

Leaks in Heads Joint Improvement Story Durango Plant

TEAM "LEAKS"

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PROBLEM / OPPORTUNITY STATEMENT

Problem: Durango Plant is manufacturing coolers for Basildon and Monterrey Plant, some coolers leaks when chillers are tested, causing reworks and warranty cost due to leaks on coolers. Since Basildon Plant started to claim on August/1999 several leaks problems have been reported. Potential reworks costs represents 4 % of sales to Basildon Plant, this 4 % is around \$ 130 K of potential reworks cost a year.

Objective: Implement changes to eliminate potential rework cost due to leaks on coolers which will represent \$ 130 K a year.

IMPROVEMENT STORY - STEP 1

IDENTIFY THE PROBLEM

Durango – Basildon LEAKS IN HEAD JOINTS

GENERAL WORK ROUTE

OUR PRINCIPAL GOAL? Eliminate reworks in coolers in both Basildon & Monterrey plants.

WHAT WE ARE LOOKING FOR? A method to eliminate leaks in the joint heads of coolers

WHERE GOING? To establish a method that can maintain the torque so that leaks can be eliminated

WHY WE ARE GOING TO ELIMINATE LEAKS? Because is a relevant warranty issue for the corporation and due to this high warranty cost are been generated.

HOW MANY YEARS? 1.5 Year

WHEN START? May-1999

WHEN WE WILL FINISH? October-2000

WHEN WE ARE TAKING MEASURES? Each week in accordance the feedback from Basildon and Monterrey.

HOW WE ARE TAKING MEASURES? In accordance with the quantity of coolers with leaks reported from Basildon each week.

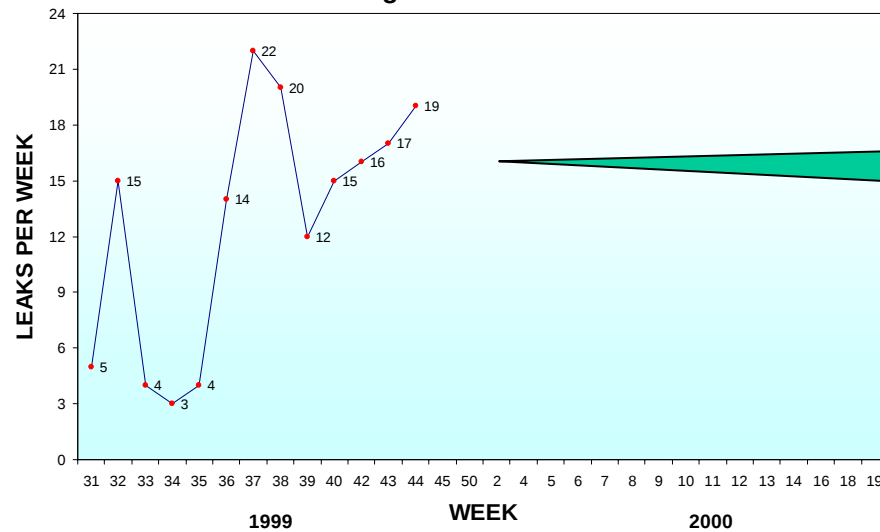
WHICH WILL BE OUR PRINCIPAL INDICATOR? In Durango Plant is the torque loosed and In Basildon and Monterrey Plant are the coolers with leaks.

WHICH ARE OUR RESTRICTIONS? The time of response from Basildon due the time of transit (3-4) weeks of the coolers and the stock that Basildon has.

IMPROVEMENT STORY - STEP 1

IDENTIFY THE PROBLEM

Line Graph of Leaks on Coolers
From August to October 1999

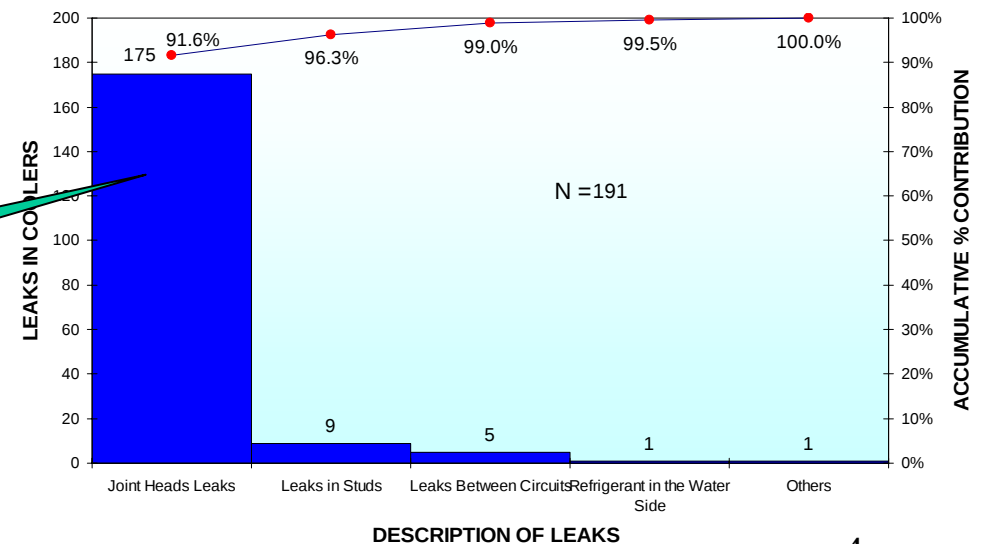


Source: Basildon Plant

**REWORKS CLAIMS
FROM BASILDON**

**JOINT HEAD
LEAKS**

Pareto Graph of Leaks
From August to October 1999



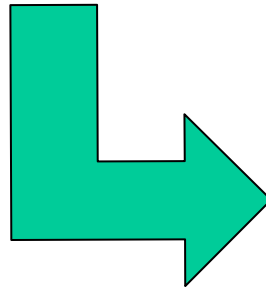
Source: Basildon Plant

IMPROVEMENT STORY - STEP 2

ANALYZE CAUSES

For analyze the differences in process between Durango, Basildon and Monterrey Plants, Basildon and Monterrey were visited by personnel from Durango Plant.

To see the main differences in process between Plants, click on the icon.



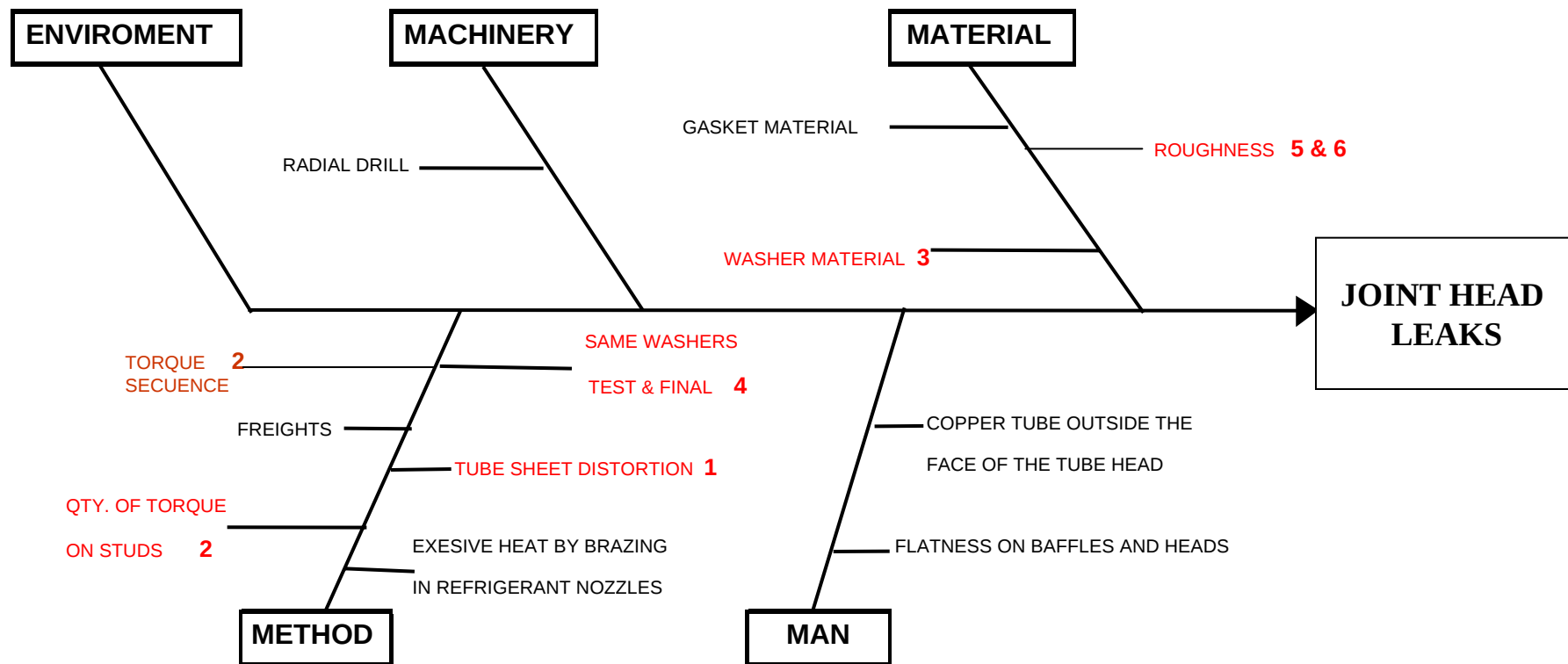
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Microsoft Excel

IMPROVEMENT STORY - STEP 2

ANALYZE CAUSES

The cause and effect diagram is based on
Durango Plant Process

FISH BONE



IMPROVEMENT STORY - STEP 2

ANALYZE CAUSES

A Design Of Experiments was to be executed in order to establish which variable from the cause and effect diagram were the ones that had the most impact in the process.

Since there were production restriction to meet such as volume and cost of the test, a screening process was carried out to establish which variable would affect most.

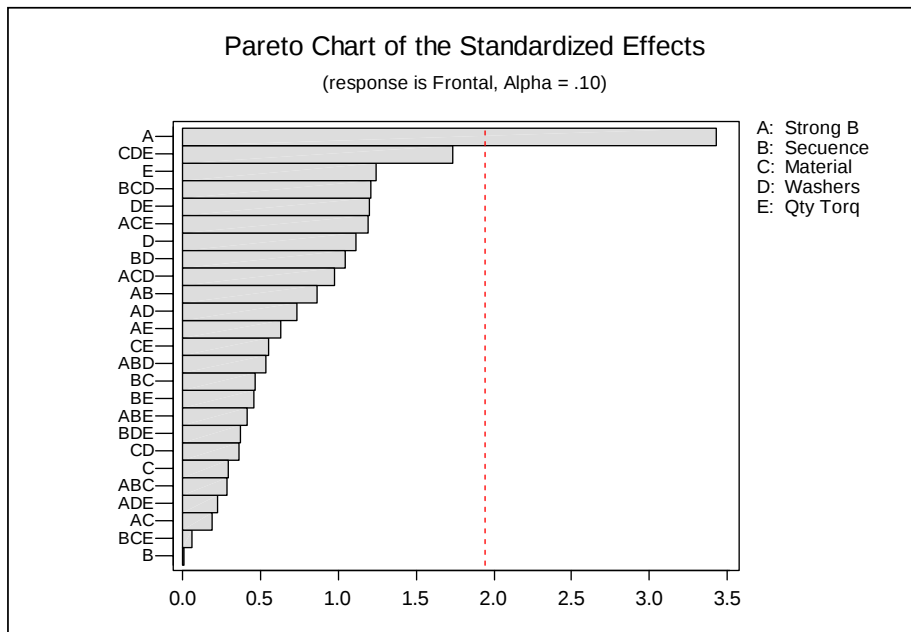
The team validated the final input variables to utilize.

ACTION PLAN FOR DOE

	Action	Who	When (Date)	Status
		Responsible	Start date	Finished date
1	DOE definition	4-UP Team	27-May-99	5-Jun-99
2	Identify the P/N with more event	4-UP Team	5-Jun-99	8-Jun-99
3	Torque procedure for DOE	Nestor ceniceros	24-Jun-99	25-Jun-99
4	Flow chart for Doe	Alberto Ramírez	22-Jun-99	29-Jun-99
5	Strong back up for DOE	Nestor Ceniceros	27-Jun-99	27-Jun-99
7	Special Washers for DOE	Gerardo Briceño	28-Jun-99	27-Jul-99
8	Collect information from DOE	Jose A. Nuñez	6-Jul-99	31-Aug-99
9	Collect information in Monterrey Plant	Jesus Cruz	9-Jul-99	31-Aug-99
10	Collect information in Basildon Plant	John Read	29-Jul-99	31-Aug-99
11	DOE Evaluation	Nestor Ceniceros Hermak Banda	17-Sep-99	19-Sep-99
12	Final Actions	4-UP Team	20-Sep-99	20-Oct-99

IMPROVEMENT STORY - STEP 2

ANALYZE CAUSES



The countermeasures for the following causes:

- 1) Washer Material
 - 2) Washer conditions (used or new)
 - 3) Tube Sheet Distortion
 - 4) Quantity of torque
 - 5) Torque Sequence
- were derived from the Design Of Experiments.

To see the DOE please click on the attached icon.



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Microsoft Word

DOE

- Factor **A** has the highest impact of all: **Distortion (Strong Back Usage)**
- Factors **E**, **D** are the next ones: **Torque Quantity and Washers (New, Used)**
- The **DE** interaction follows: **Torque Quantity X Washers (New, Used)**
- Factor **C** is in the next highest interactions: **Washer Material**
- Torque sequence factor **B** does not show impact.

IMPROVEMENT STORY - STEP 3 GENERATE AND SELECT COUNTERMEASURES

COUNTERMEASURES DERIVED FROM DOE

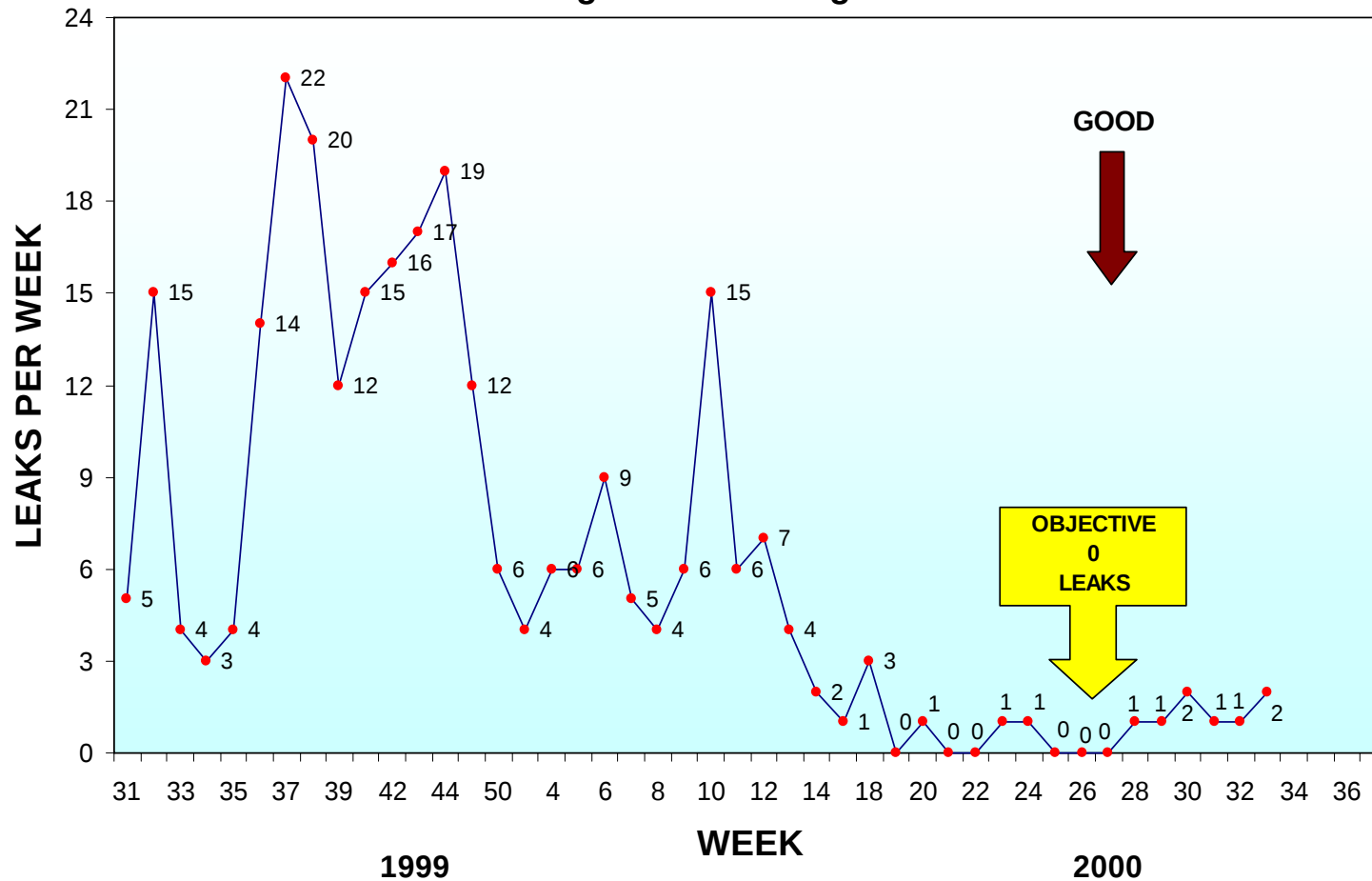
	Action	Who	When (Date)	Status
		Responsible	Start date	Finished date
1	Strong back up implementation	4-UP Team	20-Sep-99	25-Oct-99
2	Torque procedure standarization	Nestor Cenicerros	20-Sep-99	29-Sep-99
3	Change Washer Thickness	Gerardo Briseno	20-Sep-99	25-Oct-99
4	New Washers	Nestor Cenicerros	11-Dec-99	31-May-00

COUNTERMEASURES AFTER BASILDON VISIT

	Action	Who	When (Date)	Status
		Responsible	Start date	Finished date
5	Change Roughness to 100 micro inches (Blanchard 1)	Carlos Chalup	20-Jan-00	25-May-00
6	Change Roughness to 100 micro inches (Blanchard 2)	Carlos Chalup	25-May-00	
7	Gasket Between head and washers	Roberto Macias	6-Mar-00	14-Apr-00
8	Retorque to Coolers	John Read	4-Apr-00	7-Apr-00

IMPROVEMENT STORY - STEP 4 IMPLEMENT AND EVALUATE RESULTS

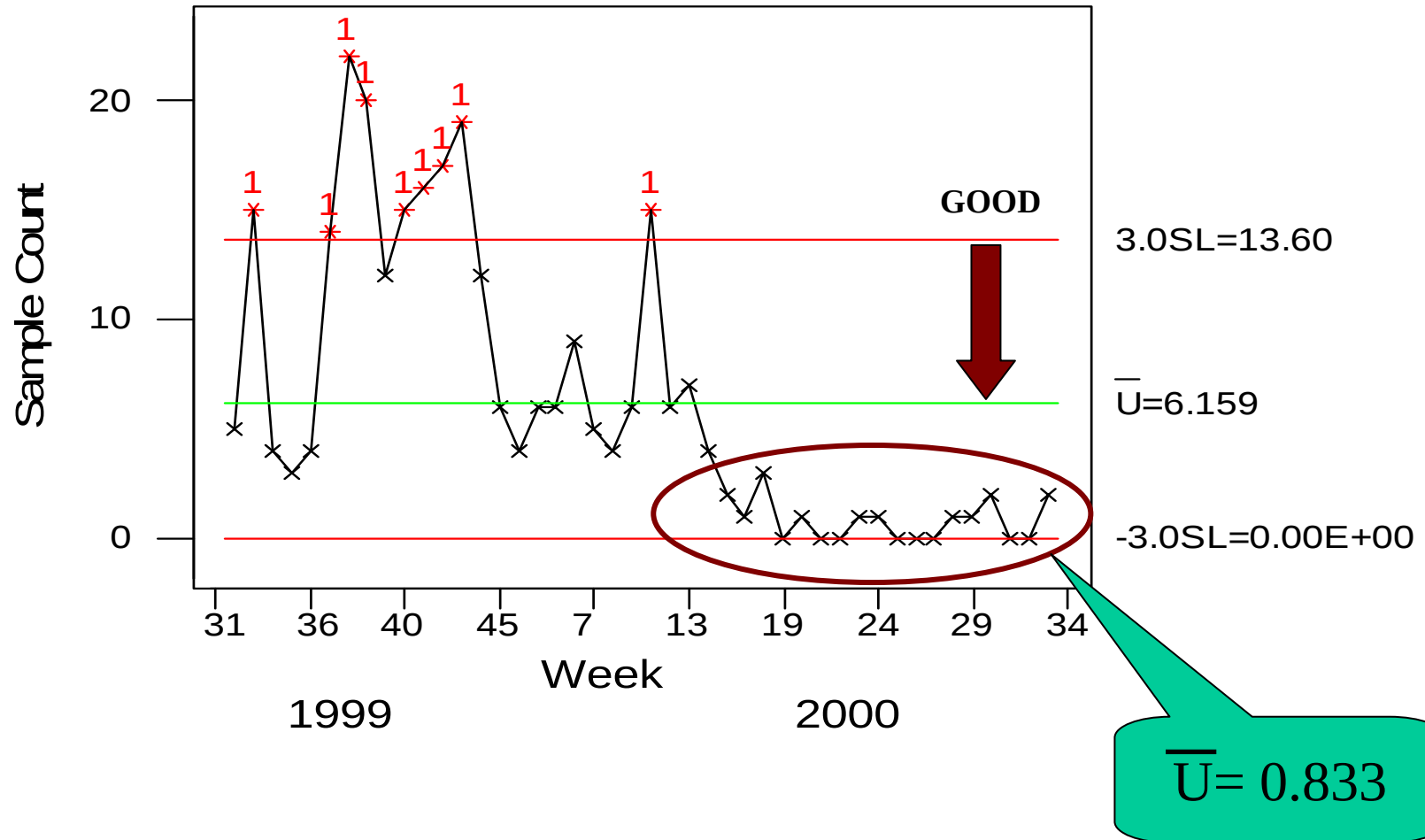
Line Graph of Leaks on Coolers
From August 1999 to August 2000



Name: Nestor ceniceros
Date: Aug-18-00
Source: Basildon Weekly Report

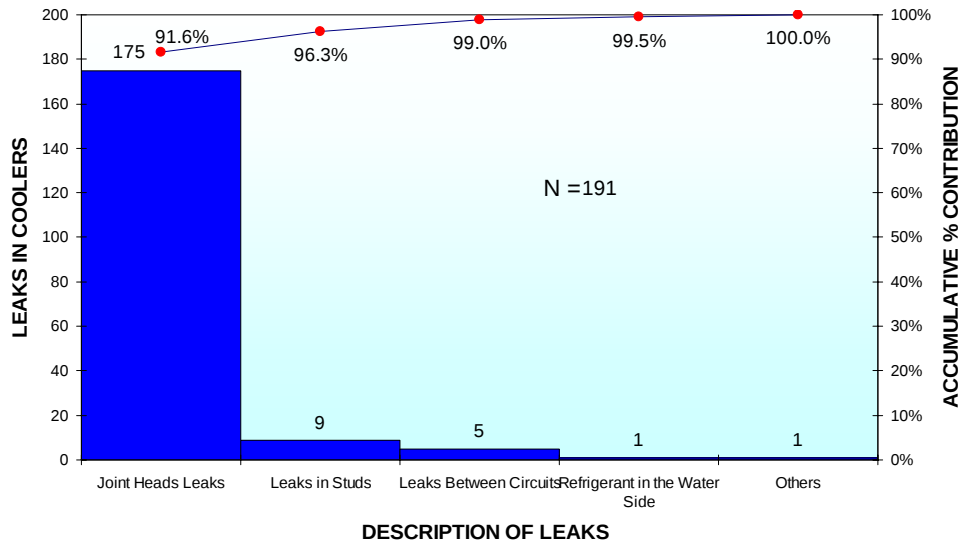
IMPROVEMENT STORY - STEP 4 IMPLEMENT AND EVALUATE RESULTS

U Chart for Leaks



IMPROVEMENT STORY - STEP 4 IMPLEMENT AND EVALUATE RESULTS

Pareto Graph of Leaks
From August to November 1999



Source: Basildon Plant

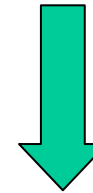


Before corrective actions we
received 8 leaks rework
claims per week.

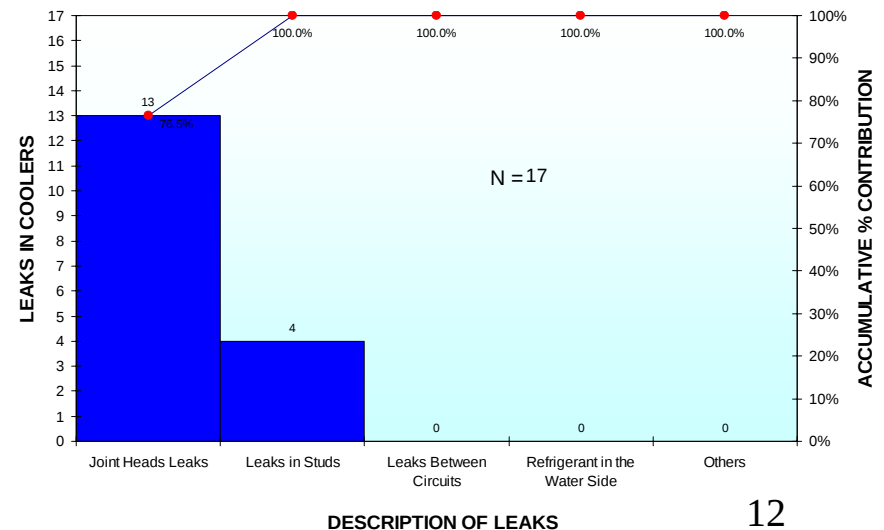
191 leaks reported in 24 weeks
Source: Basildon Plant

After corrective actions we
received 1 leak rework
claim per week.

17 leaks reported in 18 weeks
Source: Basildon Plant

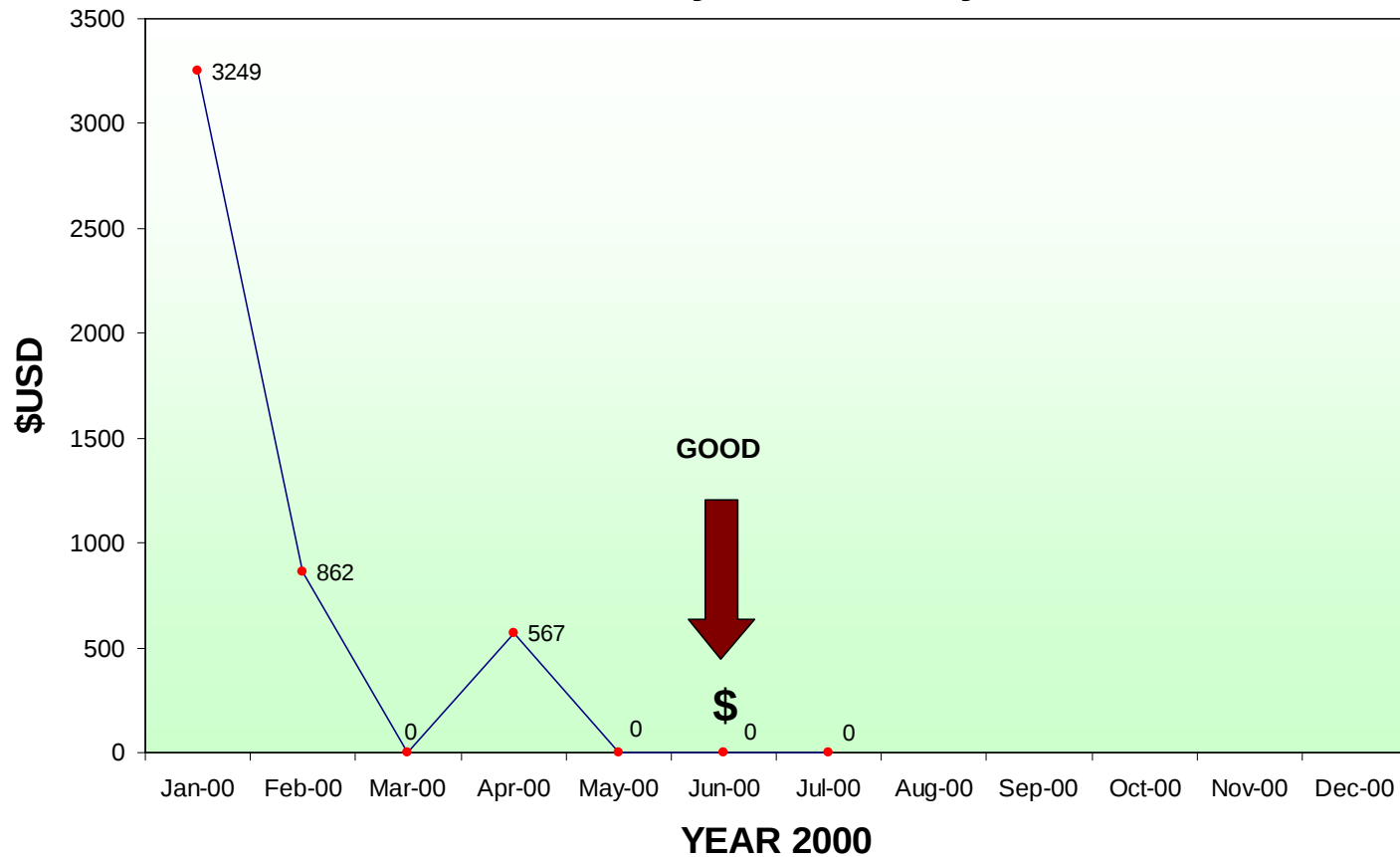


Pareto Graph of Leaks
From May 2000 to August 2000



IMPROVEMENT STORY - STEP 4 IMPLEMENT AND EVALUATE RESULTS

Leaks on Coolers Reworks Claims From January 2000 to July 2000



Name: Nestor M. Cenicerros C.
Date: Aug-07-2000
Source: Basildon Rework Claims

DURANGO PLANT

IMPROVEMENT STORY - STEP 5 STANDARDIZE AND REPLICATE IMPROVEMENTS

- 1- Continue monitoring and publishing leaks rework claims in order to sustain improvements
- 2- Continue to gathering and analyzing data on actual conditions using:
 - a) Pareto Chart
 - b) Run Charts
 - c) Lineal Charts
- 3- Keep York Durango, Basildon and Monterrey as a permanent team
- 4- Continue capacitating program for operators
- 5- Follow up standard operating procedures for torque and testing
- 6- Continue monitoring for retorque in Basildon
- 7- Implementation of X and mR control chart for torque and flatness on tube sheets

**To see torque
procedure, click on
the icon.**



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Microsoft Word



**To see X, mR control
charts for torque and
flatness, click on
the icon.**



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Microsoft Excel

