

Optical Remote Sensing: Glimpsing Future Enforcement of the Clean Air Act?

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Introduction

- Compliance as risk management
- A review of the tools
- Framing the legal debate
- Hurdles to using ORS
- Some paths forward



Remote Sensing Technologies

- DIAL, SOF, OP-FTIR, IR Camera, etc.
- These are not new technologies: OTM-10
- 2006 API questions use, not accuracy
- 2001 Shell Brochure:
“if you’re not measuring, you’re just guessing”
- DIAL/SOF testing at Swedish refineries

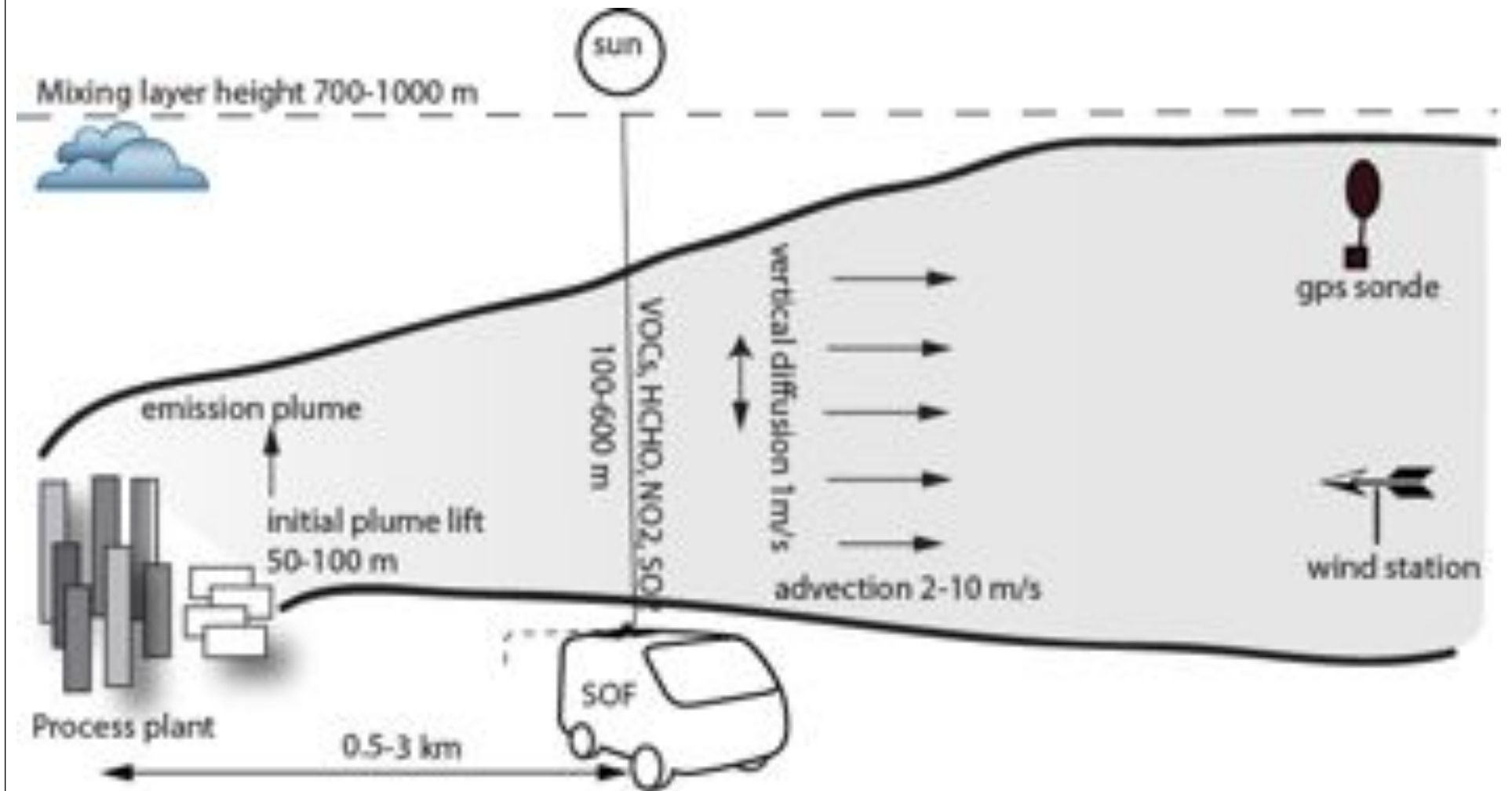
IR Camera



OP-FTIR Spectroscopy

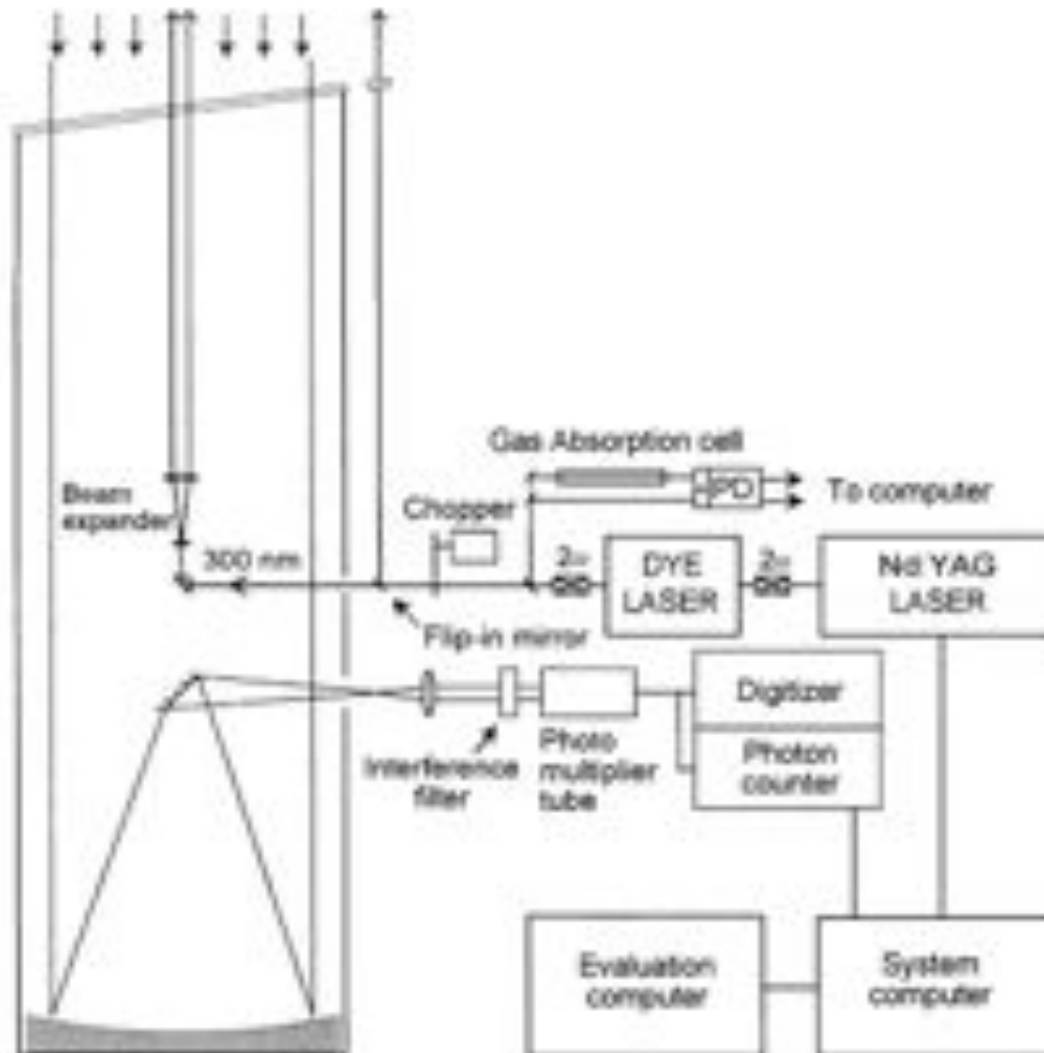


Solar Occultation Flux (SOF)





DIAL



ORS General Advantages

- More likely to identify emissions “hot spots” because measurements are collected over a large area
- Achieve better spatial and temporal emissions resolution
- No sample shipping costs
- Perform direct, measurement-based emission calculations
- Detection limits <1 ppm (DIAL “typically 50 ppb”)

ORS Disadvantages

- More costly initial investment and more costly to deploy
- Experienced manpower and higher site preparation
- Dependent on weather conditions (e.g., heavy rain, fog, dust)
- Dependent on chemical interferences (e.g., water, oxygen, O₃ and CO₂)

Current Situation

- EPA has broad enforcement mandate and information gathering powers
- GAO, National Research Council, EPAOIG, and others have criticized EPA's process for years
- July 18, 2012 EIP Notice of Intent to Sue
 - 42 U.S.C. § 7430: Review/revise every 3 years
 - Flares (21 years), wastewater treatment (14 years), and tanks (6 years)

The Role of AP-42 Factors

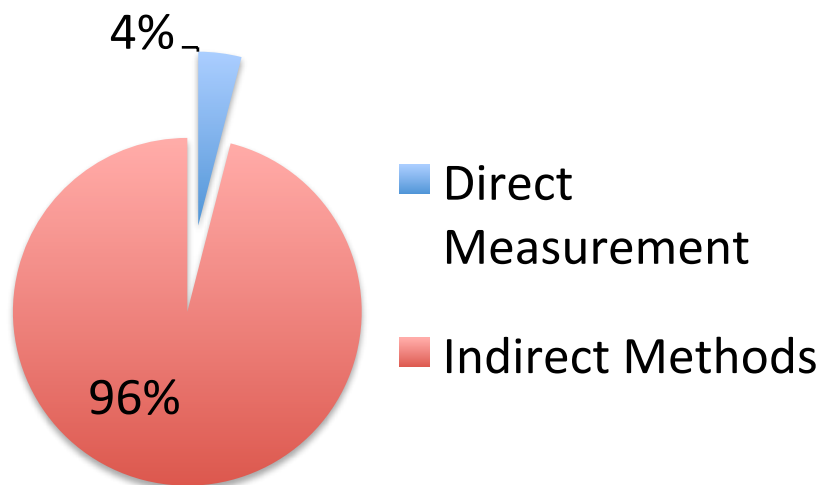
- “Emission factors in AP-42 are neither EPA-recommended emission limits...nor standards... Use of these factors as source-specific permit limits and/or as emission regulation compliance determinations is not recommended by EPA.”



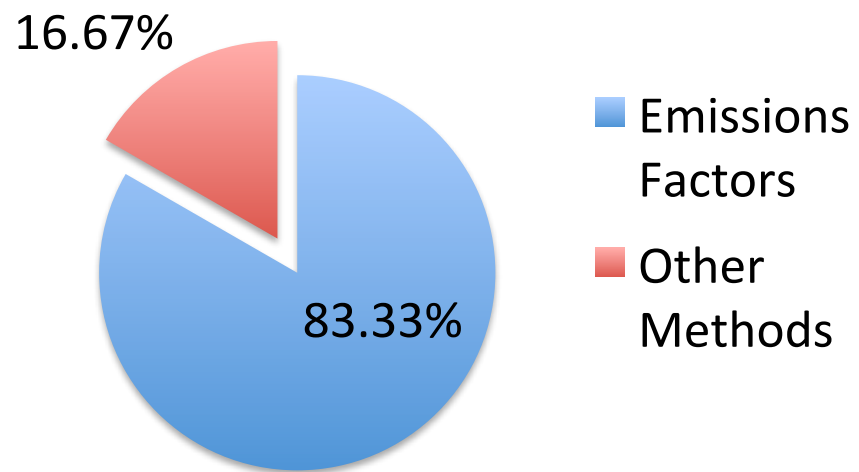
EPA OAQPS, COMPILATION OF AIR POLLUTANT EMISSION FACTORS, VOLUME I: STATIONARY POINT AND AREA SOURCES, Fifth Edition, Introduction (2005)

Emissions Factors in Reporting

All Reporting



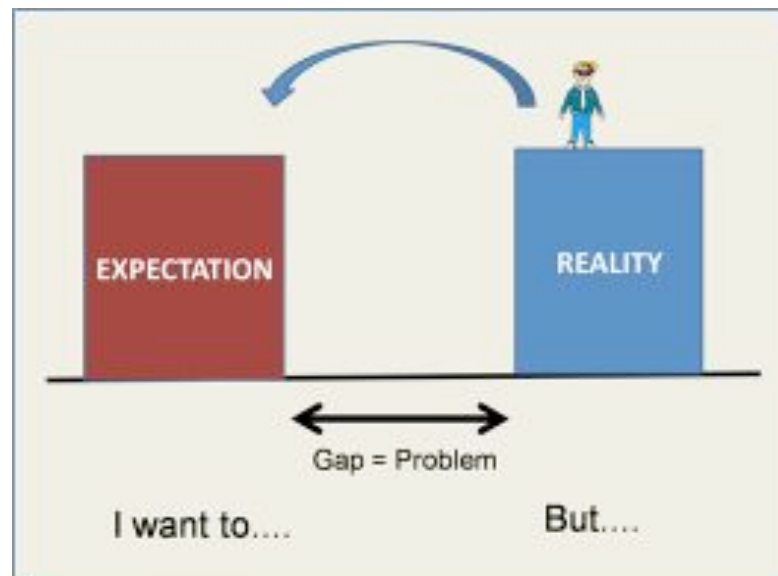
Reporting using Indirect Methods



Risk Exposure?

- “the existing emissions factors are often used for purposes for which they were not designed and for which they might not be scientifically defensible.”

MACTEC Federal Programs, Inc., Emissions Factors Program Improvement Efforts: Appendix B (2005)



EPA OIG Findings

- “EPA's use of poor quality emissions factors information has hampered environmental decisions, resulting in more than one million tons of uncontrolled emissions spanning years, and an increased risk of adverse health effects. This also places a disproportionate emissions reduction burden on those facilities that use good quality emissions factors.”



EPA OIG Uncertainty Analysis

Boiler Type	Emissions Estimate (NO _x Emissions)	Emissions Change Due to Factor Uncertainty		Emissions of Probable Emissions (tons)	
		Factor Uncertainty	Emissions Range (tons)	Low	High
Wall-fired	1,336,190	-41.4% to +33.2%	996,798	783,007	1,779,805
Tangential-Fired	751,581	-31% to 27%	435,917	518,591	954,508

EPA OIG, EPA CAN IMPROVE EMISSIONS FACTORS DEVELOPMENT AND MANAGEMENT (2006)

Developing AP-42 Factors

- Identification of test, process, and emissions factor data
- Collection of data
- Evaluation and rating of data
- Grouping data and calculating average emissions factor
- Assignment of emissions factor quality rating

Preparing an Emissions Factor

- Cost estimates
 - Revision: at least a year and costs \$30,000-50,000
 - Creation: same time at an average cost of \$100,000
 - Assumes “no significant data” submitted by reviewers

MACTEC Federal Programs, Inc., Emissions Factors Program Improvement Efforts: Appendix B (2005)

- Scope
 - As of 2004, there were over 17,000 rated EF's
 - 4,400 more unrated
 - Still not comprehensive

Data Quality Ratings

- A - Tests are performed by using an EPA reference test method, or when not applicable, a sound methodology
- B - Tests are performed by a generally sound methodology, but lacking enough detail for adequate validation.
- C - Tests are based on an unproven or new methodology, or are lacking a significant amount of background information.
- D - Tests are based on a generally unacceptable method, but the method may provide an order-of magnitude value for the source.

What Do We Know?



Emission Factor Ratings

- A = Excellent. Emission factor is developed primarily from A- and B-rated source test data taken from many randomly chosen facilities in the industry population.
- B = Above average. Emission factor is developed primarily from A- or B-rated test data from a moderate number of facilities.
- C = **Average**. Emission factor is developed primarily from A-, B-, and C-rated test data from a reasonable number of facilities. ... **it is not clear that the facilities represent a random sample of the industry.**
- D = Below average. Emission factor is developed primarily from A-, B- and C-rated test data from a small number of facilities, and there may be reason to suspect that these facilities do not represent a random sample of the industry.
- E = Poor. Factor is developed from C- and D-rated test data from a very few number of facilities, and there may be reason to suspect that the facilities tested do not represent a random sample of the industry.

Emission Factor Ratings

Emissions Factor Rating	EPA's Qualitative Description	March 1996		September 2004	
		Number	Percentage	Number	Percentage
A	Excellent	1,270	14%	2,135	12%
B	Above Average	1,190	13%	1,829	11%
C	Average	1,513	17%	2,619	15%
D	Below Average	2,077	24%	4,740	28%
E	Poor	2,788	32%	5,787	34%
U	Unrated			4,409	

AP-42 Problems

- Lack quality data on representativeness
- Simple averages: with a normal distribution 50% of facilities will emit above the factor
- Data ranges (e.g. data is 7-150 and EF is 45)
- No way to know how much uncertainty exists
- No way to know how to reduce uncertainty
- Assumes everything is working as it should

EPA 2009 FY Annual Plan

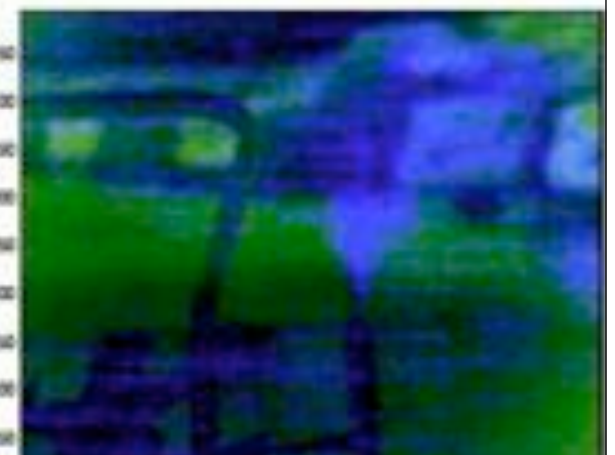
- Launched WebFIRE: combining AP-42 and FIRE data
- Conducted an analysis to determine the uncertainty of highly-rated emissions factors.
- Plan to allow users to verify background information for emissions factors.
- Plan to develop emissions factors for coke ovens, landfills, municipal waste combustors, steel mini-mills, landing losses for external floating roofs, low pressure petroleum storage tanks, natural gas engines, rubber manufacturers, and AFO's

2010 Shell Deer Park DIAL Study

- Used DIAL, FTIR, UV DOAS, and MAAML
- Used calibrated cylinder and other techs to check data
- Catalytic Reformer Unit VOC's comparable
- Southwest Tanks VOC's "off by a factor of 132"
- Benzene Extraction Unit benzene off by "factor of 5"
- Tanks south of BEU benzene off by "a factor of 93"
- Not an isolated result

Other Studies

- 2010 Texas Flare Study
- 2000 & 2006 TexAQS
- Alberta, Canada
- Europe
- Many others...



Enhance Monitoring & CER

- Title IV
- *Appalachian Power Co. v. EPA* (2000)
- Credible Evidence Rule (1998)
 - *Sierra Club v. Public Service Co. of Colorado* (1995)
 - *Unitek Env'tl. Servs. v. Hawaiian Cement* (1997)
 - *Clean Air Act Implementation Project v. E.P.A.* (1998)
 - *Seirra Club v. TVA* (2005)
 - *US v. San Diego Gas and Electric Co.* (2009)

Emerging ORS Tech and Law

- Getting results into court using the CER
- Does the data fit the rule?
- CER does not trump Federal Rules of Evidence
 - Rule 702
 - Rule 403
- Admissibility vs. weight
- Permit shields?



Practical Issues

- Most ORS systems provide time-slice data
- Need for predictability
- Regulatory ossification
- Self-inflicted wounds
- Cost



"Keep doing what you're doing and you'll keep getting what you're getting." –Unknown

Path I: Guidance

- OTM-10 Final ORS Protocol issued 6/14/2006
“The methodologies described in this protocol are appropriate for characterizing ground level area sources and non-point fugitive emission sources such as landfills, lagoons, and industrial complexes.”
- “any PI-ORS system that can provide PIC data”
- Recall *Appalachian Power*



Path II: Administrative Rule Making

- 42 U.S.C. § 7661c(b)

“The Administrator may by rule prescribe procedures and methods for determining compliance and for monitoring and analysis of pollutants regulated under this chapter, but continuous emissions monitoring need not be required if alternative methods are available that provide sufficiently reliable and timely information for determining compliance.”



Path III: Agreed Orders/Consent Decrees

- Both sides can bargain for terms
- Remove practical & legal barriers
- Require individual resolution
- Can't just ask for it



CONSENT BY RESPONDENT

Respondent hereby consents to the issuance and entry of the foregoing Order, without further notice, waives its right to a hearing herein as provided by law, and agrees to be bound by the provisions, terms and conditions contained herein. The undersigned represents and affirms that he or she has the legal authority to bind Respondent to the terms and conditions of this Order.

Path IV: Enforcement Outcomes

- 42 U.S.C. § 7413
“whenever, on the basis of any information available to the Administrator...”
- 42 U.S.C. § 7414
 - Records
 - Reports
 - Monitoring equipment
 - Sampling emissions



Tonowanda Coke Corp.

- Inspection finds violations (4/09)
- § 114 letter requiring DIAL (7/09)
- Tonowanda's response to §114 Letter (8/09)
- EPA rejects Tonowanda's arguments (10/09)
- Felony criminal cases (12/09)

“TCC's estimate of its facility-wide benzene mass emission rate using AP-42 emissions factors, which are not intended to be used for source-specific emissions estimates, does not substantiate TCC's claimed benzene emission rate of 6.038 tons per year.”

EPA letter to TCC dated 10/30/09 (citing language from slide 4)

Path V: Enforcement w/Data Gathering

- *Association of Irrigated Citizens v. EPA (2007)*
 - Uncertainty of actual emissions from AFO's
 - Consent Agreement: 70 FR 4958-01 (2005)
 - No admission of violation
 - Pay civil penalty
 - Fund 2-year study and monitoring
 - End-game compliance
 - Get limited covenant not to sue
- Can/should it be adapted?



Path VI: Outside Drivers

- Courts
 - *Massachusetts v. EPA*
 - EIP Notice of Intent to Sue
- Legislative agendas
- Ongoing research
 - Industry & Environmental community
 - Academics doing “pure research”
- Public response to major (or minor) incidents

Conclusions

- Managing compliance risks requires good data
- Use AP-42 estimations with an understanding of their strengths and weaknesses
- Technological innovation can/will change the weight assigned to evidence
- ORS is coming
- The real question is “How will we manage the transition?”

Questions?

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