Risk

Analyzing Petrobras DP Incidents

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Petrobras

October 17-18, 2006

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Analyzing
Petrobras DP Incidents

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Gilberto Beduhn Machado

E&P-SERV/US-SS/CPSE

Petrobras Scenario

•80% of the Brazilian oil and gas production is extracted from the sea.

•Different working environments - some of them specific to the Brazilian offshore fields.

•DP rigs, a successful tool used to drill, complete and carry out workovers in sub sea wells.

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•Situation before 1992:

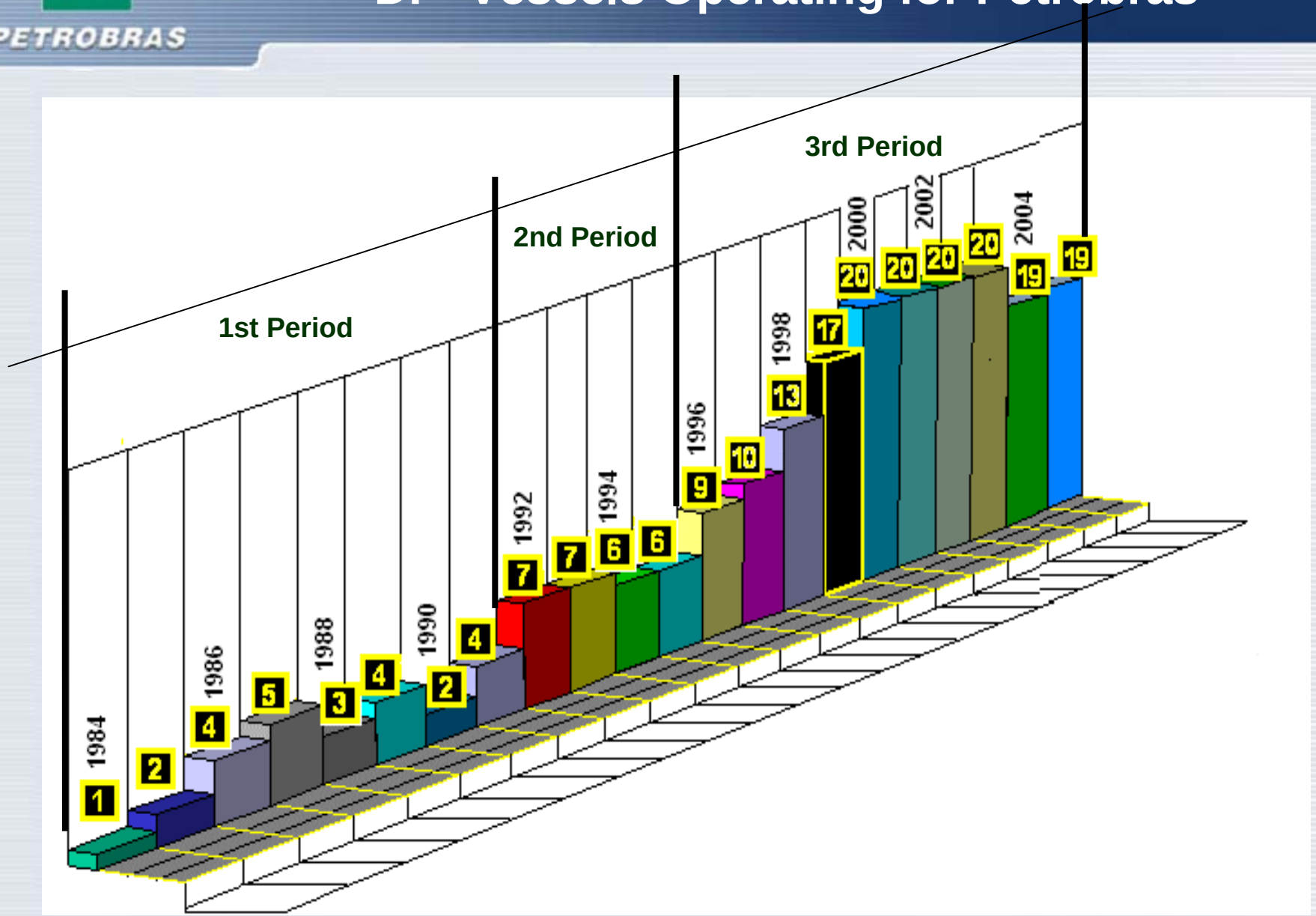
- ✓Poor operational procedures and lack of contingency plans;
- ✓Inappropriate operational safety limits;
- ✓Engineers were unfamiliar with DP rigs details.

•Petrobras started carrying out DP vessel studies.

•1992 => DPPS (Dynamic Positioning Safety Program) is created in partnership with contractors - to avoid incidents or, at least, to minimize their consequences by using a proactive policy.

•1996 => The number of DP vessels started increasing rapidly.

DP Vessels Operating for Petrobras



Projects being developed by DPPS

01 - Weather Forecasts
02 - DP Incidents Data Bank (BDIP)
03 - Restrictions Diagram
04 - Procedure Prior to Arrival on Location
05 - Position Reference System
06 - EDS and Degraded Status Criteria
07 - Contingency Plans for Uncontrolled Drift (blackout situation)
08 - DP Rig Audit
09 - Non-conformities Data Bank (SPS)
10 - Bid Requirements
11 - Key DP Personnel Log Book
12 - DP Training for Petrobras Representative on board
13 - New Projects

02 - DP Incidents Data Bank (BDIP)

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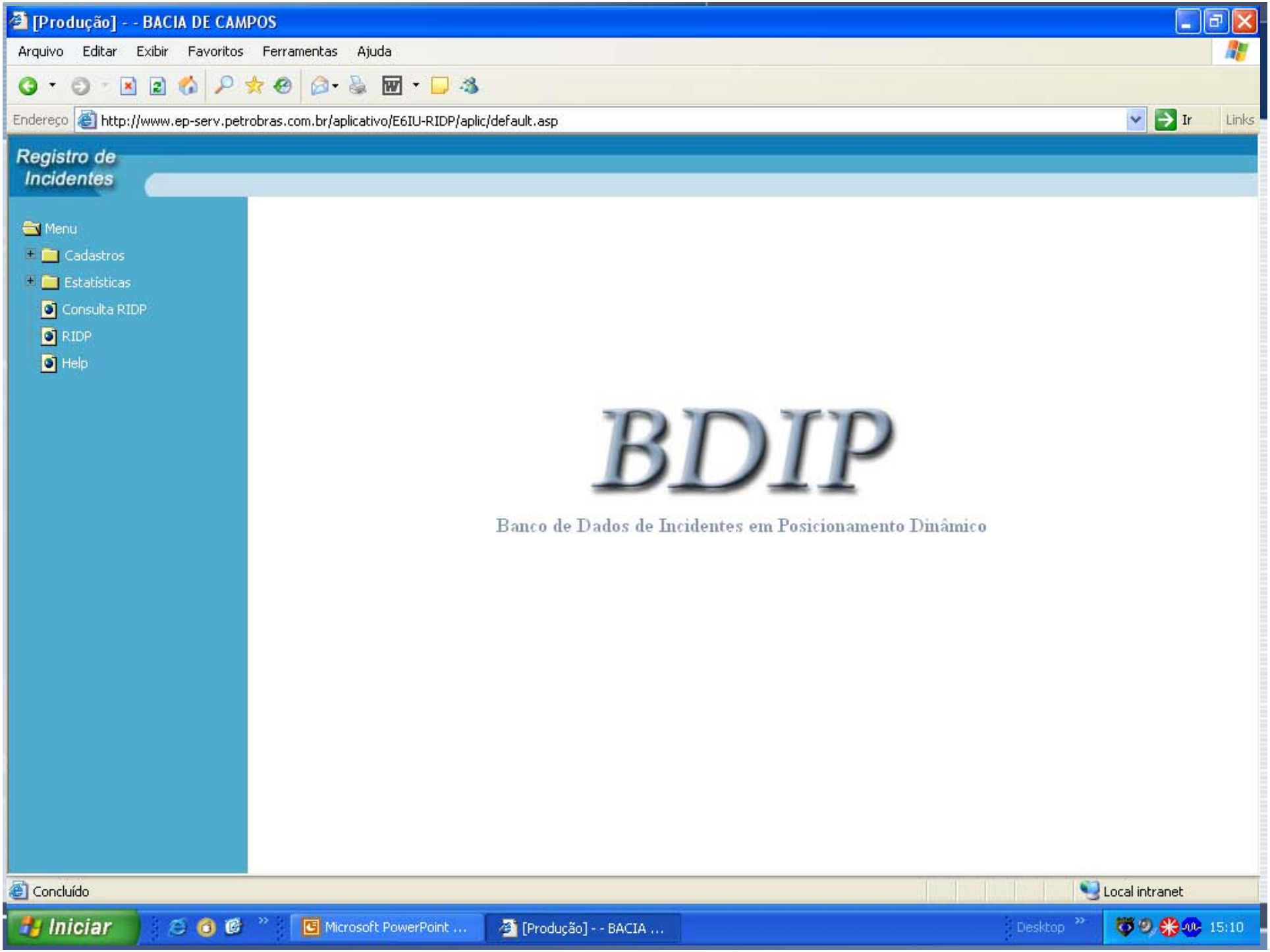
Objectives:

- to avoid repeating occurrences - an useful and practical tool to improve reliability on DP Vessels;
- to keep an updated source for contracts renewals and
- for DPPS risk management purposes.


[Produção] - - BACIA DE CAMPOS
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Ir
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Microsoft PowerPoint ...
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Desktop
15:10

RIDP

BLOCO 01 DADOS GERAIS

Sonda: Selecione | Data da Ocorrência: | Hora da Ocorrência: | Nº Incidente no dia:

○ Selecionar Campo, Poço e PDA ◉ Inserir Campo, Poço e PDA manualmente

Nome do campo: | Nome do poço: | PDA:

Atividade: Selecione uma opção | Incidente: Selecione uma opção

Tipo Operação: Selecione uma opção

SALVAR DADOS DO BLOCO 01

BLOCO 02 RESPONSABILIDADE OPERACIONAL DURANTE O INCIDENTE

BLOCO 03 ORIGEM DO INCIDENTE

BLOCO 04 INCIDENTE É QUALQUER AMEAÇA OU PERDA DE POSIÇÃO

BLOCO 05 SITUAÇÃO DA SONDA NO MOMENTO DO INCIDENTE

BLOCO 06 CONDIÇÕES AMBIENTAIS NO MOMENTO DO INCIDENTE

BLOCO 07 TEMPOS DAS ANORMALIDADES

BLOCO 08 DESCRIÇÃO SUMÁRIA DO INCIDENTE

BLOCO 09 CONSEQUÊNCIA DO INCIDENTE

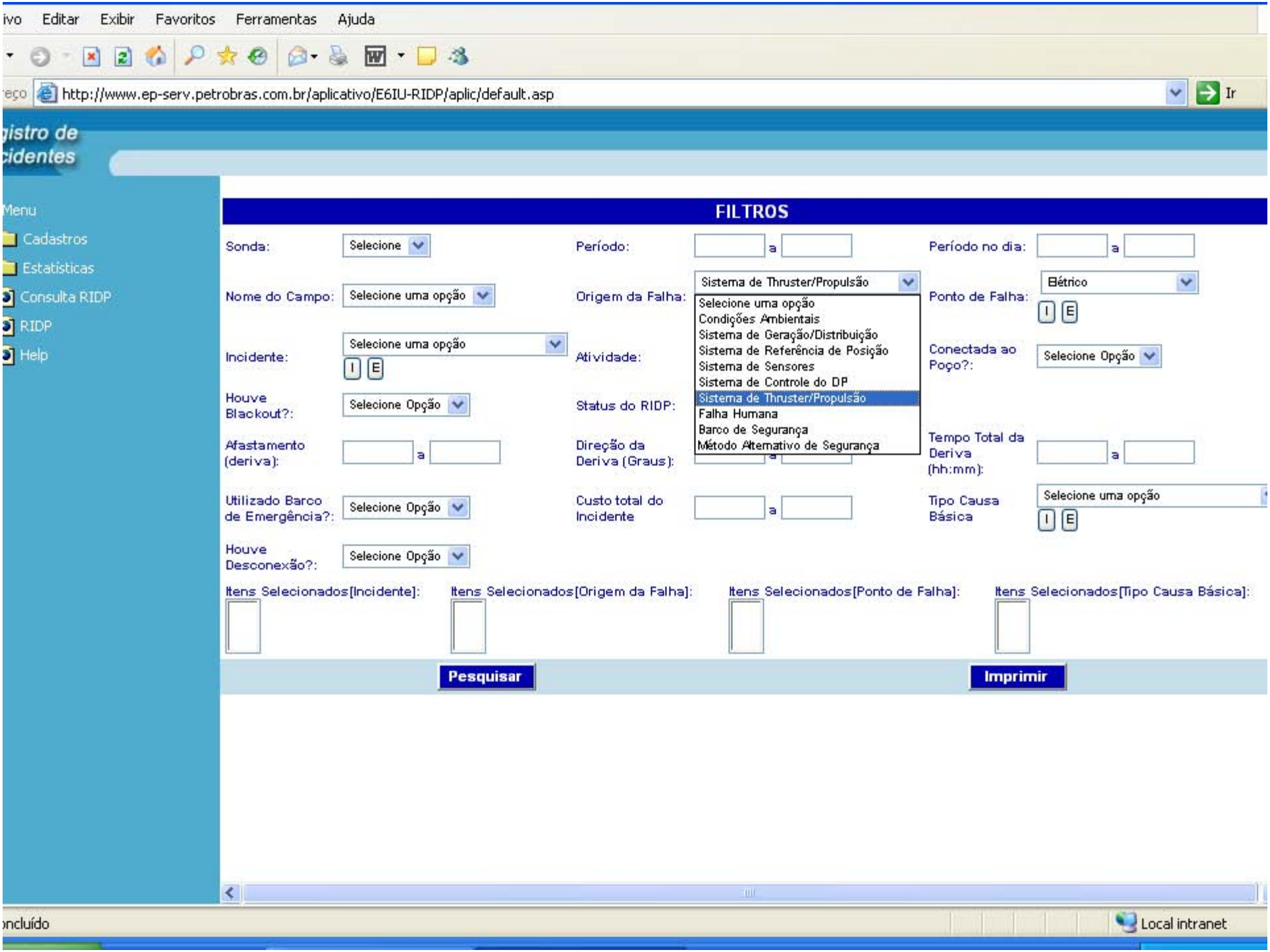
BLOCO 10 AÇÕES CORRETIVAS

BLOCO 11 CAUSA BÁSICA DO INCIDENTE

BLOCO 12 RECOMENDAÇÕES, COMENTÁRIOS E ASSUNTOS NÃO ESCLARECIDOS

BLOCO 13 CUSTO ESTIMADO DO INCIDENTE EM (U$ 1000,00)

Pesquisar | Fechar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Cadastros
Estatísticas
Consulta RIDP
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FILTROS
Sonda:
Selecione
Período:
a
Período no dia:
a
Nome do Campo:
Selecione uma opção
Origem da Falha:
Sistema de Thruster/Propulsão
Selecione uma opção
Condições Ambientais
Sistema de Geração/Distribuição
Sistema de Referência de Posição
Sistema de Sensores
Sistema de Controle do DP
Sistema de Thruster/Propulsão
Falha Humana
Barco de Segurança
Método Alternativo de Segurança
Ponto de Falha:
Elétrico
I
E
Incidente:
Selecione uma opção
I
E
Atividade:
Conectada ao Poço?:
Selecione Opção
Houve Blackout?:
Selecione Opção
Status do RIDP:
Afastamento (deriva):
a
Direção da Deriva (Graus):
a
Tempo Total da Deriva (hh:mm):
a
Utilizado Barco de Emergência?:
Selecione Opção
Custo total do Incidente
a
Tipo Causa Básica
Selecione uma opção
I
E
Houve Desconexão?:
Selecione Opção
Itens Selecionados[Incidente]:
Itens Selecionados[Origem da Falha]:
Itens Selecionados[Ponto de Falha]:
Itens Selecionados[Tipo Causa Básica]:
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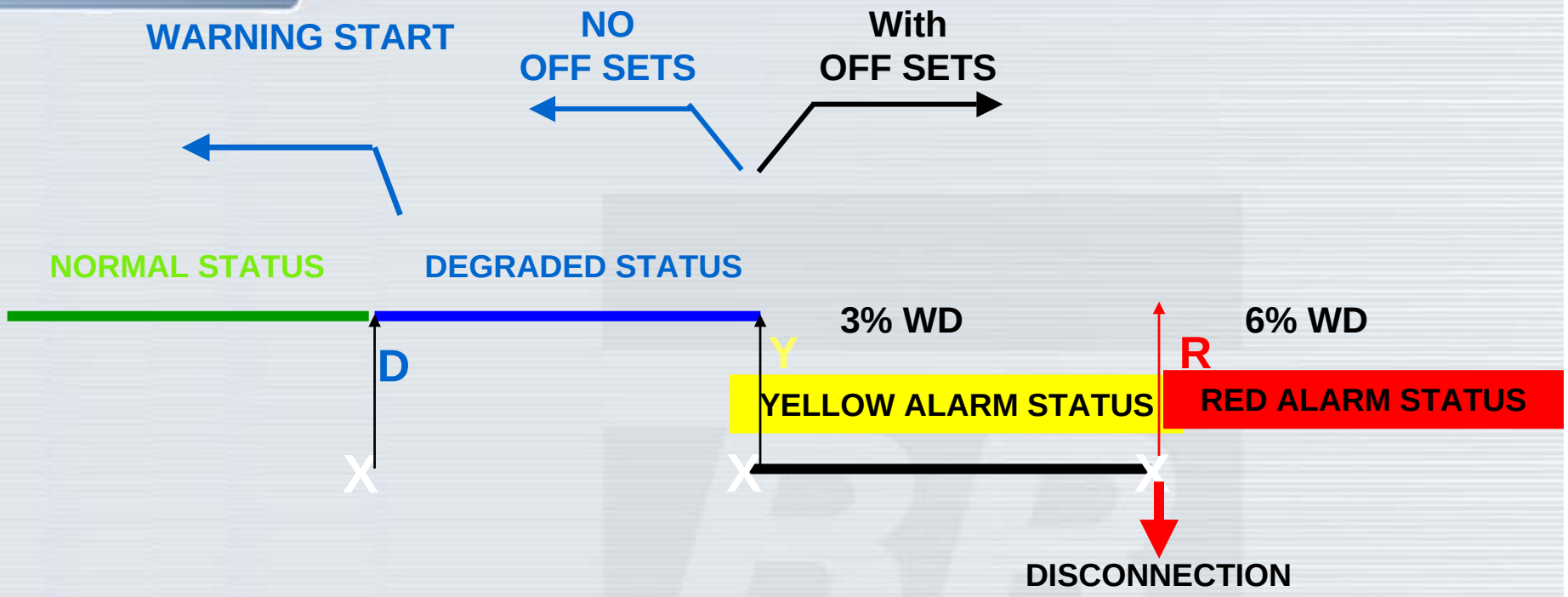
Local intranet

Definition of Incident



CAUSE	EFFECTS	CONSEQUENCE
Loss of Redundancy	Degraded	Without loss of position - Possible cease of operations (Critical Operation)
Progressive loss of station keeping capability	Yellow Alarm/ Red alarm	Loss of position under control – preparing for disconnection => disconnection
Sudden loss of station keeping capability (ex: black out)	Straight Red Alarm	Loss of position without control => Immediate disconnection

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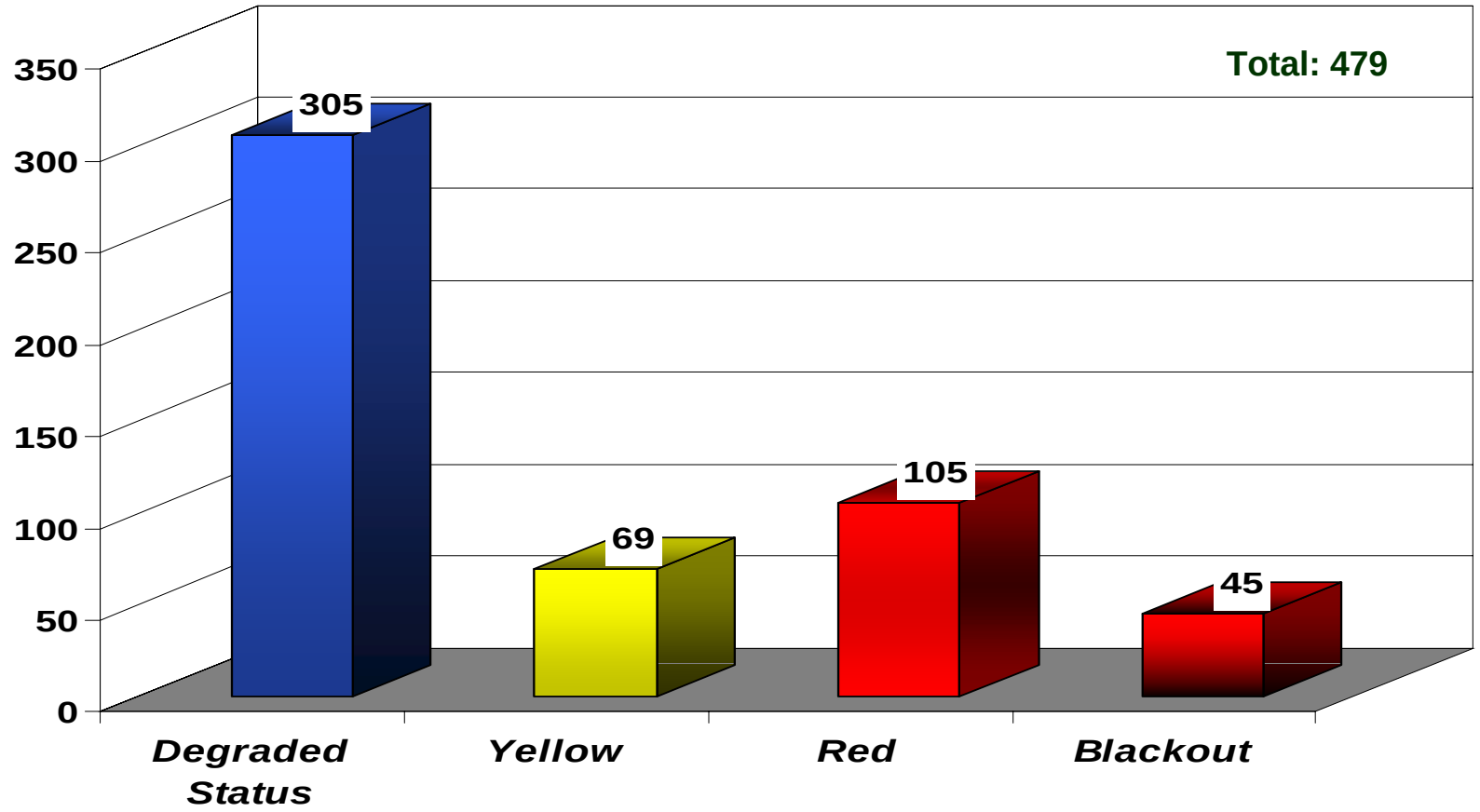
DP Incidents 1992 - 2005



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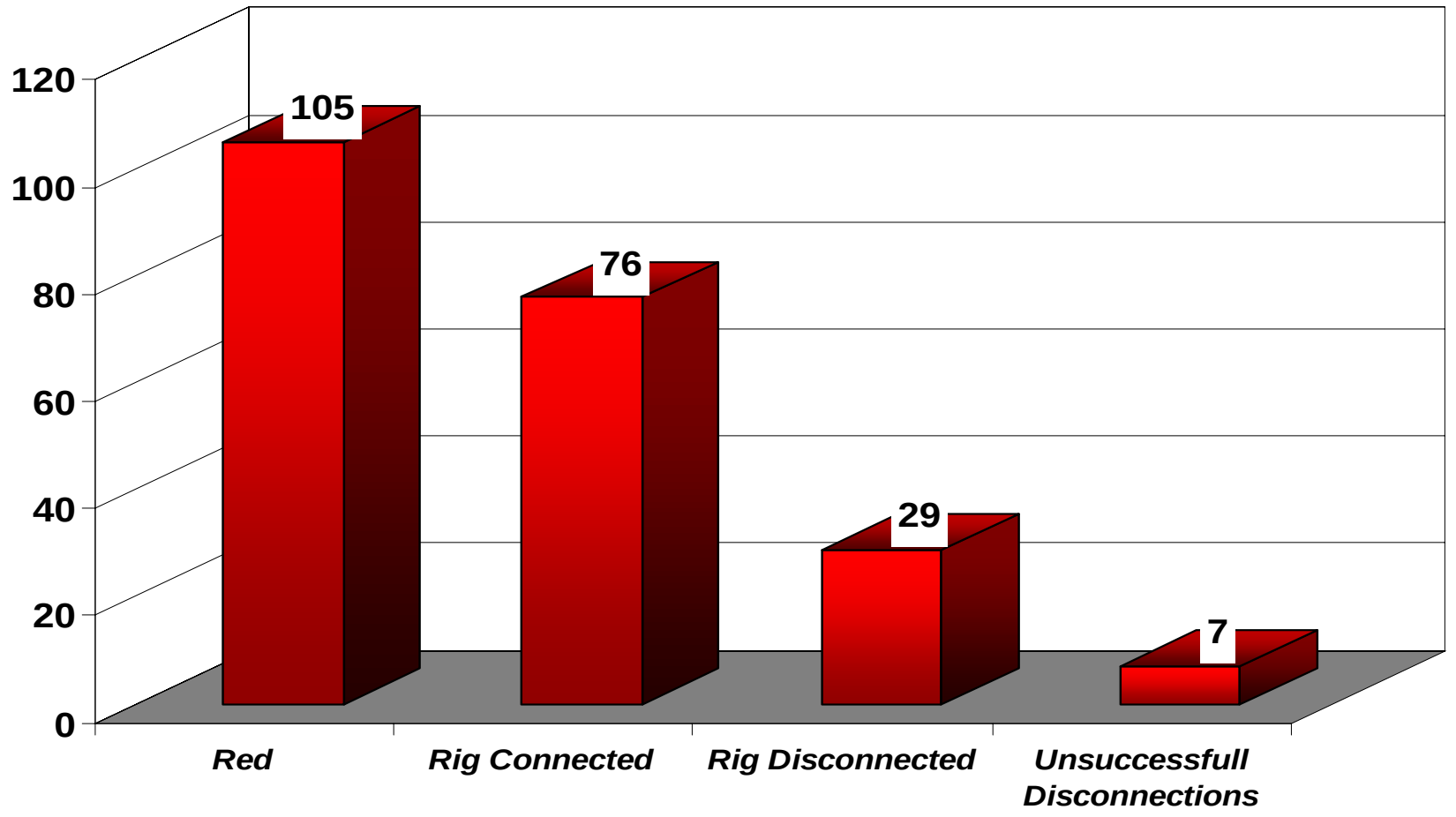
Red Alarm vs Disconnections -1992/2005



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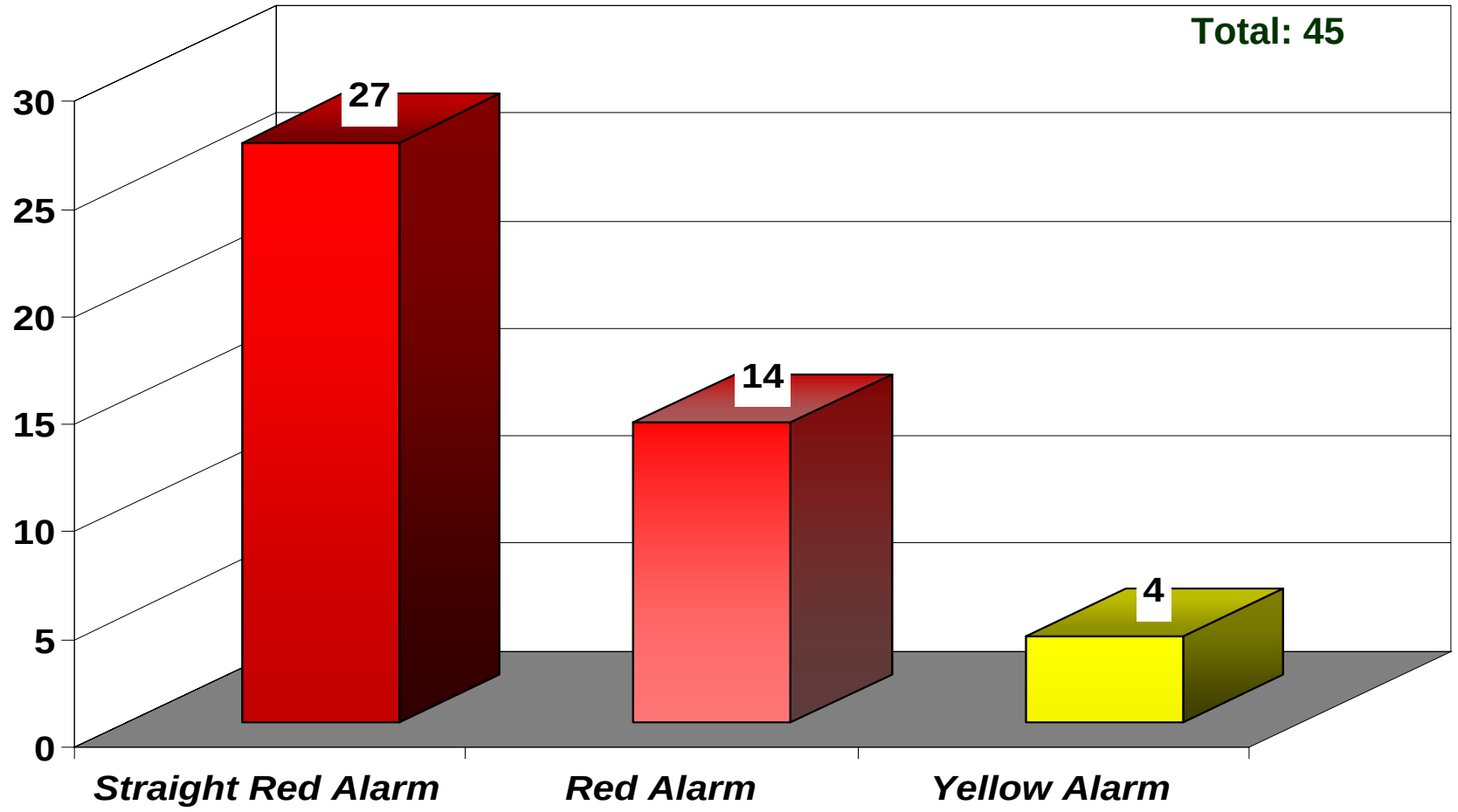
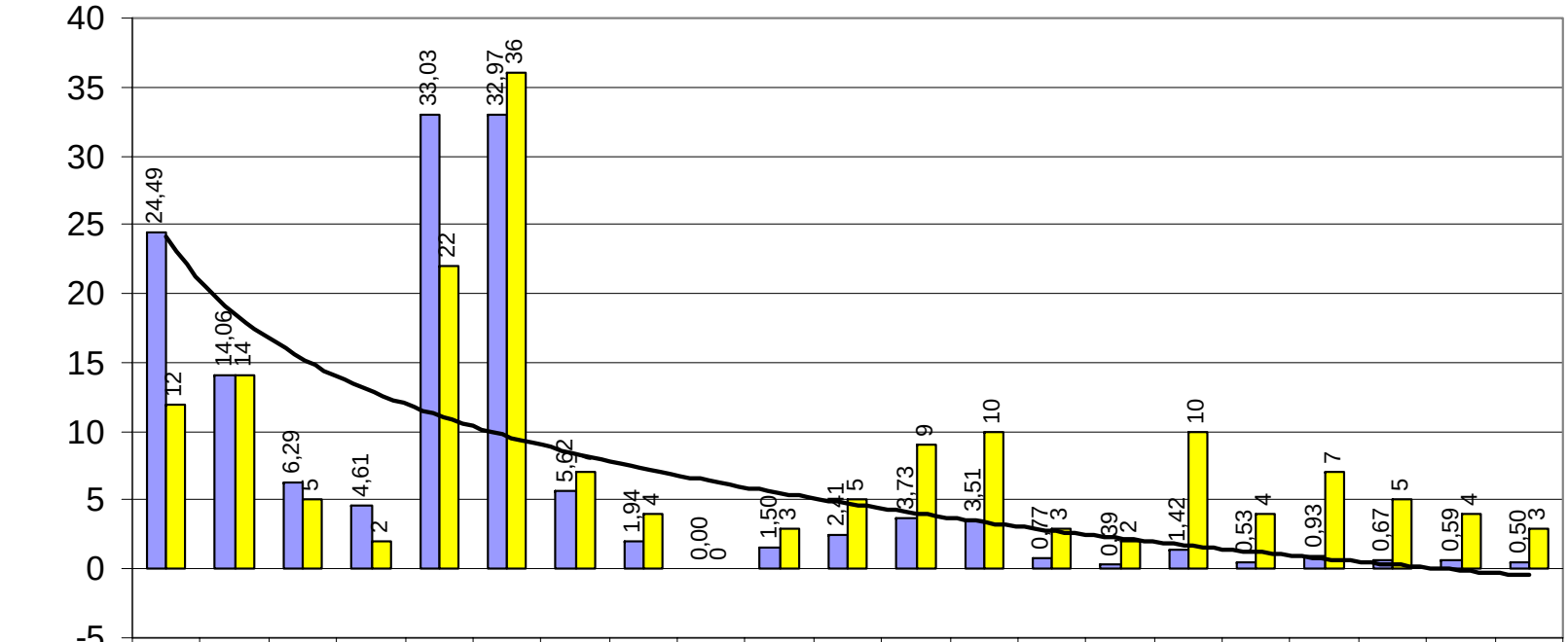
Blackout - Type of Incident -1992/2005



Yellow Alarm vs. Working Hours

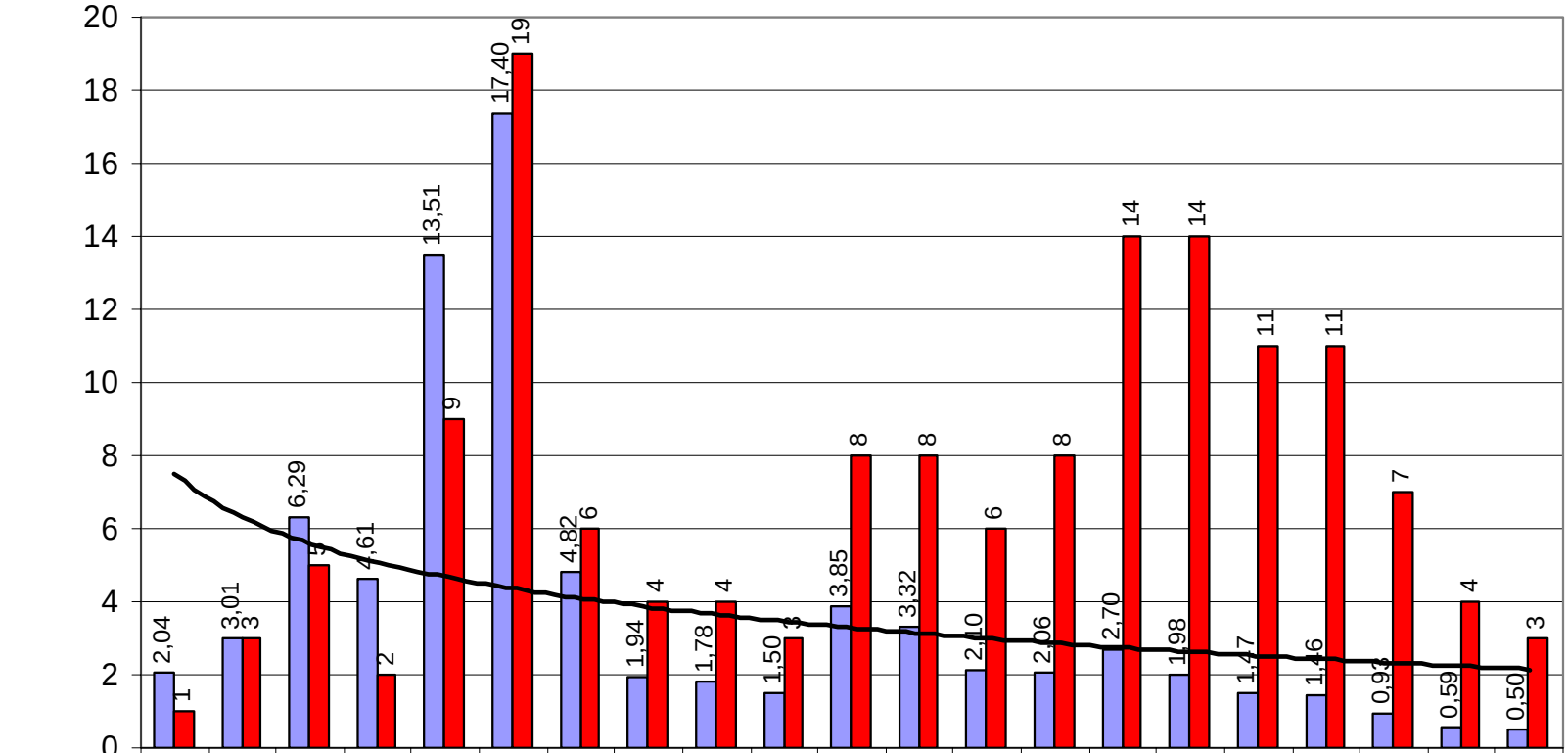
1985-2005



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Rate	24,49	14,06	6,29	4,61	33,03	32,97	5,62	1,94	0,00	1,50	2,41	3,73	3,51	0,77	0,39	1,42	0,53	0,93	0,67	0,59	0,50
# Alarms	12	14	5	2	22	36	7	4	0	3	5	9	10	3	2	10	4	7	5	4	3

Red Alarm vs. Working Hours

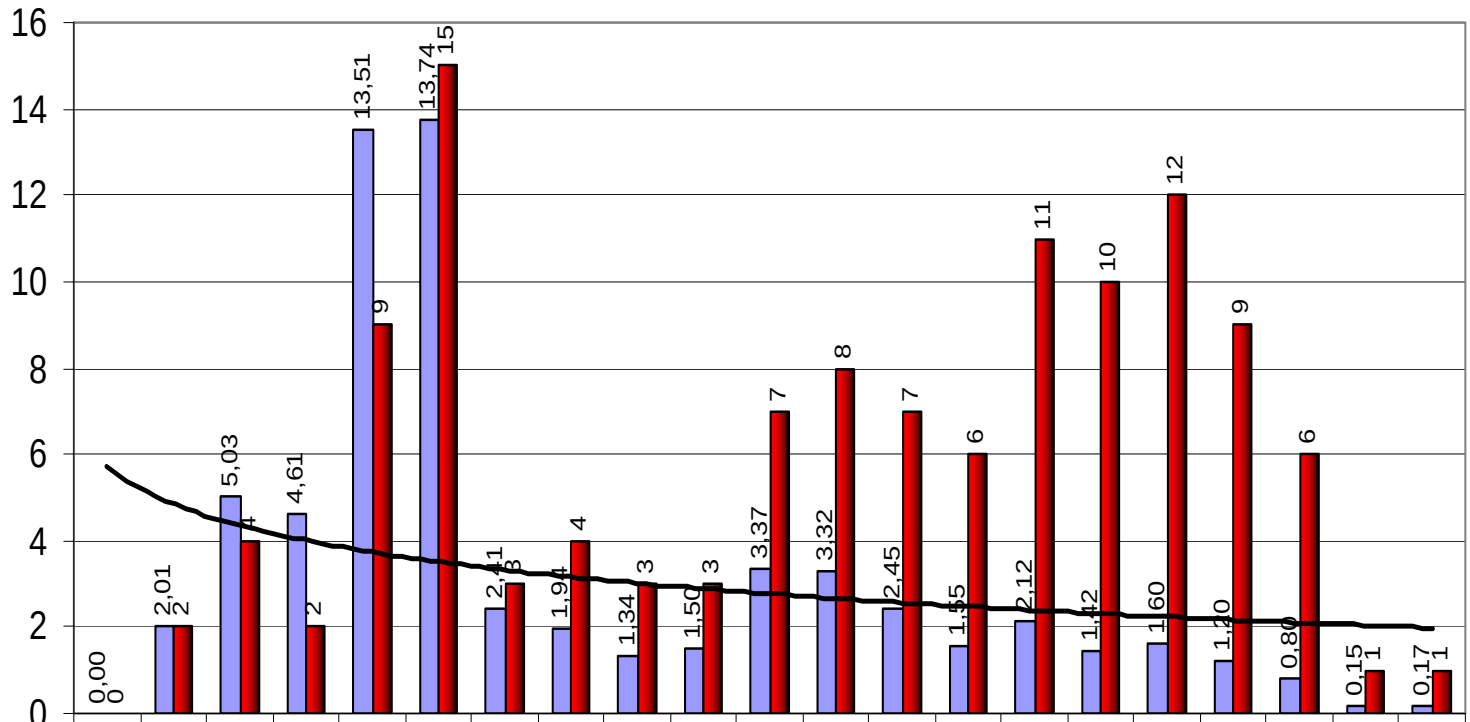
1985-2005



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Rate	2,04	3,01	6,29	4,61	13,51	17,40	4,82	1,94	1,78	1,50	3,85	3,32	2,10	2,06	2,70	1,98	1,47	1,46	0,93	0,59	0,50
# Alarms	1	3	5	2	9	19	6	4	4	3	8	8	6	8	14	14	11	11	7	4	3

Disconnections vs. Working Hours

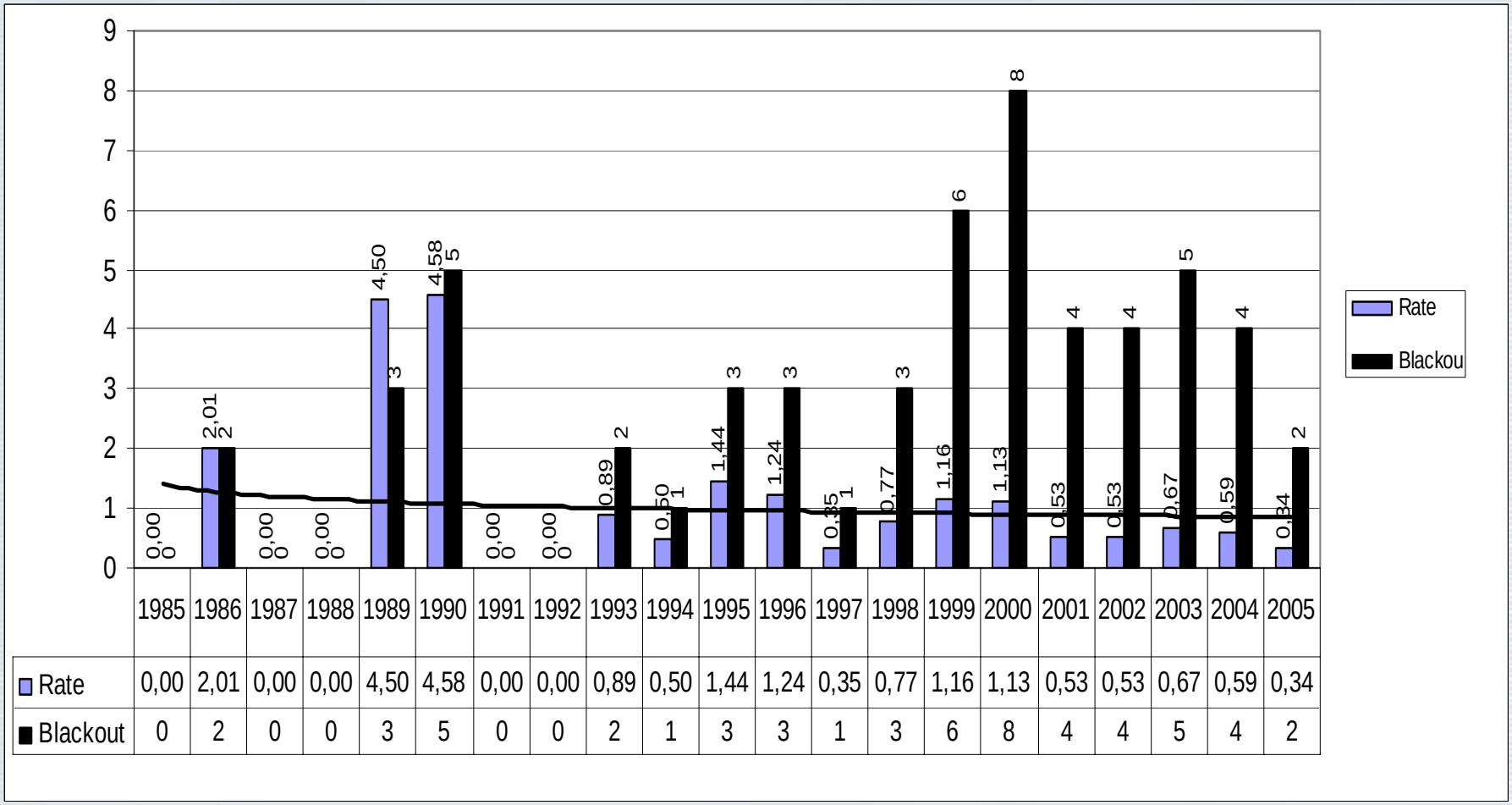
1985-2005



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Taxa	0,00	2,01	5,03	4,61	13,51	13,74	2,41	1,94	1,34	1,50	3,37	3,32	2,45	1,55	2,12	1,42	1,60	1,20	0,80	0,15	0,17
Nº Desconexões	0	2	4	2	9	15	3	4	3	3	7	8	7	6	11	10	12	9	6	1	1

Blackouts vs. Working Hours

1985-2005



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Rate	0,00	2,01	0,00	0,00	4,50	4,58	0,00	0,00	0,89	0,50	1,44	1,24	0,35	0,77	1,16	1,13	0,53	0,53	0,67	0,59	0,34
Blackout	0	2	0	0	3	5	0	0	2	1	3	3	1	3	6	8	4	4	5	4	2

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Failure Root Causes
&
Trigger Systems and Points

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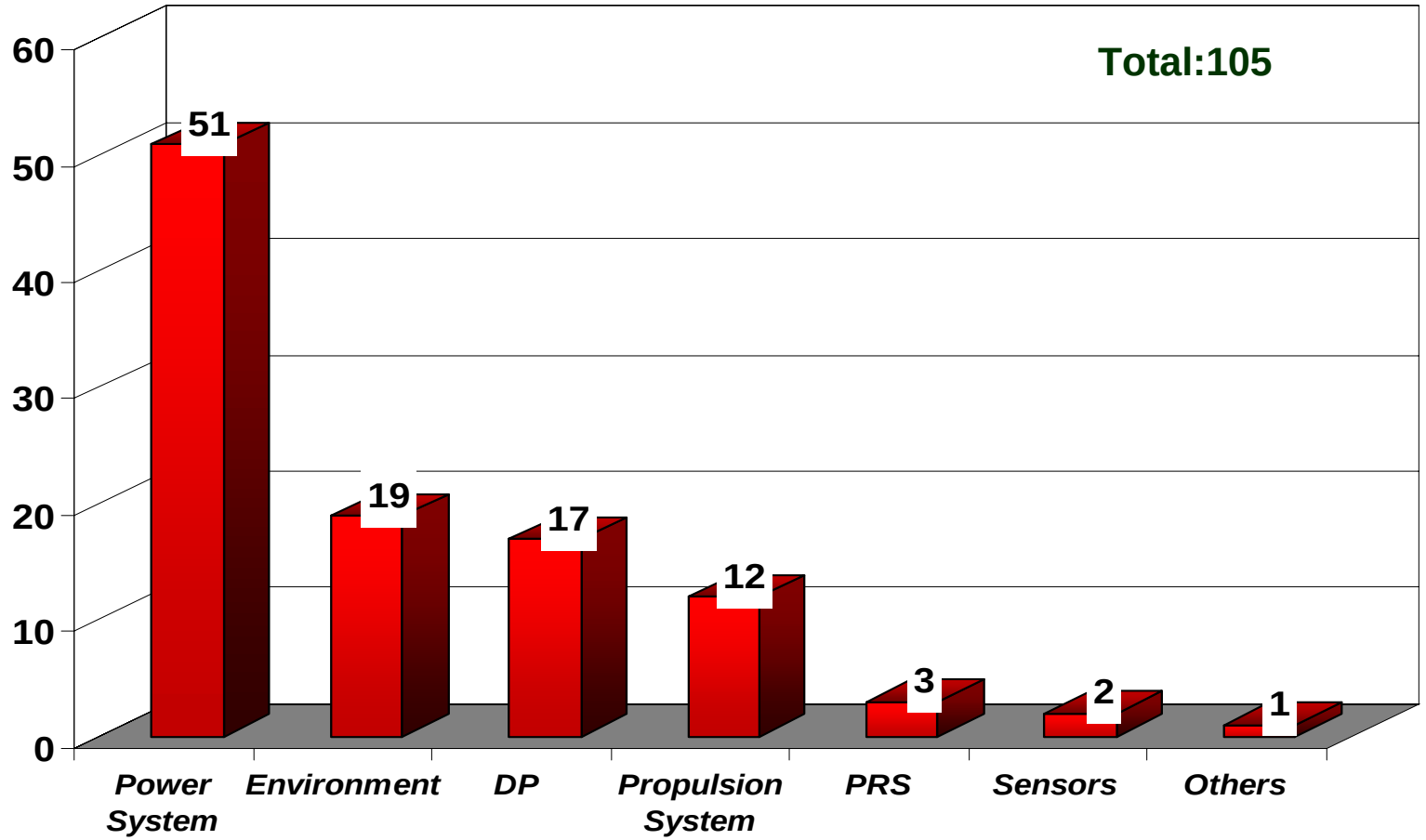
Red Alarm - Trigger System -1992/2005



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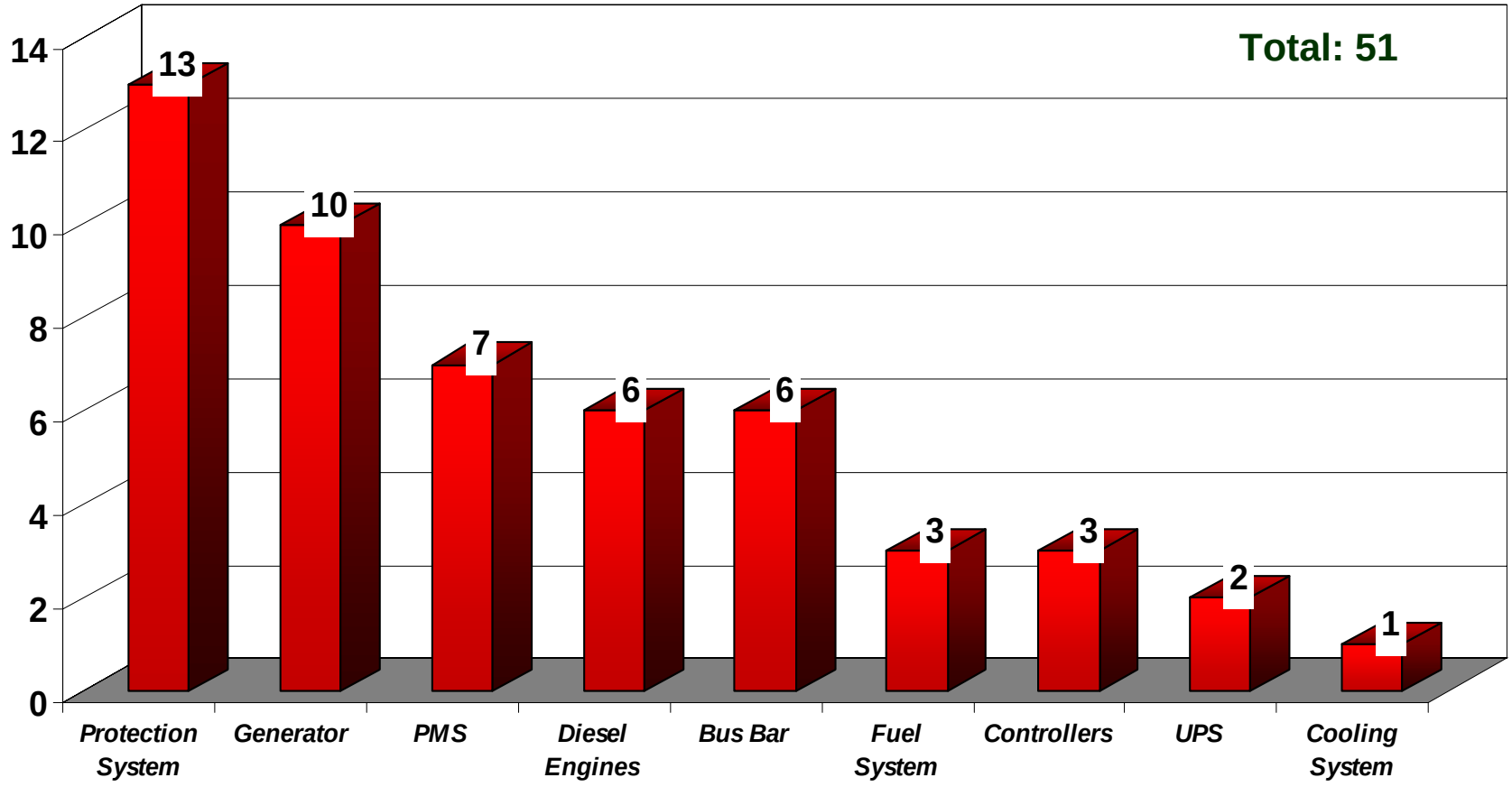
Red Alarm - Power System -1992/2005
Trigger Point



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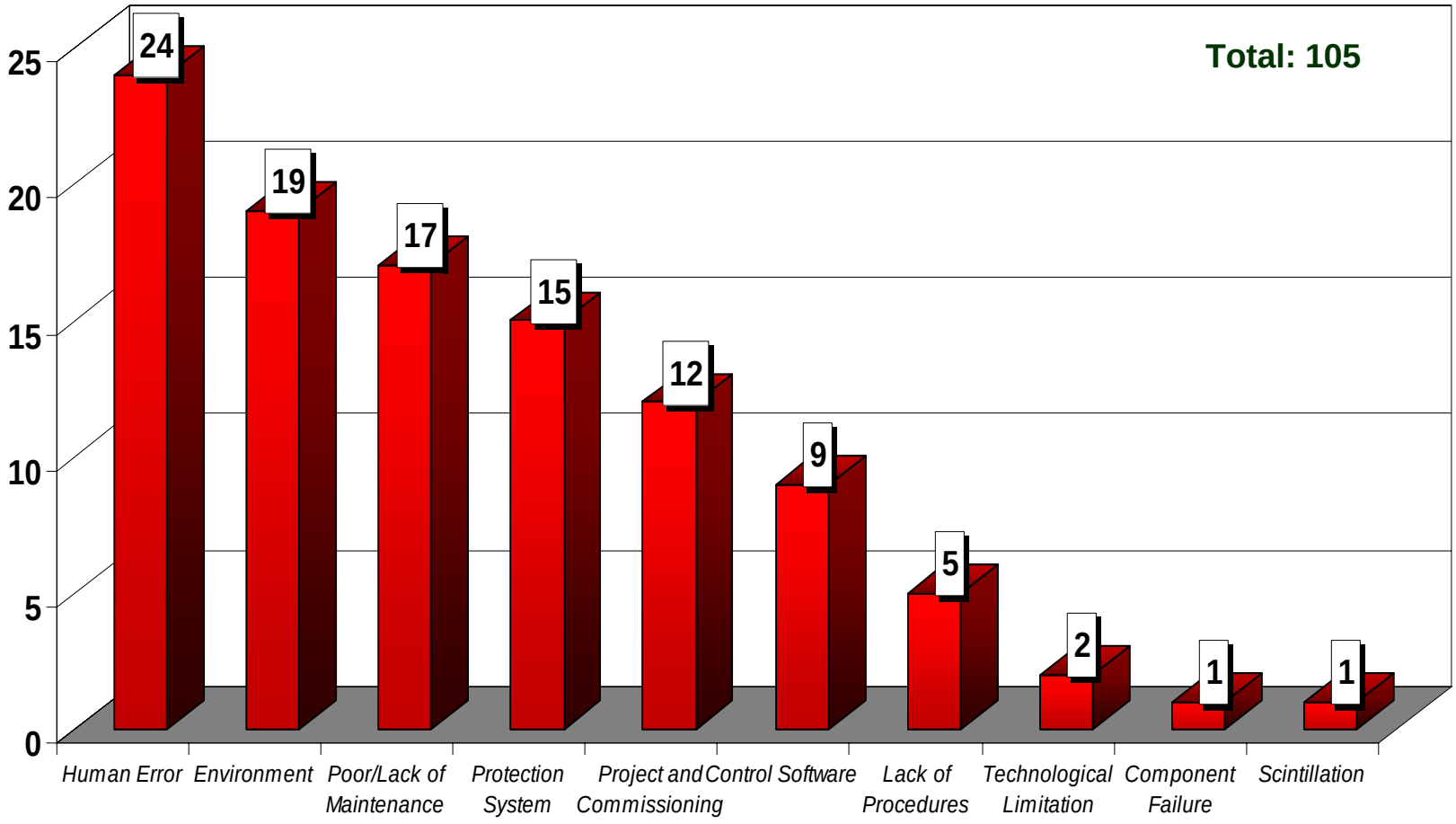
Red Alarm - Root Cause - 1992/2005



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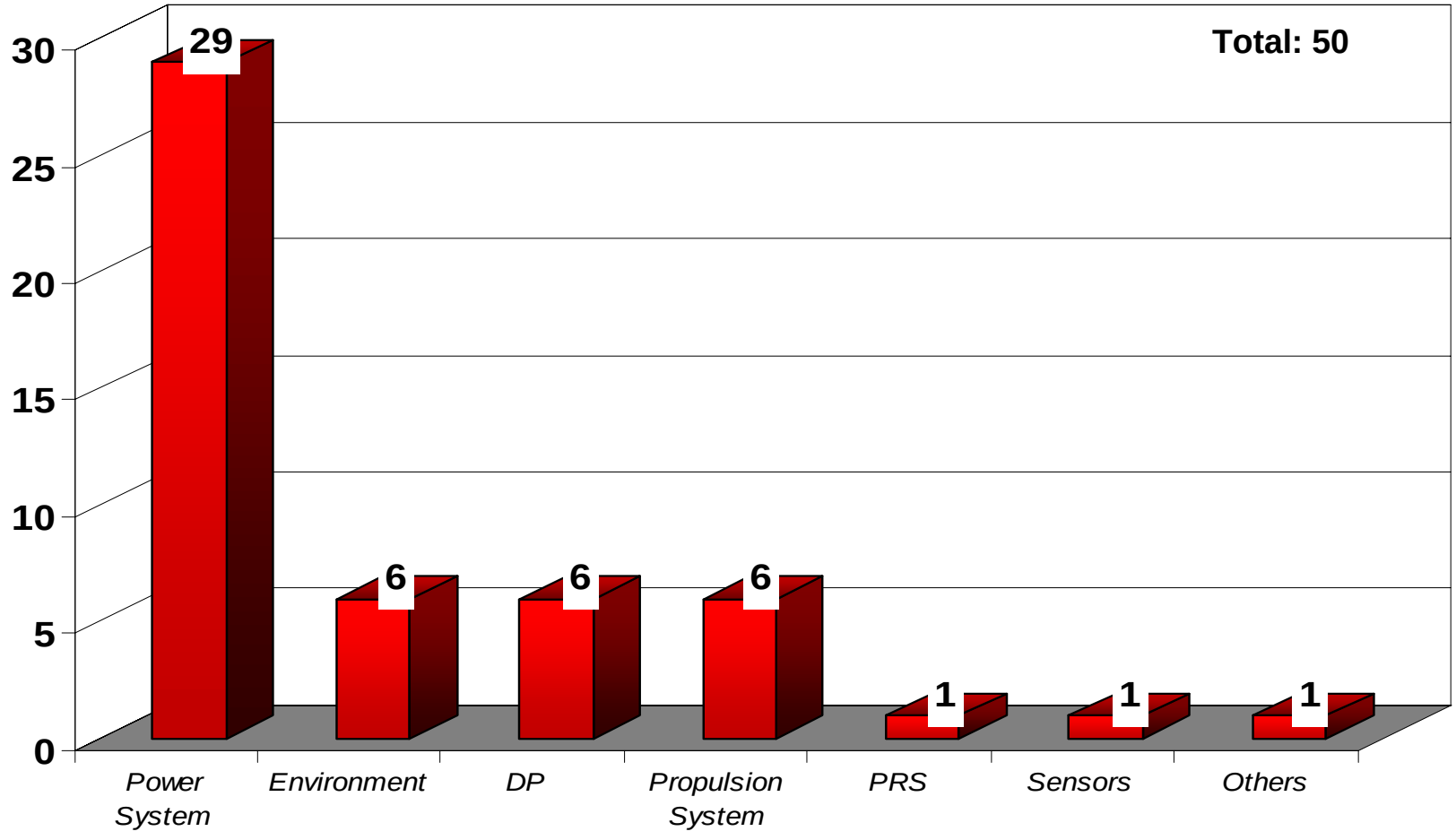
Red Alarm - Trigger System -2000/2005



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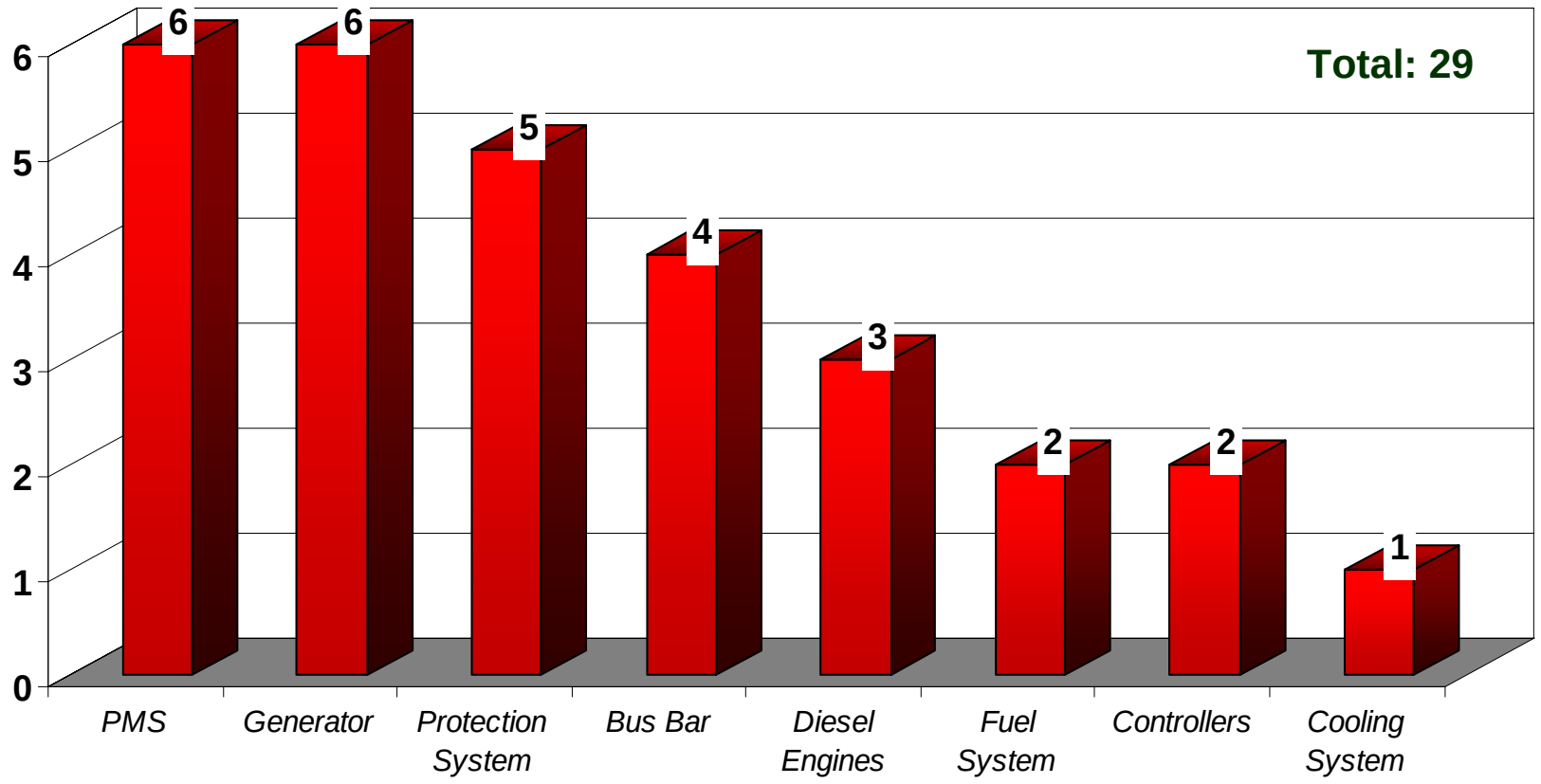
Red Alarm - Power System -2000/2005
Trigger Point



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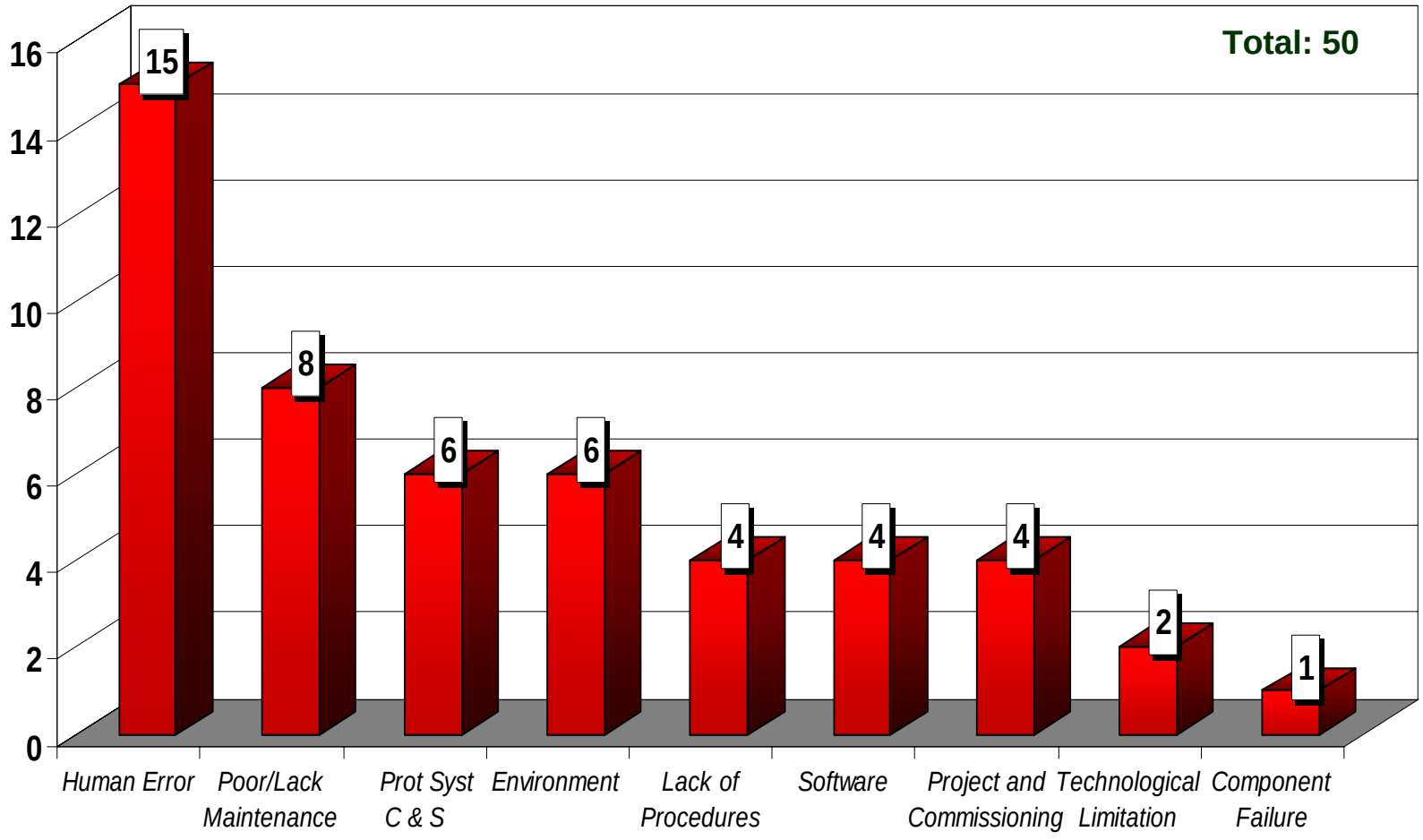
Red Alarm - Root Cause - 2000/2005



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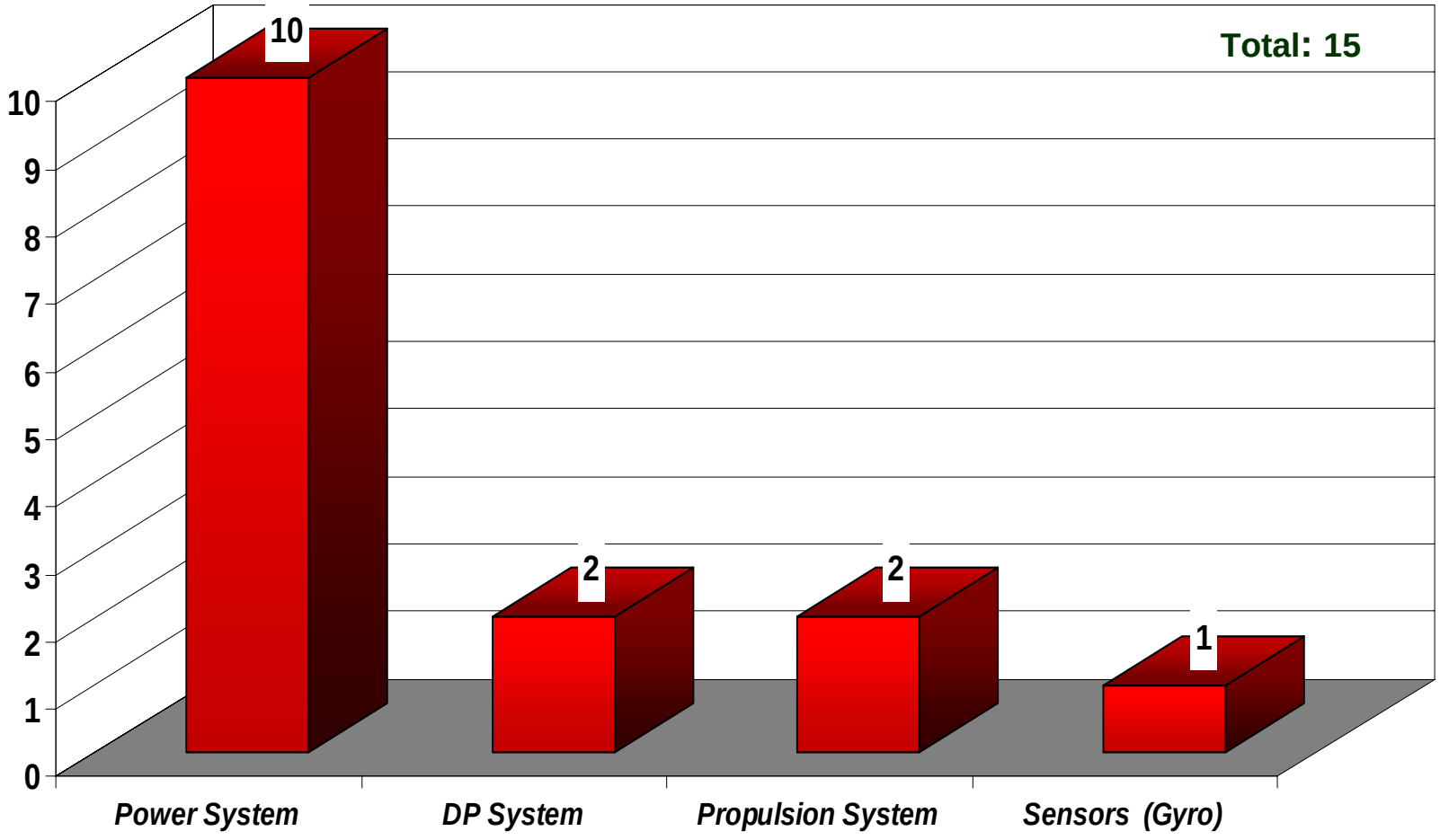
Red Alarm - Trigger System - Human Error - 2000/2005



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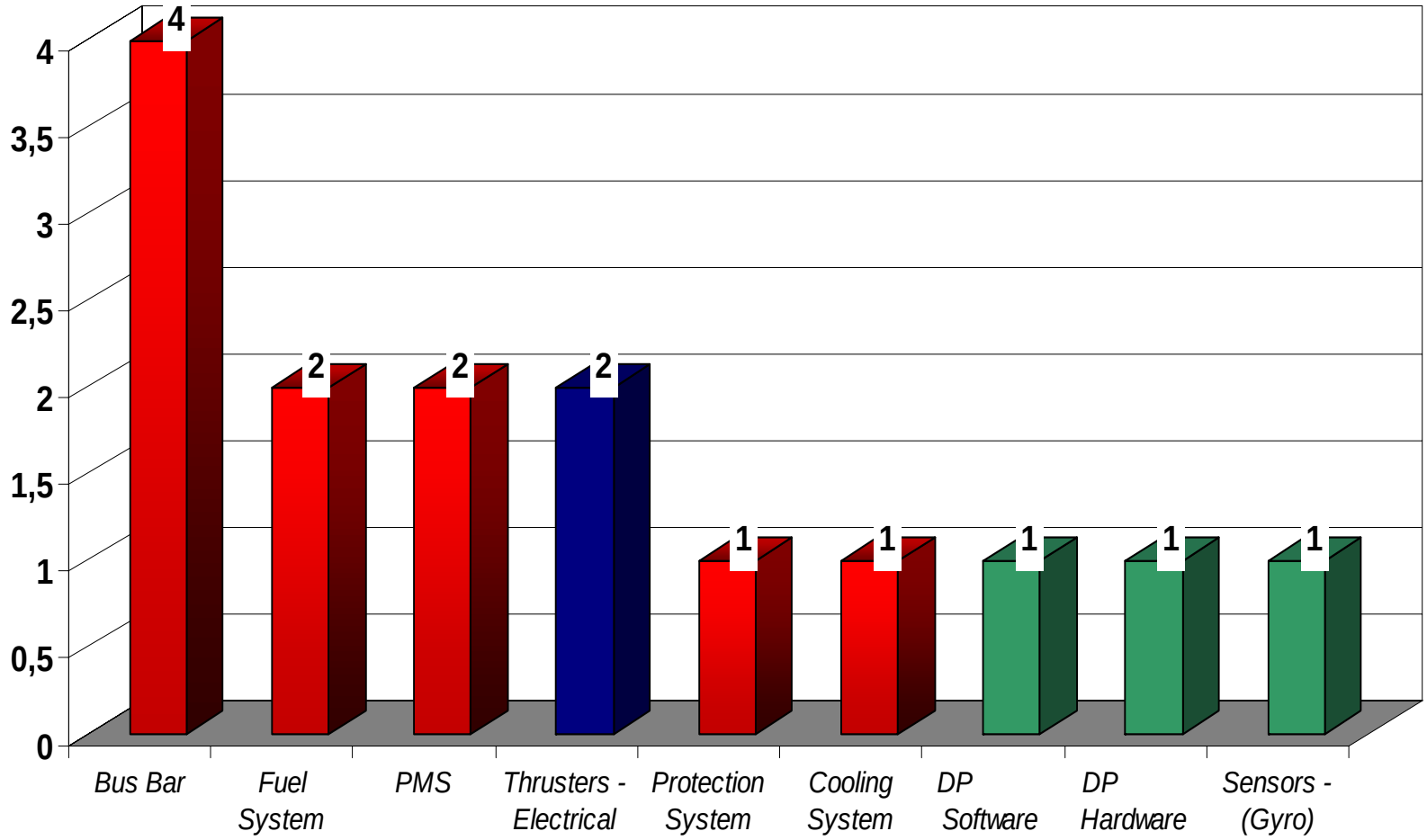
Red Alarm - Trigger Point - Human Error - 2000/2005



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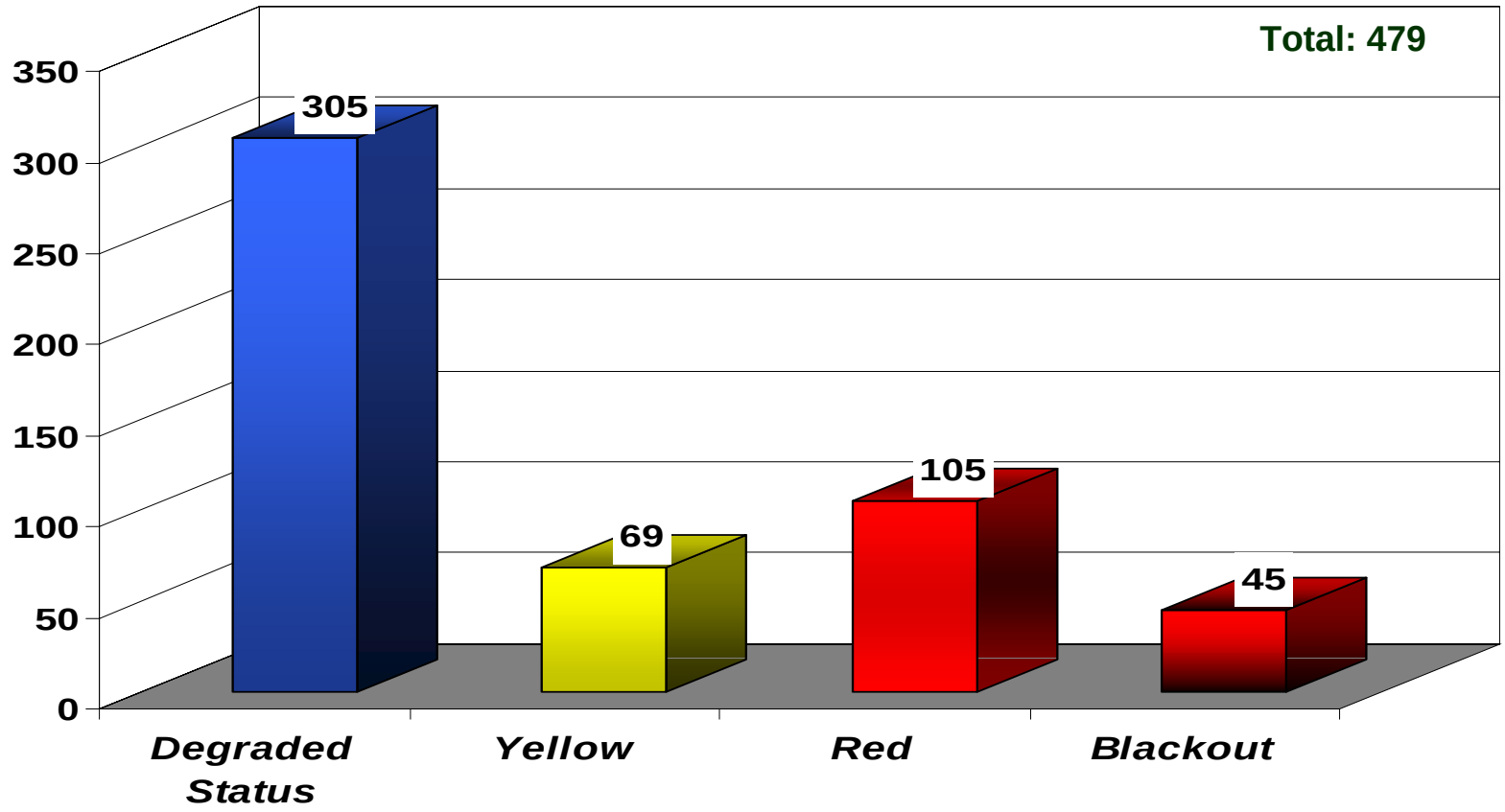
DP Incidents 1992 - 2005



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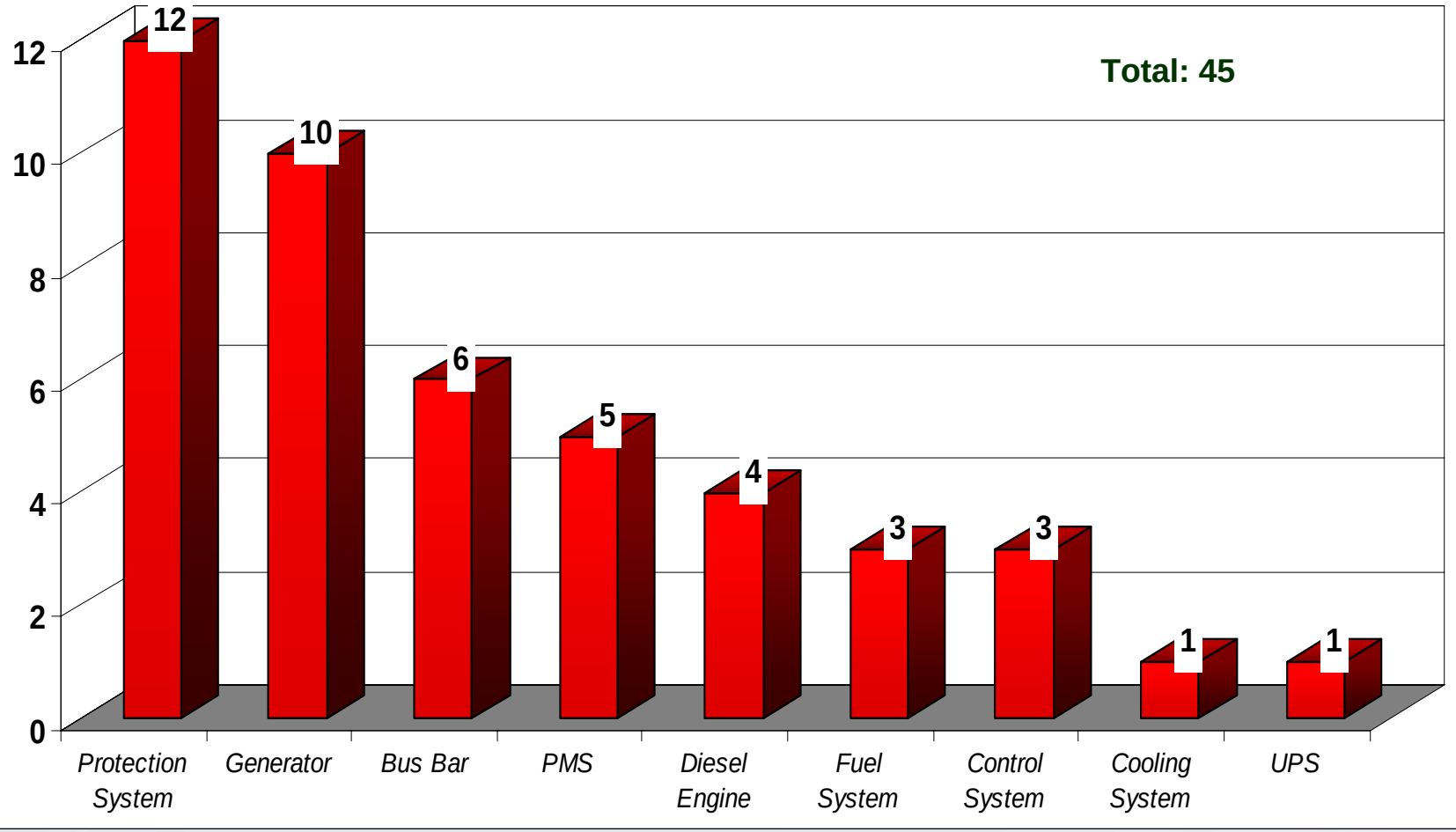
Blackout - Trigger Point -1992/2005



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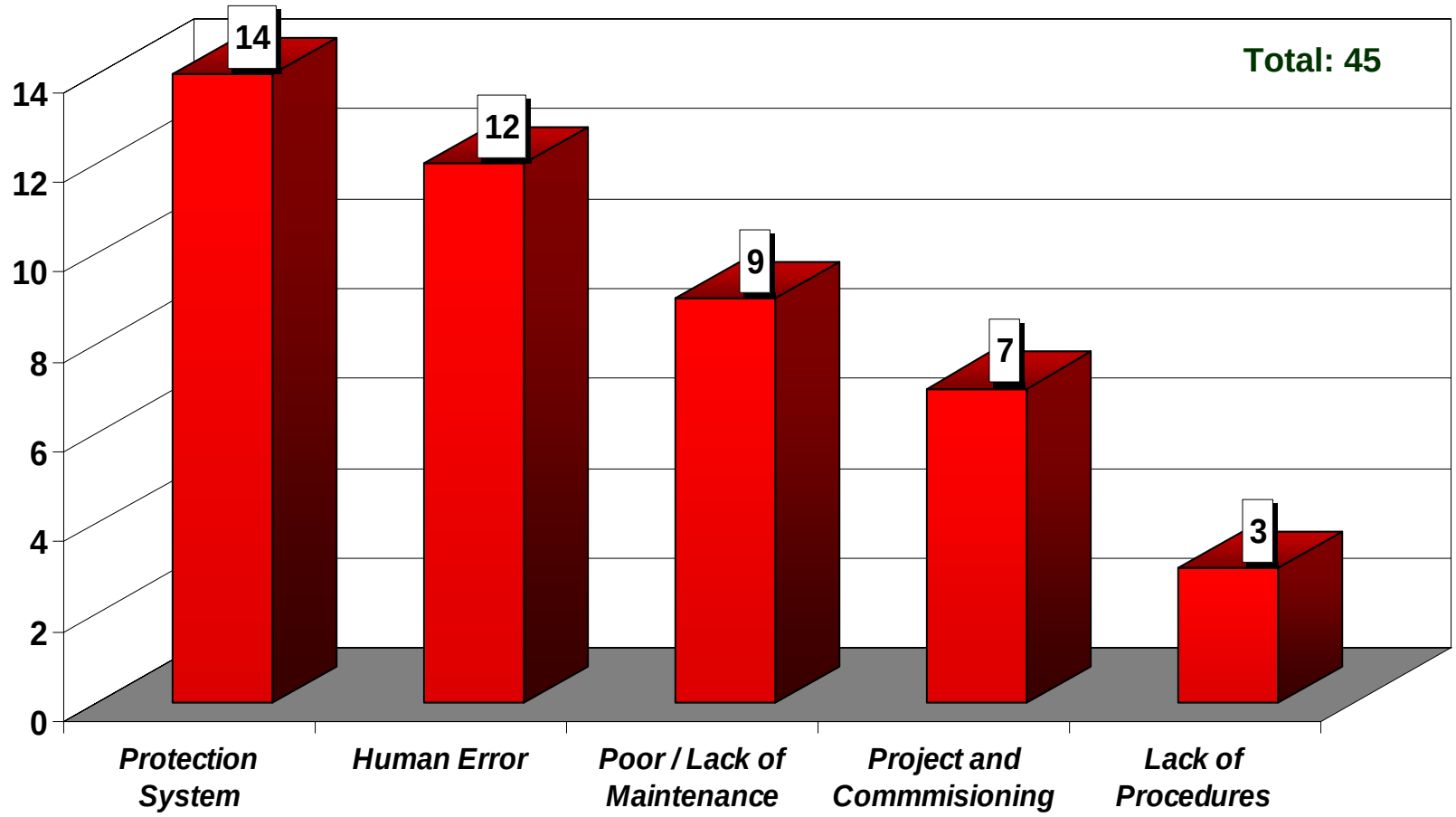
Blackout - Root Cause - 1992/2005



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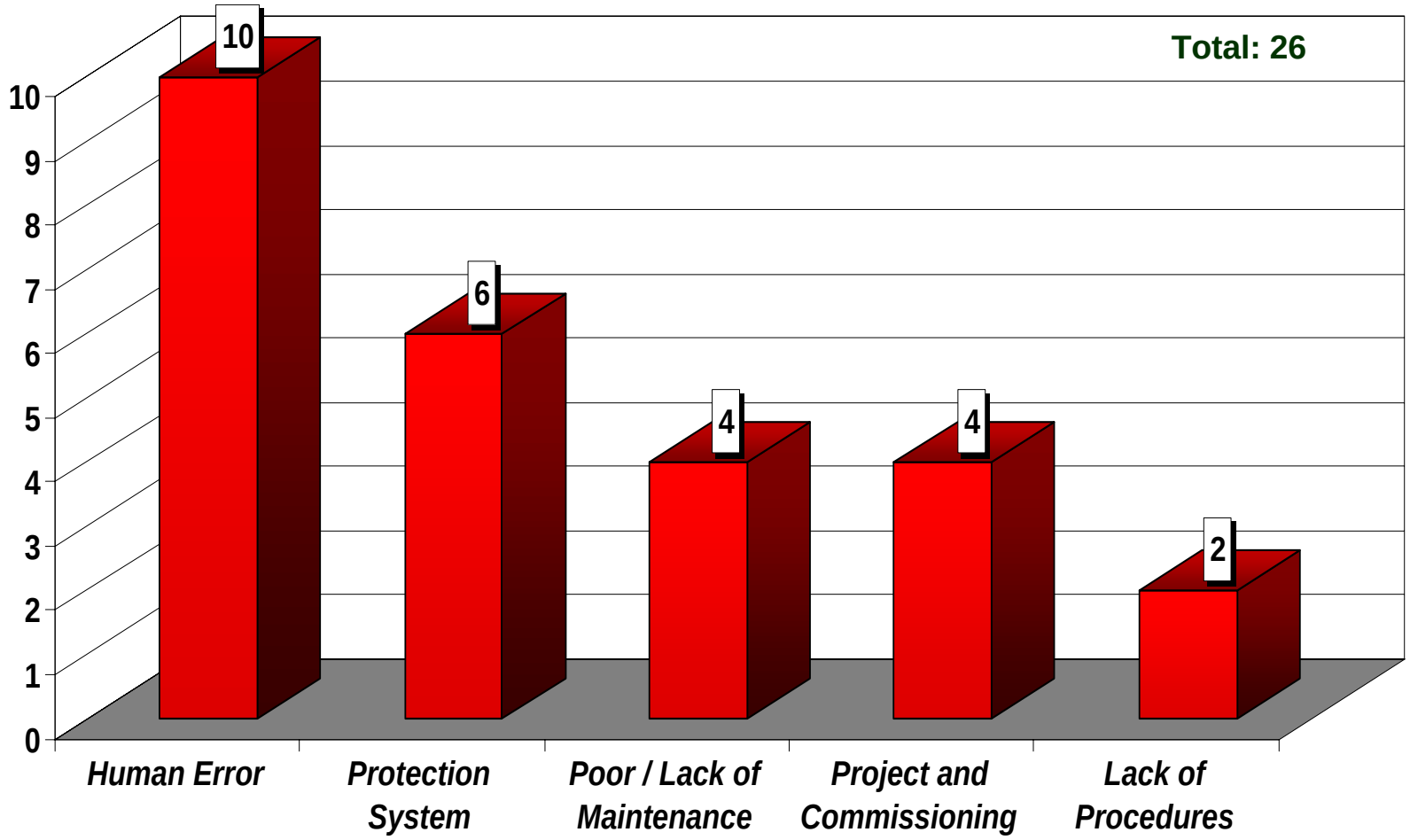
Blackout - Root Cause - 2000/2005



HUMAN ERROR – WORKGROUP

- ✓ **Objective: to look for root causes for incidents classified as *human error* on DP-operated vessels suggesting an action plan to avoid them to happen.**

- ✓ **Components: Petrobras + Schahin + Diamond + Transocean + Noble + Pride + Ventura**

HUMAN ERROR – WORKGROUP

1. **Ineffectiveness of on-job-training for DPO / SDPO as well as for new DPO Certification**
2. **High turnover among companies or even within the same company**
3. **Few opportunities for practicing or not enough time to be familiar with the system**
4. **Inadequate supervision**

- ✓ ***Theoretical training for DP/ECR personnel***
- ✓ ***Practical training on board for DP/ECR personnel***
- ✓ ***Training on DP/VMS simulators***
- ✓ ***Make DP/ECR a worthy team***
- ✓ ***DP personnel hiring as part of a bigger process***

HUMAN ERROR – WORKGROUP

5. **Poor handover causing incidents due to the lack of details about ongoing operations.**

✓ ***Improve handover***

6. **Poor communication process among departments (DP / Rig Floor and DP / ECR).**

✓ ***Improve communication process among DP/ECR/RIG FLOOR by cross training.***

7. **Stressful situations caused by less experienced operators combined with more activities/responsibilities.**
8. **Long time in front of the console (DP, VMS, etc).**
9. **High noise, lack of attention, amusement for chatting in close coffee shops (Bridge, ECR).**

✓ ***Improve work conditions for DP/ECR personnel***

HUMAN ERROR – WORKGROUP

10. Poor motivation or attitude
11. Experienced people's overconfidence
12. Lack of specific procedures

✓ *Improve confidence/motivation by HR programs.*

✓ *Create procedures making them available*

13. Poorness/Absence of manuals especially after upgrades

✓ *Organize and update technical documentation*

14. Poor automation asking for human interference

✓ *Automate non-critical DP/ECR systems*

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Thank You !

Questions?

You can send your questions or comments to:

gbeduhn@petrobras.com.br