May '71 review With Bortz

"BIODEGRADATION CONSISTS OF A CHANGE OF A CHEMICAL OR GROUP OF MATERIALS BY LIFE PROCESS AS WITH AN ACCOMPANYING TRANSFER OF ENERGY."

Definition proposed by a sub-committee of the standard methods committee for the W.P.C.F.

"The conversion of chemicals which are potential environmental pollutants to innocuous substances via the biological action of living organisms."

Primary Biodegradation - Minimum alteration of the chemical structure of the material in question to an extent that the characteristic properties of the original material are no longer evident.

Ultimate Biodegradation - Complete conversion of the material in question to CO_2, H_2O, inorganic salts, and products normally associated with the natural metabolic processes of living organisms.

PLAINTIFF'S EXHIBIT L603-C

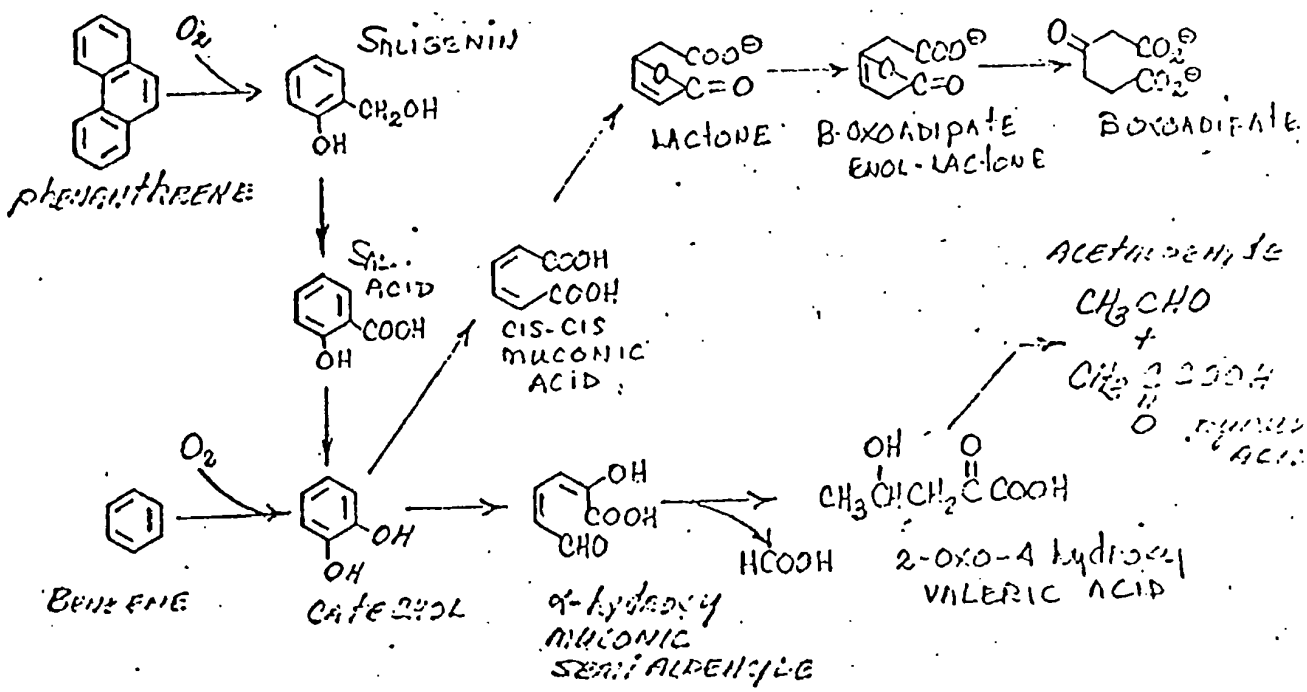
"Develop a laboratory test procedure which will measure the susceptibility of selected Organic Division Products to primary biodegradation via the biological action of bacteria. Furthermore, the procedure should produce results in a reasonable period of time at a reasonable cost which can be easily extrapolated to the environment."

Potential Environmental Pollutants		Selected Organic Division Products
Living Organisms	-	Bacteria
Conversion	-	Primary Biodegradation
Mixed Bacterial Population	or	Pure Bacterial Culture
Mixed Foods	or	Sole Carbon Source
Aerobic	or	Anaerobic (Slower (Difficult

✓ River Die-Away Test ($\sim 1 \times 10^5$ cells/ml)
Fortified and Inoculated Water Test
Shake Culture Test
Laboratory Trickling Filters
Continuous Flow Activated Sludge
Batch Sludge Die Away
✓ Semi-Continuous Activated Sludge (2×10^8 cells/ml)
✓ Soil Percolation

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Standard Operating Conditions

Vol.	1500 mL.
SS	3750 mg (2500 ppm) activitated sludge
Air	½ ft³/hr
Feed	Synthetic sewage { Dextrose, Nutrient broth, KH_2PO_4 —
	Test compd (EtOH)

Mechanical Cycle

Feed Syn. Sewage
" Test Compd
→ Aerate & stir - 1 hr. - after feeding ("0" time) sample taken for analysis.

Aeration & stirring resumed and 1 L tap water added

Cycles
wk
5 - 24 hr
1 - 72 "

Aerate & stir - 21 hrs
Before feeding sample taken for analysis

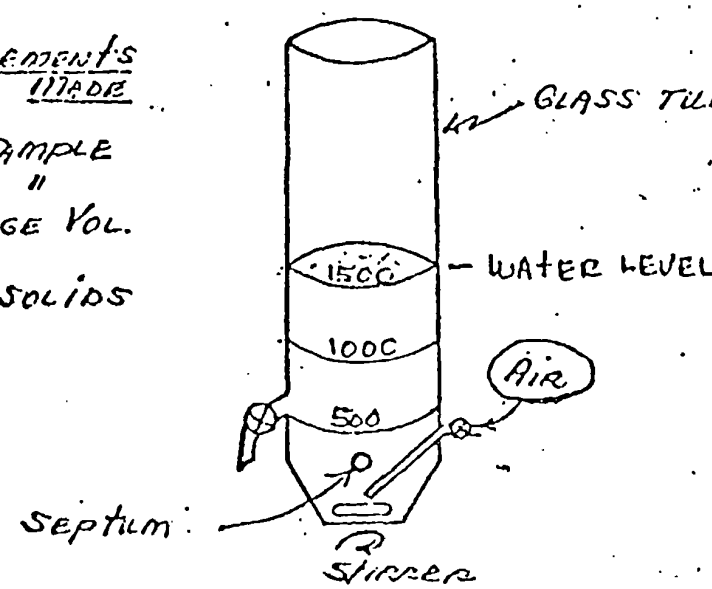
Sludge volume measured. ⅔ of supernatant with drawn - pH measured.

← Aeration & stirring stopped for 0.5 - 1.5 hr

↓ Suspended solids concentration measured weekly and unit adjusted to desired level.

Measurements made

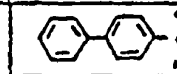
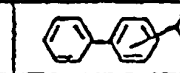
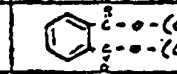
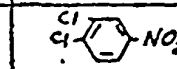
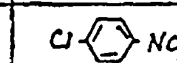
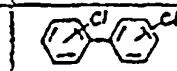
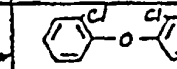
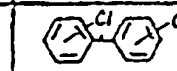
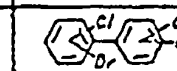
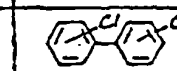
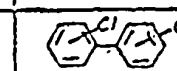
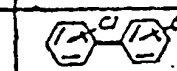
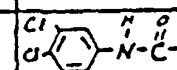
1. AF Sample
2. BF "
3. Sludge Vol.
4. pH
5. Sus. solids



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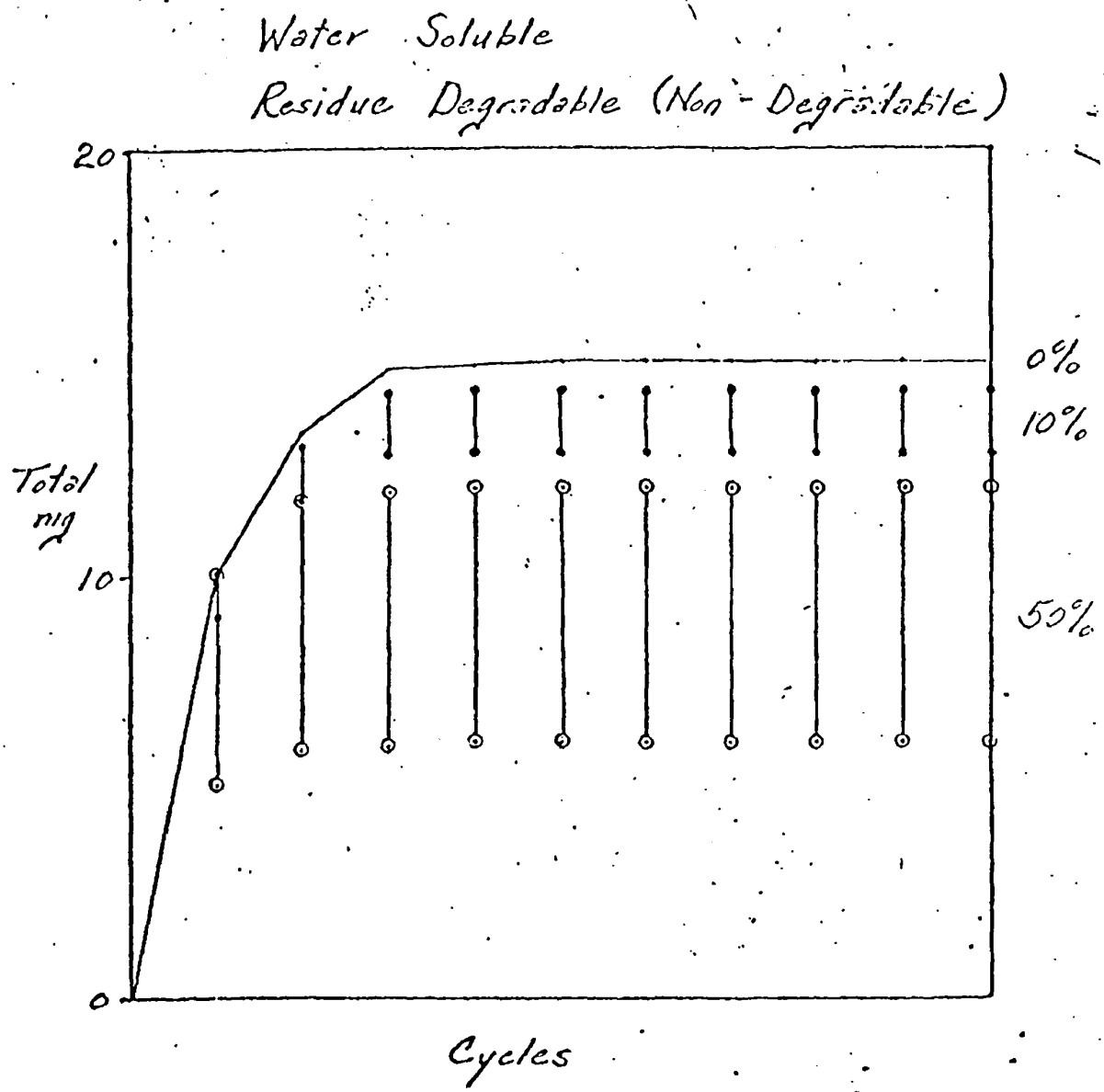
Test Compound	Molecular Structure	Feed Level (mg)	Cycle Time (hr)	Disappearance Rate (%)	Water Solubility %	Vapor Pressure mmHg (25°C)	Method of Analysis
LAS (Dodecane-1)		20	24	>99.5	Soluble		Colorimetric
p-Chloroaniline		5	24	97.3±1.6	0.5	0.1	UV
MIPB		10	24	78.2±3.2		0.005	UV, FID-GC
HB-40		10	24	48.6±6.9		N.S.	UV, FID-GC
S-711 M		10	24	48.3±7.7			UV
o-NCB		5	24	31.5±8.8	0.050		UV
Nitrated Orthene		5	24	40.3±3.2			UV
p-NCB		5	24	33.9±2.9	0.005		UV
Aroclor 1221	 21% Cl	1	48	~70.0		0.005	UV
2,2' Dichloro Diphenyl Ether		5	24	12.0±4.8			EC-GC
MCS 1043	 ~30% Cl	1	48	56.2±15.5			UV, EC-GC
Arobromoclor 1232	 21% Cl 11% Br	1	48	54.1±19.3			UV, EC-GC
MCS 1016	 41% Cl	1	48	32.9±13.8			UV, EC-GC
Aroclor 1242	 42% Cl	1	48	26.3±15.3	2×10^{-5}	1.4×10^{-3}	UV, EC-GC
Aroclor 1254	 54% Cl	1	48	15.0±37.7	5×10^{-6}	3.4×10^{-4}	EC-GC
TCC		1	24	0	<0.001		UV

* Initial Disappearance Rate 71.3 ± 5.5 %

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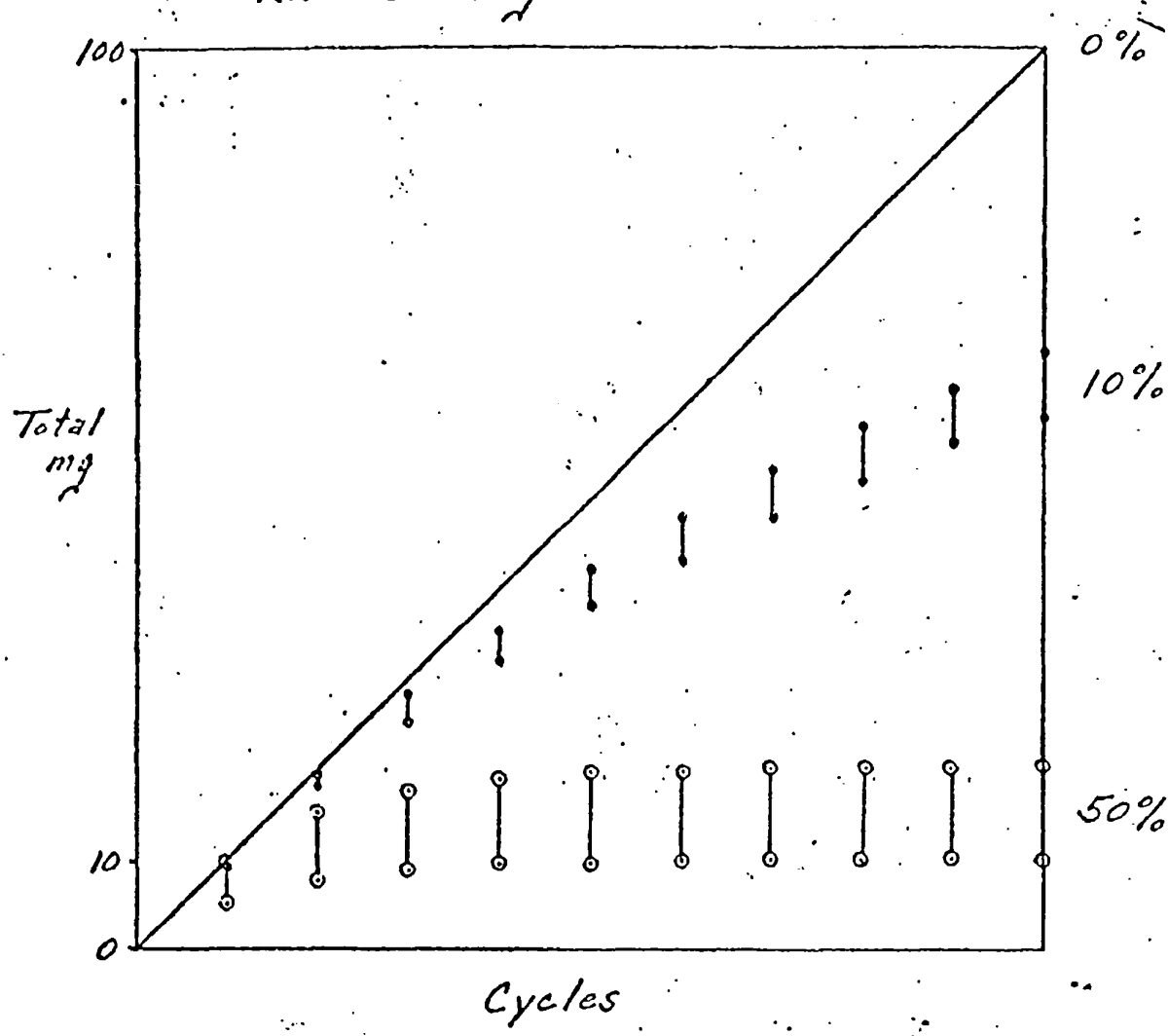
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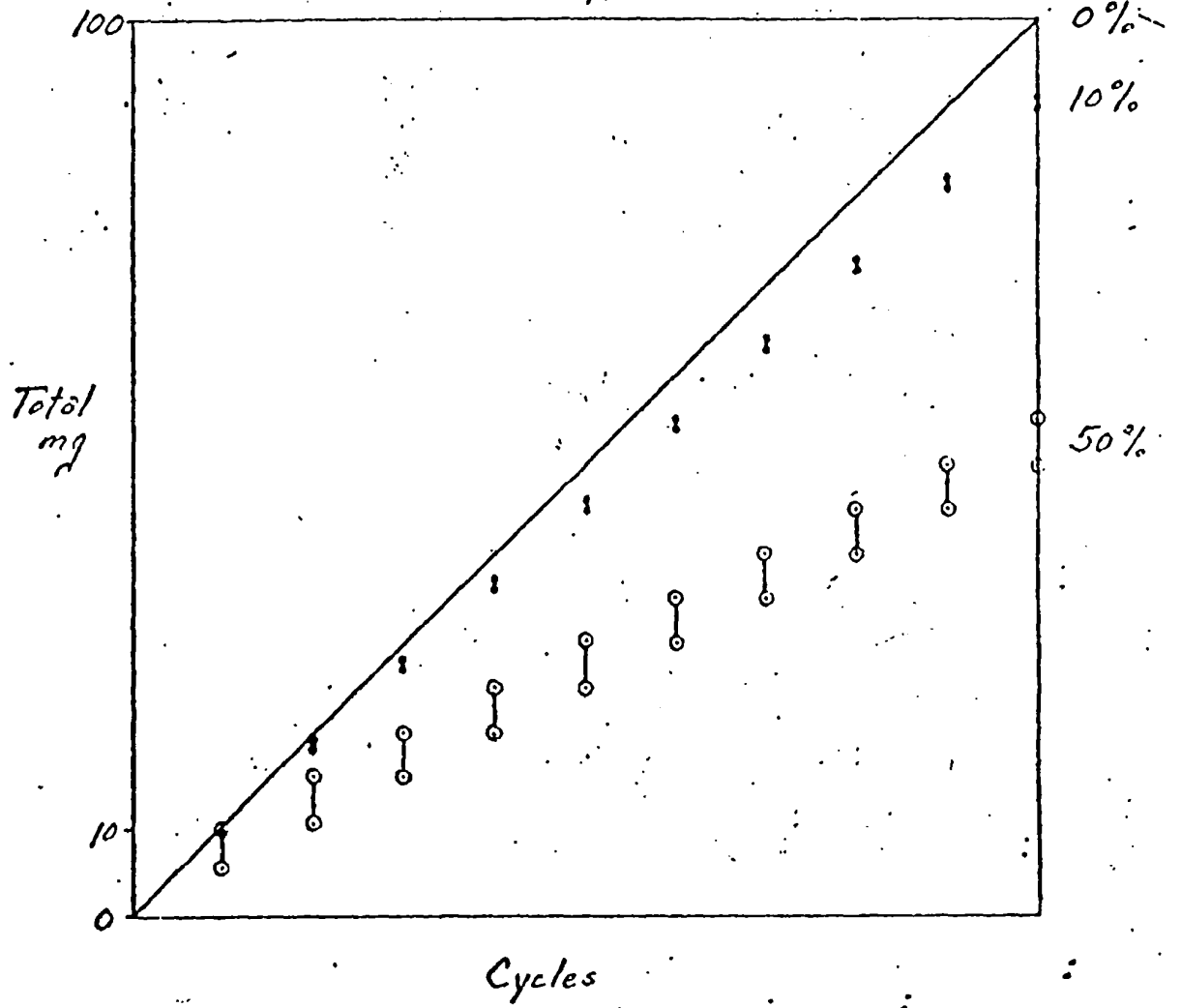
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Water Insoluble

Residue Non-Degradable



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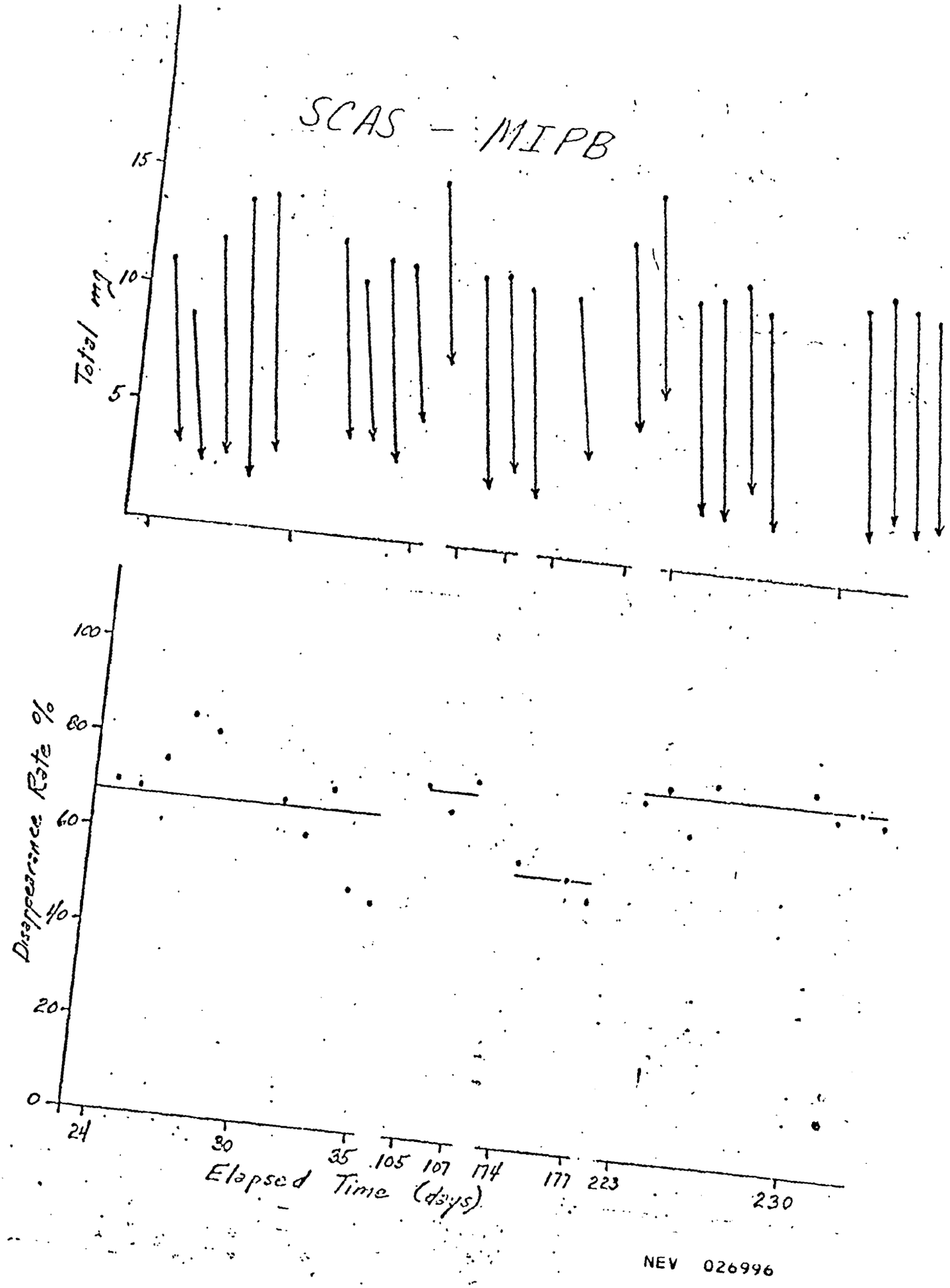
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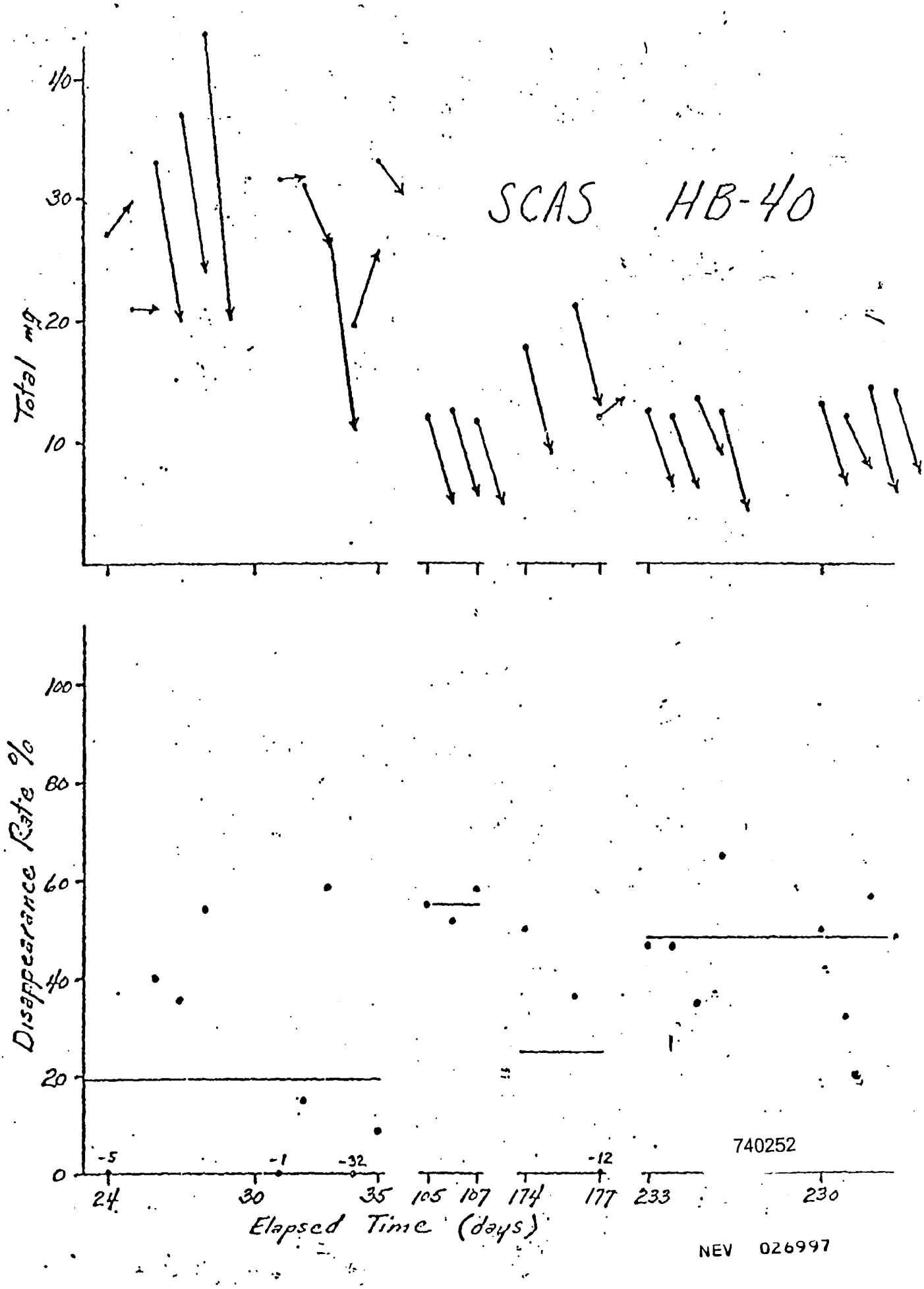
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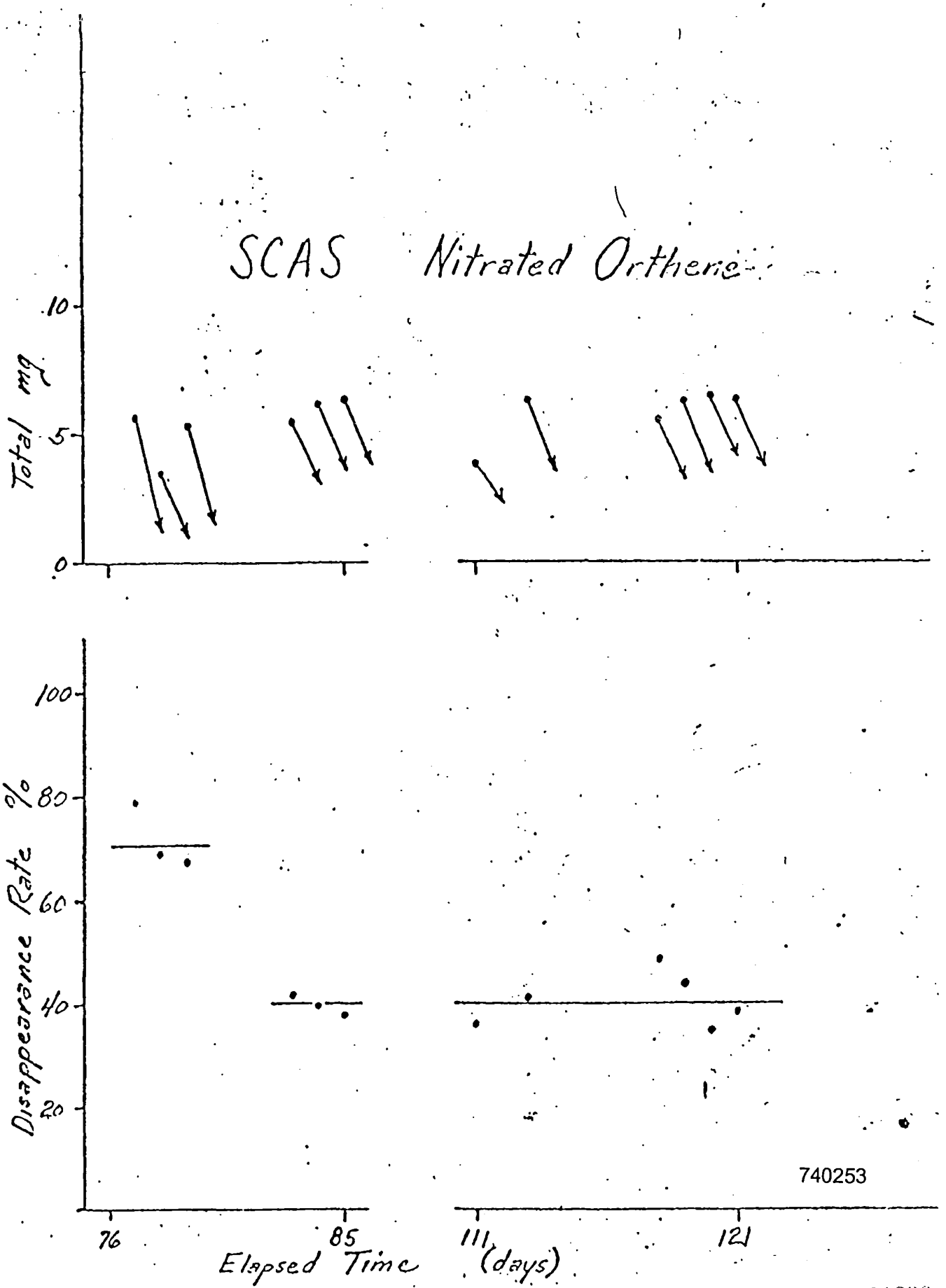


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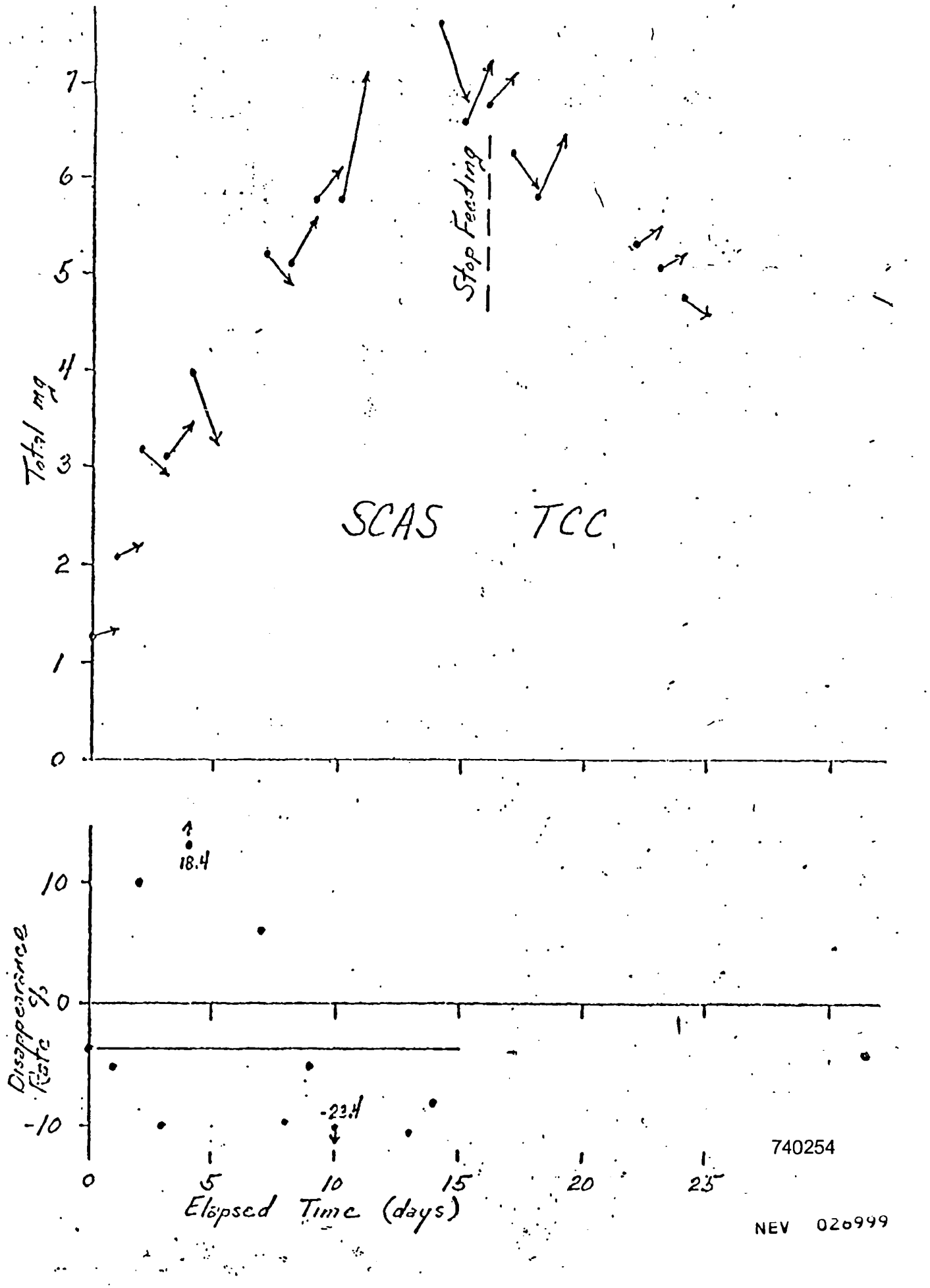
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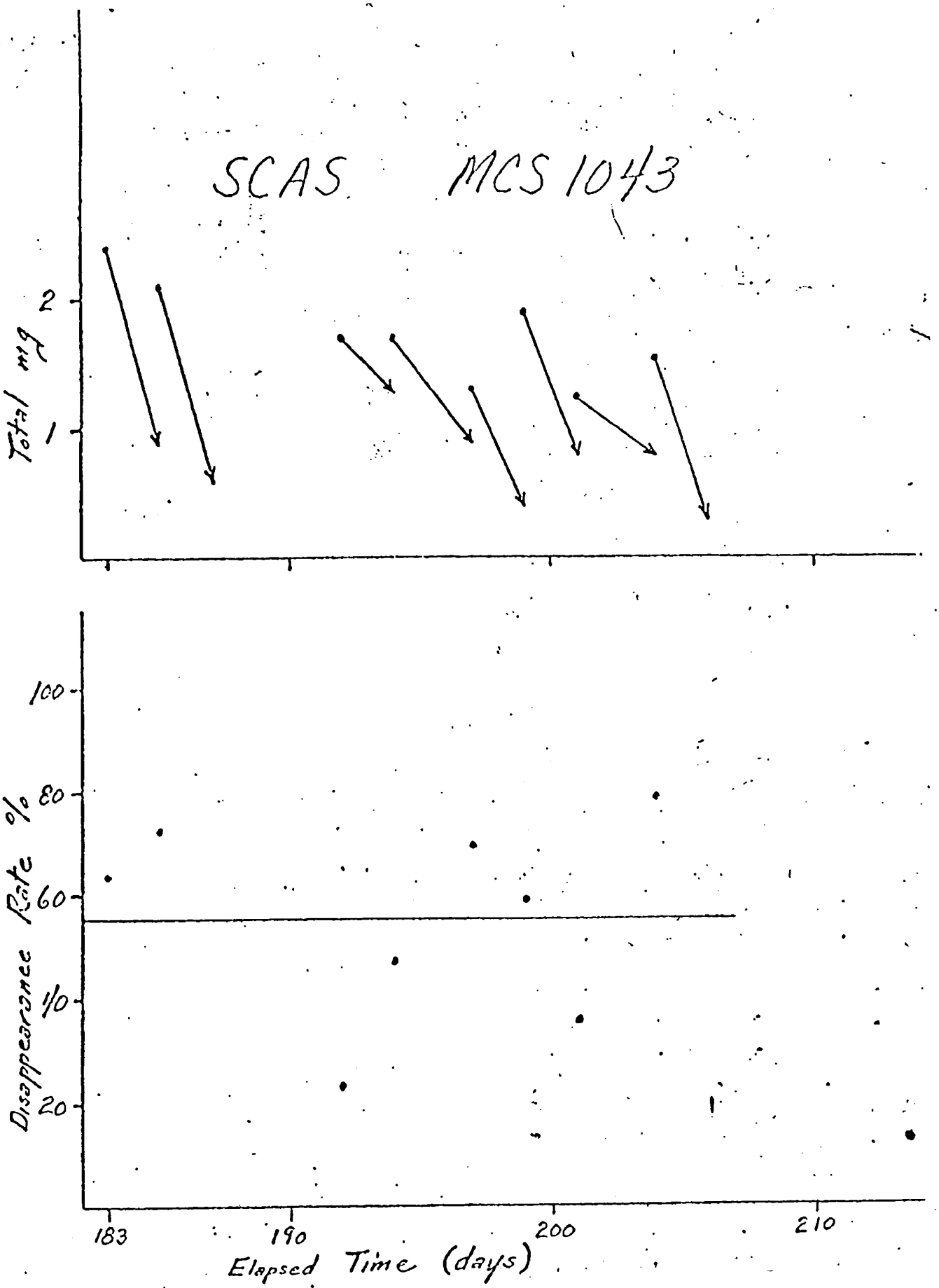
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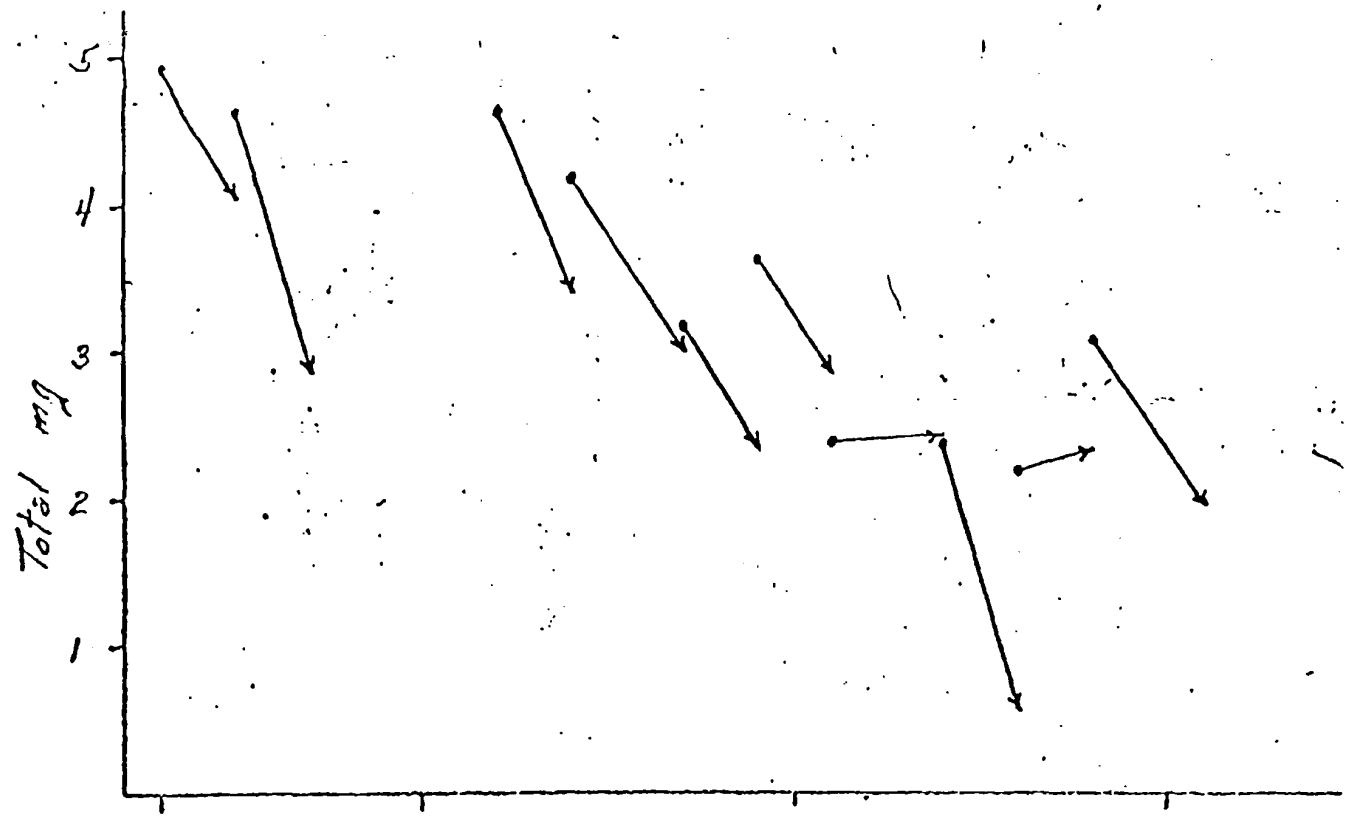
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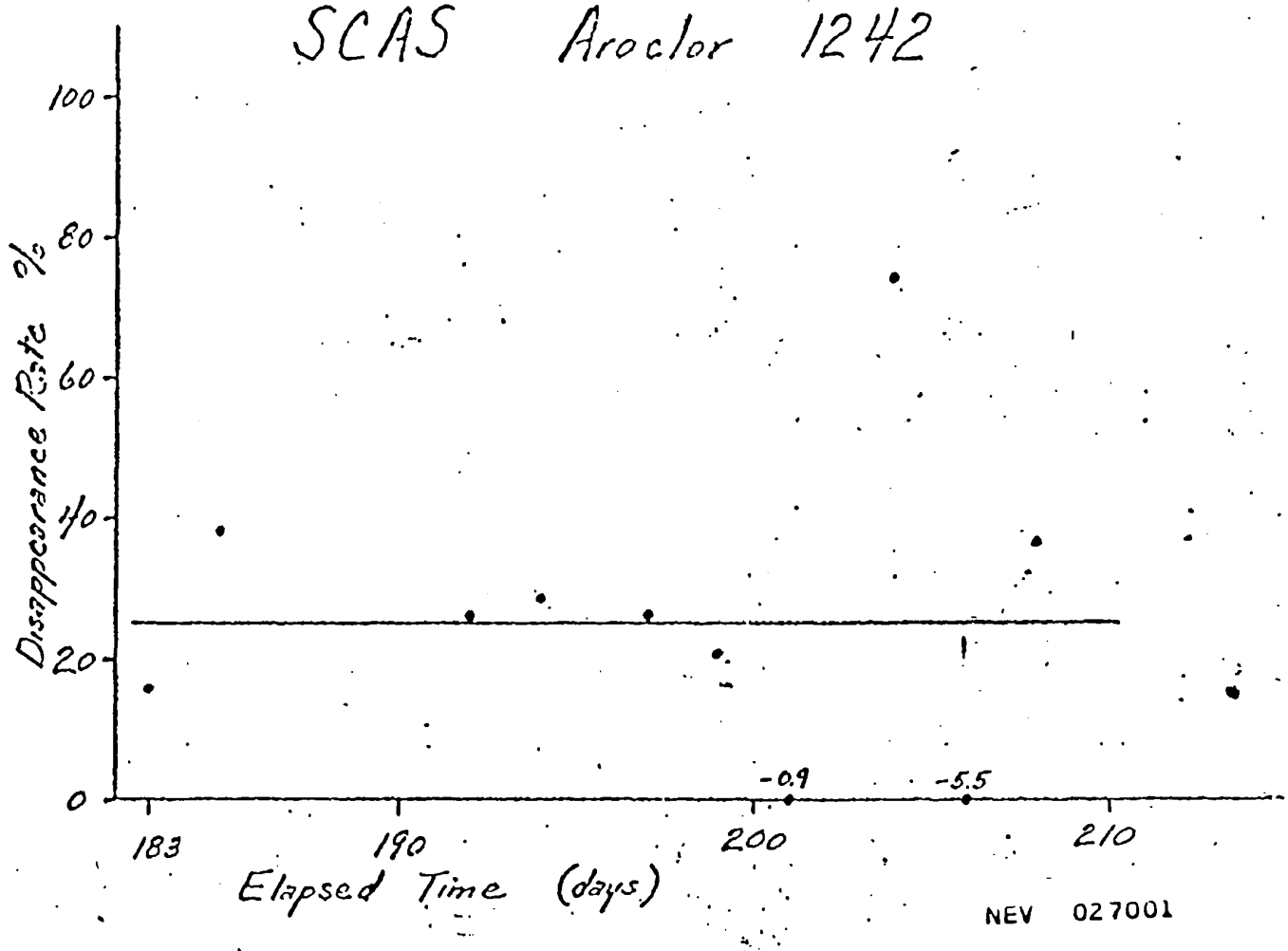
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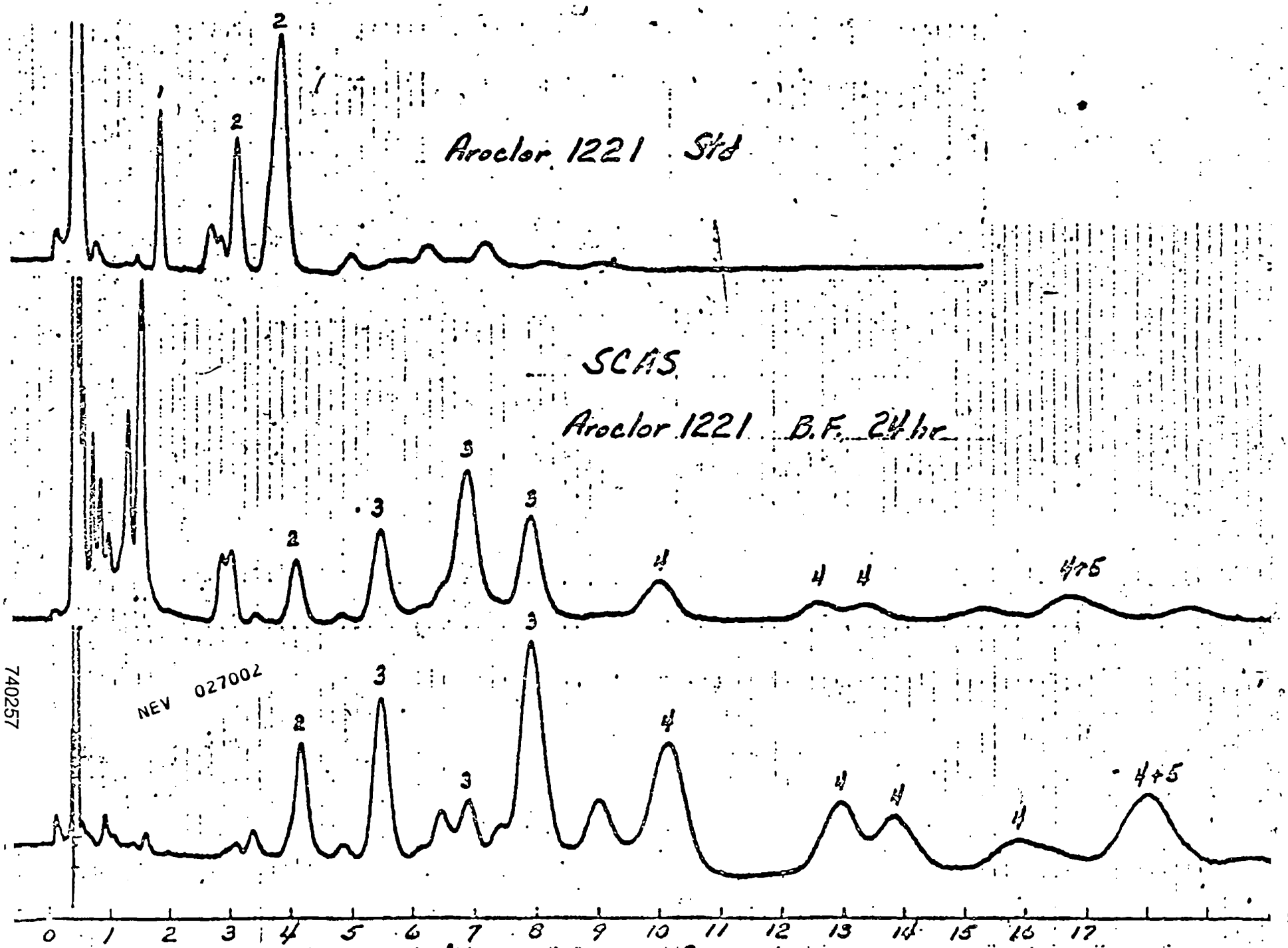
SCAS Aroclor 1242



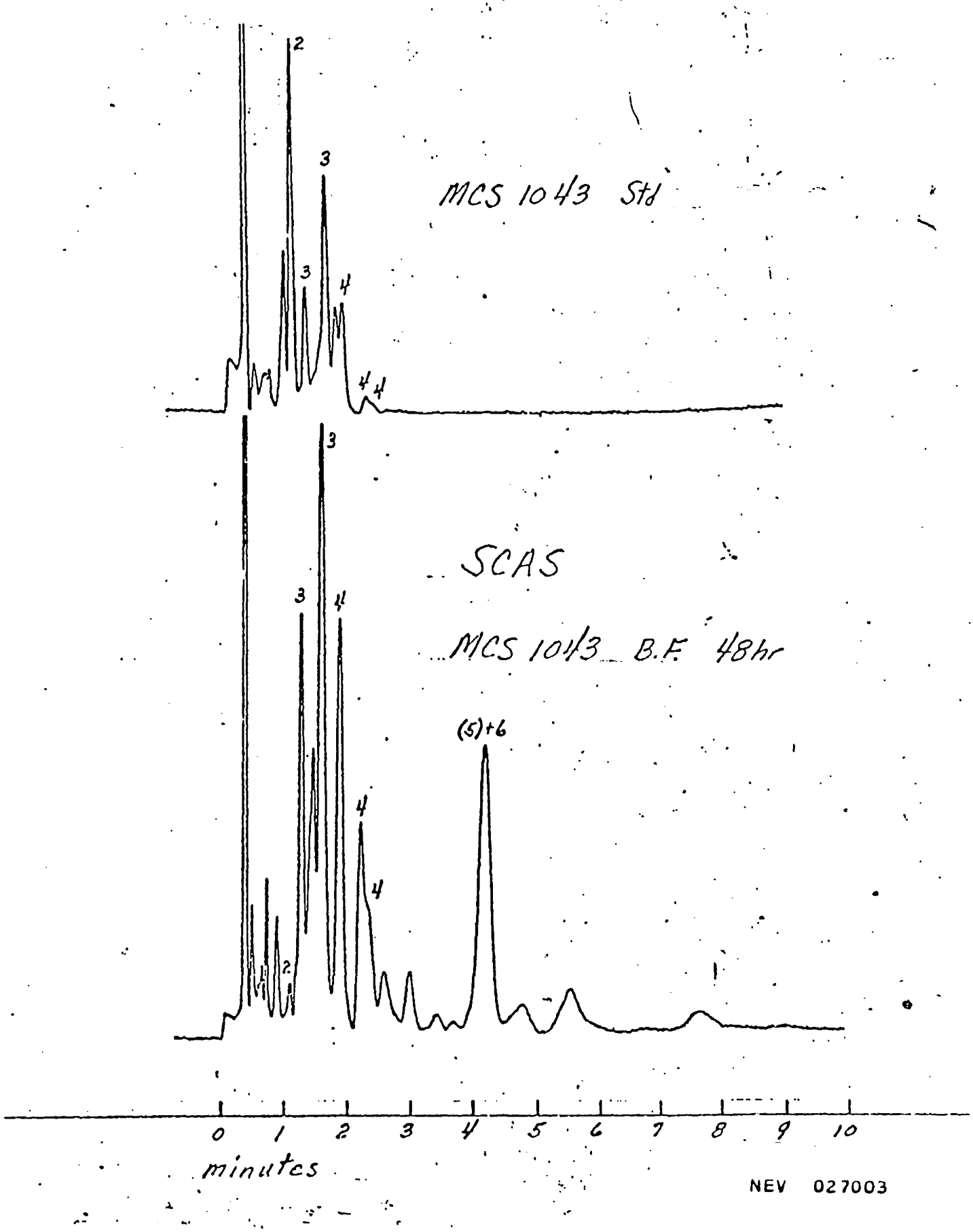
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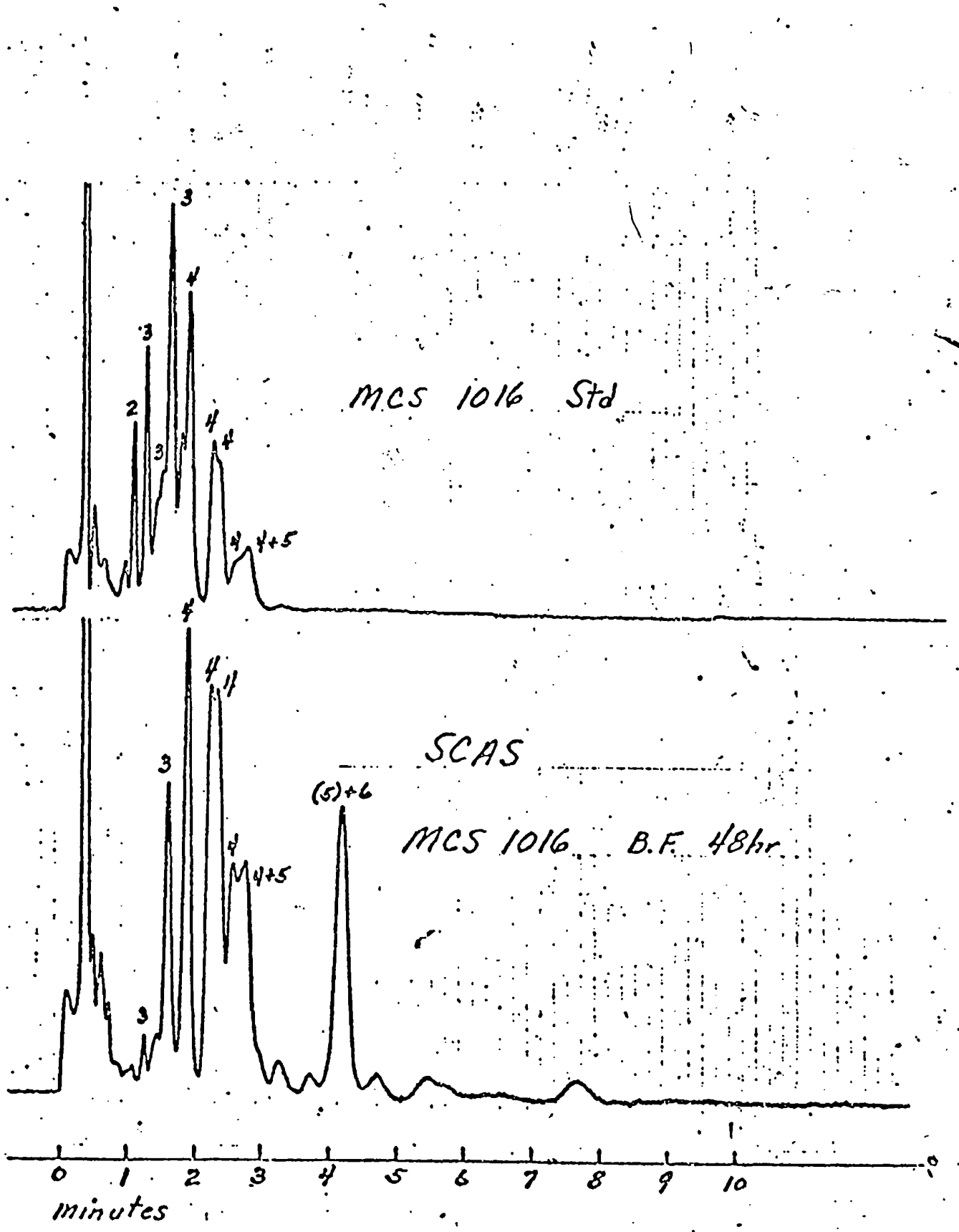
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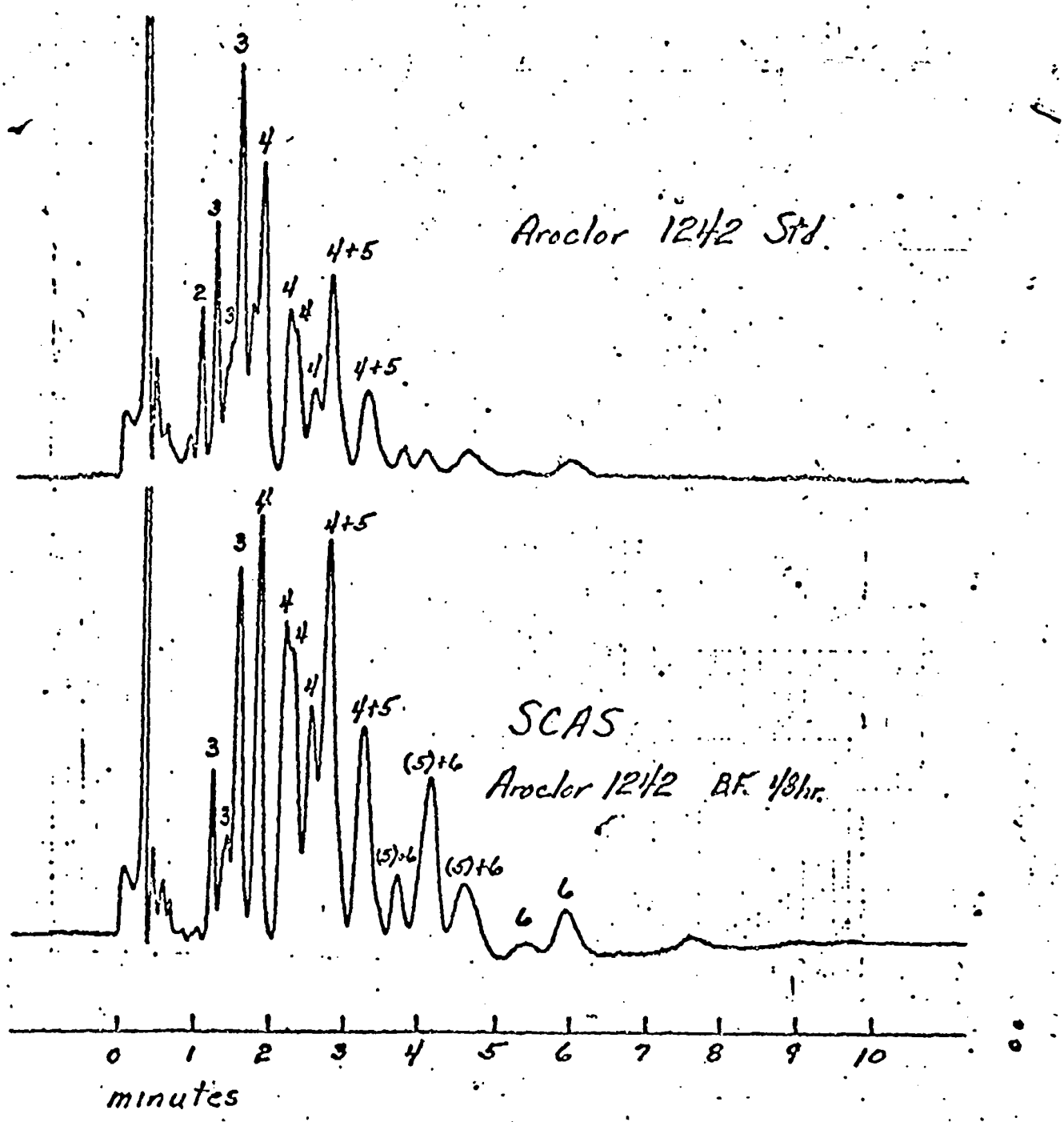
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