limestone #26	Absorber Slurry #48	Sump
							Tray
							Spray Tower #401

FGD Re-Cycle Slurry Pump

Generic Component

Next it is necessary to identify the **generic component** under consideration. The choices are shell, piping, nozzles, mist eliminator, re-cycle tank or recycle pump. In this case, it is the recycle pump.

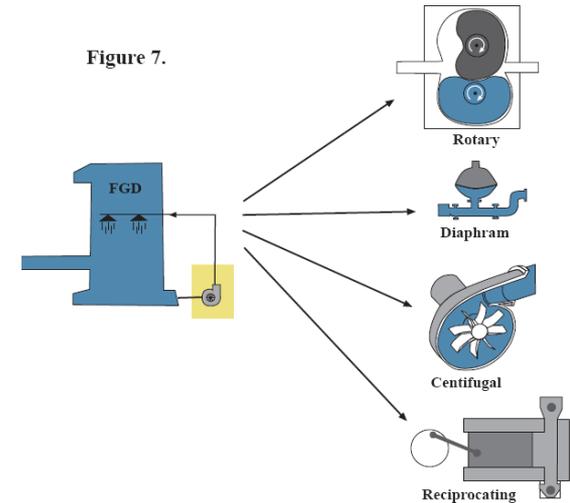


Industry	Industry Sub Segment	Process	Sub Process	System	Reagents	Sub System	Type	Generic Component
Fossil Fired Boilers #284	Coal Fired Boilers #3	Air Quality #10	FGD #18	Wet #202	Limestone #26	Absorber Slurry #48	Spray Tower #401	Shell
								Nozzles
								Mist Eliminator
								Re-Cycle Tank
								Re-Cycle Pump #219

FGD Re-Cycle Slurry Pump

Pump Type

And finally the **type of pump** must be selected . Pump choices include rotary, diaphragm, centrifugal, and reciprocating. Hard metal or rubber-lined centrifugal pumps are the only choice given the 50,000 gpm requirement of the application and the abrasive nature of the slurry.



Industry	Industry Sub Segment	Process	Sub Process	System	Reagents	Sub System	Type	Generic Component	Component Type
Fossil Fired Boilers #284	Coal Fired Boilers #3	Air Quality #10	FGD #18	Wet # 202	Limestone #26	Absorber Slurry #48	Spray Tower # 401	Re-cycle Pump #219	Rotary
									Diaphragm
									Centrifugal #602
									Reciprocating

FGD Re-Cycle Slurry Pump

Completed Bid Specification

The entire **bid specification** can now be captured as just one number #602. This is because the centrifugal pump #602 only has one parent which is recycle pump #219 which only has one parent which is spray tower #401, and so forth. The whole chain of parents is then easily displayed with the software. At each point along the way there is a schematic which is also linked to the number.

Industry	Industry Sub Segment	Process	Sub Process	System	Reagents	Sub System	Type	Generic Component	Component Type
Fossil Fired Boilers #284	Coal Fired Boilers #3	Air Quality #10	FGD #18	Wet #202	Limestone # 26	Absorber Slurry #48	Spray Tower #401	Re-cycle Pump #219	Rotary
									Diaphragm
									Centrifugal #602
									Reciprocating

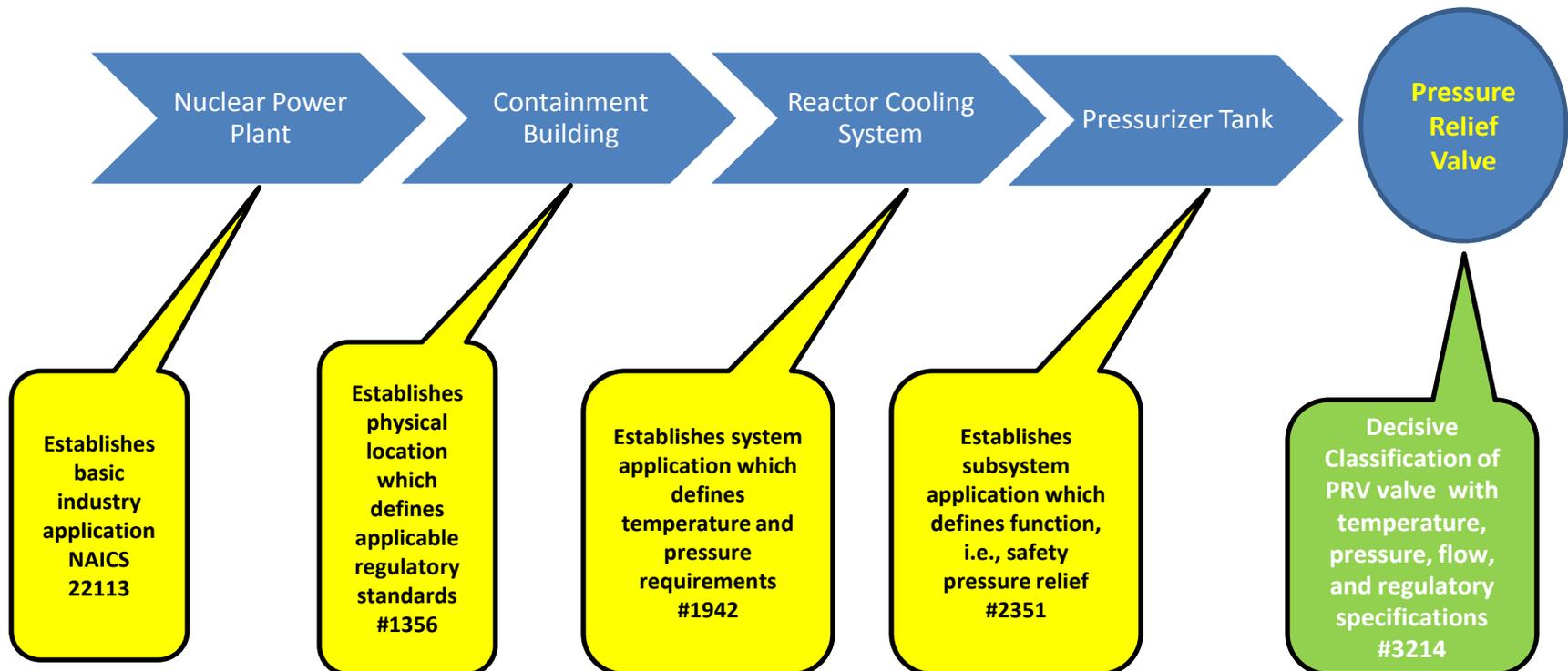
Example #2: Nuclear Valve

Nuclear Valve Selection

- This is an example of decisive classification & sequencing for an important safety valve in a nuclear power plant.
- The specific requirement is for a nuclear-certified safety relief valve for the main pressurizer tank in the reactor coolant system.

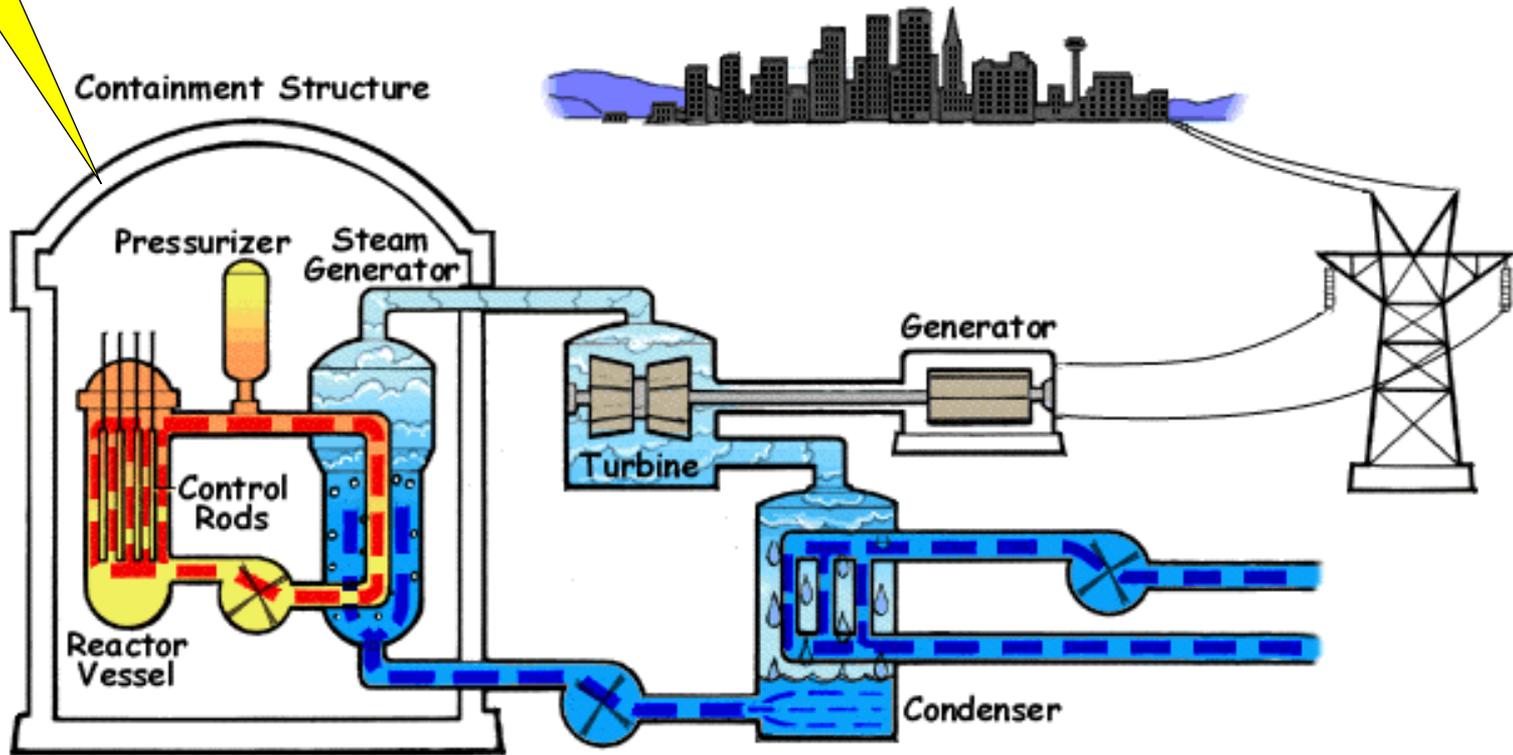
Defining the Requirements

The Decisive Classification “string” looks like this.

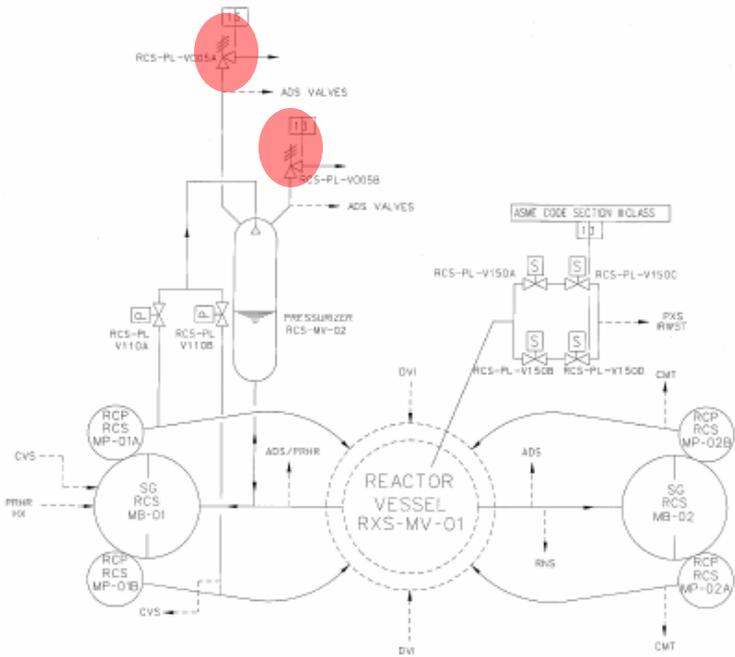


Linking the String To the Application

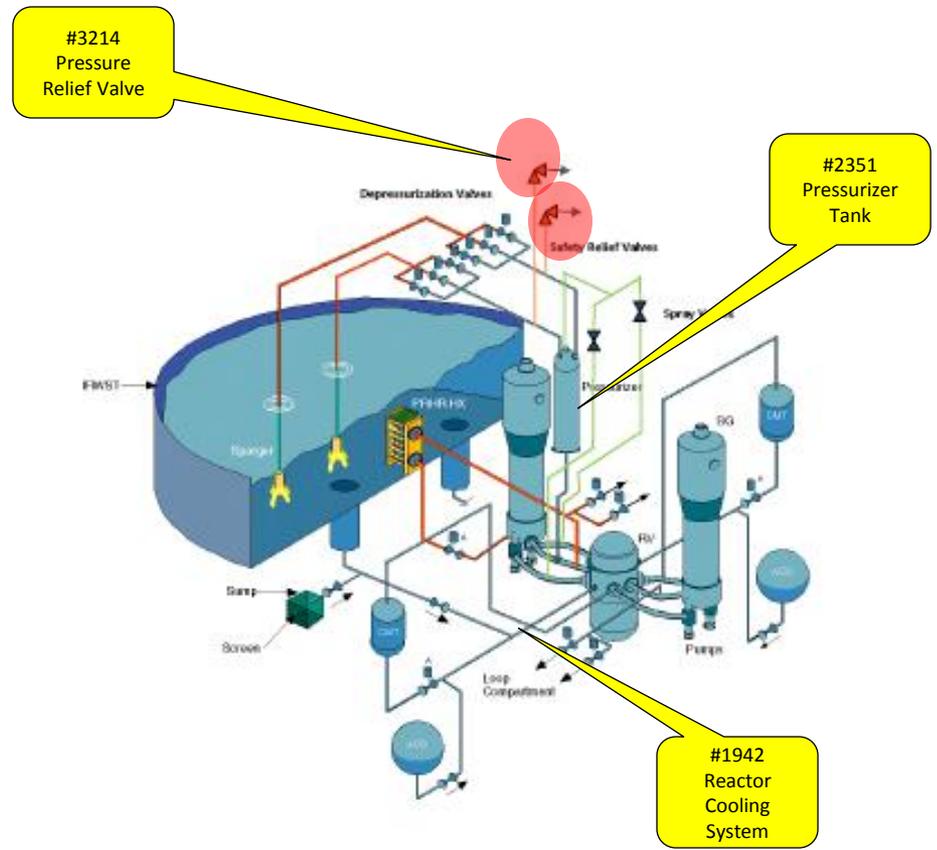
#1356
Containment
Building



Decisively Defining Product Application and Function



Source: Westinghouse Corporation for AP1000 reactor.



Closing the Loop with an actual power plant Bill of Material or list of qualified vendors, or technical analysis for #3214

Valve Class	Valve Type	Operator	Connection	Material	Size	Qty
PV62	Pressurizer Safety Valves	Self-Actuated	Flanged	Stainless Steel	6"x8"	2
PV63	Pressurizer Spray Valves	Air-Operated w/Positioner	Butt Weld	Stainless Steel	4"	2
PV64	Main Steam Isolation Valves	Pneumatic-Hydraulic Actuated	Butt Weld	Alloy Steel	38"	2
PV65	Main Steam Safety Valves	Self-Actuated	Flanged	Carbon Steel	8"	12
PV66	Main Steam Power Operated Relief Valve	Self Actuated	Butt Weld	Alloy Steel	12" x 8"	2
PV67	Feedwater Isolation Valves	Pneumatic-Hydraulic Actuated	Butt Weld	Alloy Steel	20"	2
PV68	Feedwater Check Valves	Nozzle Check	Butt Weld	Alloy Steel	20"	2
PV69	Feedwater Control Valves	Air w/Positioner	Butt Weld	Alloy Steel	6 - 20"	4
PV70	Squib Valves		Flanged	Stainless Steel	8 - 14"	12
PV78	Needle Valves	Manual	Socket Weld	Stainless Steel	1"	2

Source: Westinghouse Corporation.